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MIGRATION AND REMITTANCES – CASE STUDY ON ROMANIA

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ABSTRACT:
One of the most studied topics of each time in economics refers to the economic growth of a country and what causes it. There have been developed different theories throughout time and there have been questioned different possible relations between the growth rate and different variables. A highly debated causality refers to migration, remittances and growth, therefore, in this context, through this paper it is analysed the impact of remittances upon Romania's economy. The subject discussed is a very present-day issue that Romania is facing, so it is important to determine both the short-term and the long-term effects of the phenomenon. The paper builds mathematical models for testing the correlation between the growths of Romania (measured as GDP/capita).
KEYWORDS:
Migration, remittances, GDP/capita, growth, Romania, emigrants, foreign direct investments

1. INTRODUCTION

In the past couple of years migration has become a very hot topic of debate and analysis, as it is an ever growing component of contemporary society. It is considered a factor for stimulating global markets but also an instrument for regulating imbalances on the regional and local labour markets. Work related migration is today the most dynamic form of circulation.

One of the main positive consequences of international migration refers to remittances, financial transfers to the senders' country of origin, which are often seen as a compensation for the brain drain phenomenon and human capital outflow. Remittances increase the country's income from external sources and, as a result, not only does the living standard of the recipients grow but so does the level of local economic development, through consumption and investment. However, there isn't a consensus concerning their contribution to economic growth and new job creation.

In what concerns Romania, the transition period following 1990 led to significant restructuring, mainly throughout industrial markets. One can go as far as the disappearance of some industrial branches, bankruptcies and an overall destabilisation process for the country's economy in general. Financial problems led to a mass migration to countries like Italy or Spain. Temporary jobs abroad can be considered an adaptive strategy for almost 100% of Romanians. Once visas for EU entry were eliminated, labour related migration became one of the most important phenomena for social change in the country.

As for remittances, Romania is in the worldwide top ten and in the top at European level concerning the money sent by Romanians working abroad according to a UNDP (United Nations Development Programme) report of human development. Still, in the past 2 years remittances have significantly dropped for different reasons. As such this articles sets out to estimate the impact of this decrease.

2. METHODOLOGY AND DISCUSSION

2.1. FIRST STEPS – HOW THE PHENOMENON STARTED TO SPREAD

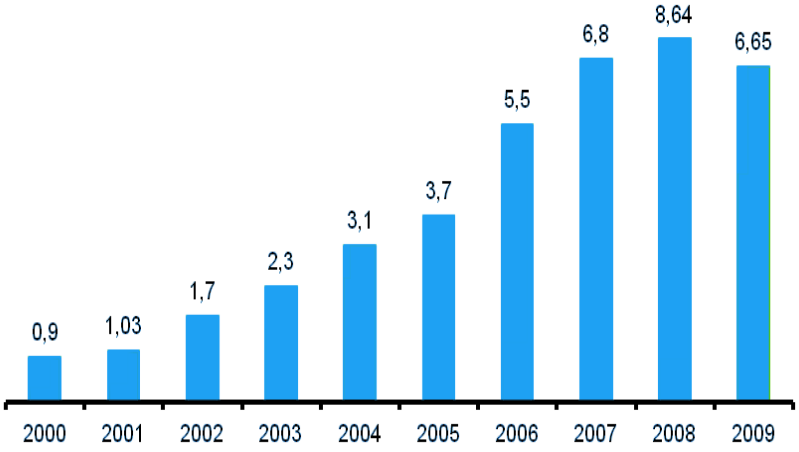
Migration has multiple causes, but the main one relates to the desire for financial comfort, and this is possible through emigration due to international wage differences. Other reasons wide spread in the Romanian society are the need for professional statement, the desire to provide a

bright future for children or just young people characteristic need for independence. The real number of the Romanian population that chose the path of migration at this time is not known. Figures and official records say that almost 900,000 people left. The data provided by a study done by Romanian Academic Society[2], quotes the International Labour Organization which states that "approximately 47% of Romanians who work abroad have not had legal forms of employment(2004)".

Italian and Romanian authorities estimate more than 2,000,000 Romanian immigrants. The fact is that in Italy, even if the exact numbers are not known, Romanians are first among legal immigrants (a total of 555,997 persons). The number of illegal immigrants is not known but it is estimated that it would only be around 1.5 million.

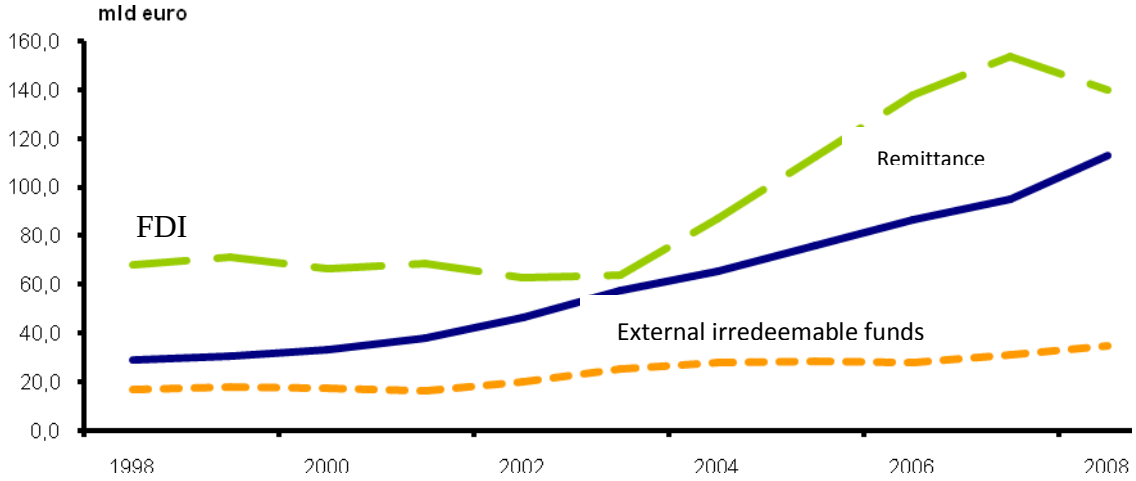
Romanian migrants, although neglected by the authorities, are becoming more potential agents of development. Their private transfers (remittances) increased significantly to 0.9 billion Euros in 2000, from 1.03 billion in 2001 to 5.5 billion Euros in 2006 and 6.65 billion in 2009. The peak was reached in 2008 with a value of EUR 8.64 billion (see Chart 1). Such transfers tend to exceed the volume of foreign investments in 2007, at around 7.1 billion Euros (according to National Bank). Better managed labour migration would stimulate social development concerning personal, family and community levels, leading to a reduced rate of unemployment and poverty.

In this chart we can easily see the evolution of remittances from 2000 until the year 2009. In the year 2009 there was a decrease in remittances due to the financial crisis. Estimates show a strong decrease in 2010. In this context, the most important question that arises is what will be the effect of a decrease in remittances on the Romanian economy on the short, medium and long term. There are no relevant studies to indicate those aspects which make this question a difficult problem to quantify.



Source: National Bank of Romania

Chart 1. The evolution of direct transfers (remittances in billion lei)



Note: The graph is computed at global level and it shows the external private funds that are sent to this countries

Source: Migrant remittances to developing countries[3]

Chart 2. External funding in developing countries

In Chart 2 we find an overview of the migratory phenomenon, which highlights the magnitude of the phenomenon at a global level. Developing countries are those that contribute most, with a rate of 87% of international migration, mainly because of poverty and low living standards. This chart is very relevant to link the main incoming funds in a country, i.e. non-reimbursable external funds, foreign direct investment and remittances. As can be seen from the chart, the level of remittances between 2003 and 2008 was very close to the level foreign direct investment, which means that the importance of remittances has increased dramatically in recent years.

The main cause for remittances is empathy, but the reasons behind these transfers can be classified thus:

- *endogenous* - those pertaining to migrants themselves, given an empathic attitude toward family and close ones back home. The level depends on the type of migration: temporary or permanent, migrant education and skills, etc)
- *exogenous* - those pertaining to the external environment, such as security in the transmission of funds, a reduction or cancellation concerning transfer charges, the geographical distribution of migrants and between differences in GDP between the country of origin and destination.

2.2. THE EFFECTS OF MIGRATION AND REMITTANCES

It's hard to find a phenomenon that can produce a more complex set of economic effects than migration on the countries from which people migrate. As remittances are the most visible result of migration, we take two independent phenomena. The image below illustrates the main economic impacts of migration and remittances, emphasizing the positive and negative effects (Figure 1)

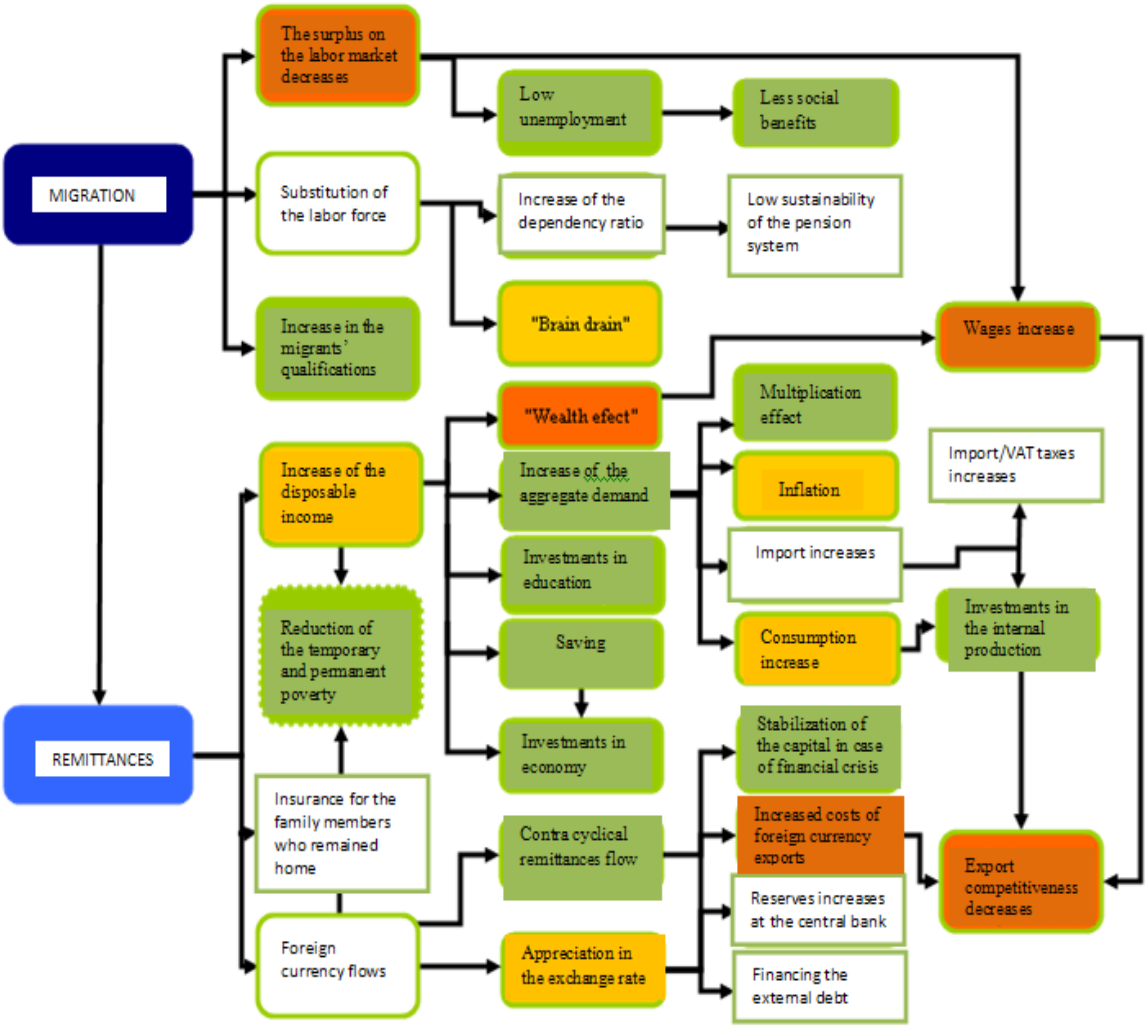


Figure 1. The economic effects of migration and remittances on the economy

Note: Green indicates the positive effects and orange the negative effects. Yellow represents the debatable elements in the branch literature.

Source: Alexandru Culiuc[4]

As observed in the graph presented above (Figures 1), remittances represent the second largest source of external financing after foreign direct investment (FDI) in the economy. Without this revenue, Romania's current account deficit would have been 21% by the end of 2008 instead of 16%. These remittances cover a shortfall of income, basic daily needs, ensure access to services, increase the standard of living and are believed to support growth in the country of origin of the worker. With the increase in imports generated by a consumer supported by remittances, and increased state budget revenues through import duties and taxes on consumption. At the same time, rising real interest rates and thus lowering the value of public debt, lower unemployment and hence the state-supported social services, benefit the country of origin of migrants.

Corresponding to the above, we can say that remittances are desirable in an economy and undoubtedly, remittances lead to a short-term positive impact by filling the needs of households participating in the scheme. The effects are further propagated in the economy through the multiplication effect - a large part of remittances is used to purchase goods and services. Three studies from different countries identify the values of this multiplier, ranging from 1.24 (Bangladesh - Stahl and Habib[5]) 1) to 3.2 (study from Mexico - and Taylor Adelman[6]).

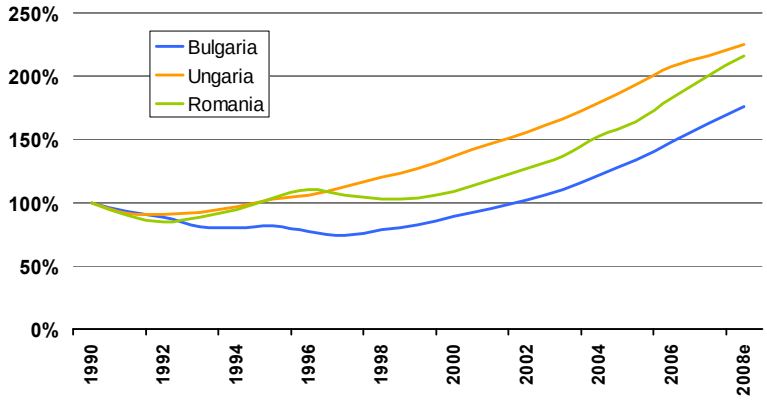
Looking at the long-term contribution of remittances to economic growth we find conflicting opinions in literature. As these foreign funds increase, officials record levels, and the academic community fails to reach a consensus on the long-term impact of remittances on the economy and its development. The link between remittances and economic development has been a constant topic of debate in recent decades between migration researchers. While some authors and organizations say that it has a positive impact by developing regions of origin, other researchers are more sceptical. In principle, if we consider the brain drain, migration process is one that adjusts itself. If we take a region that has a surplus labour market, it will undergo a migration process until the market in that region will reach equilibrium.

However, there are a substantial number of disadvantages produced by high remittances, such as: feeding inflation, reduced interest in work on behalf of the beneficiaries, the social impact on family members remaining in the country of origin. In 2005, 9% of all households in an independent study declared that they have at least one family member abroad. In 2007 around 14% of all households in Romania had migratory experience.

3. REMITTANCES AND ECONOMIC GROWTH

One way to assess the growth of a country is to measure the progress of GDP per capita. The chart below shows the comparative evolution of the indicator in Romania, Hungary and Bulgaria over the 1990 – 2008 period.

According to the graph above, we can say with certainty that the transition to a market economy had a positive effect on Romania's economic growth. But the question is how much did remittances contribute to this growth? Remittances help to influence the economy, and hence economic growth, through several channels of influence. An indicator that is part of GDP, and is influenced by direct transfers, is household consumption.

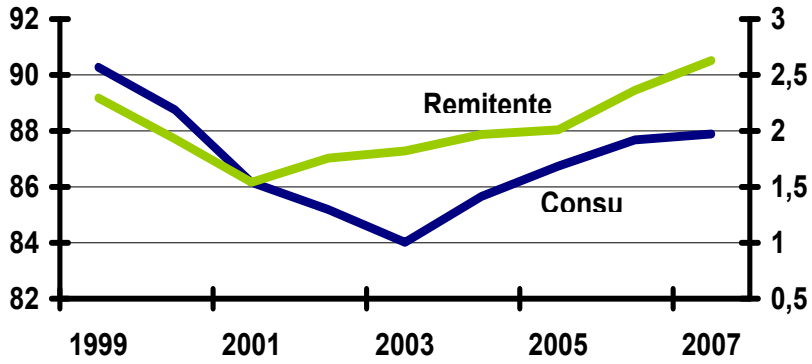


Source: IMF
Chart 3. GDP per capita PPC (1990=100%)

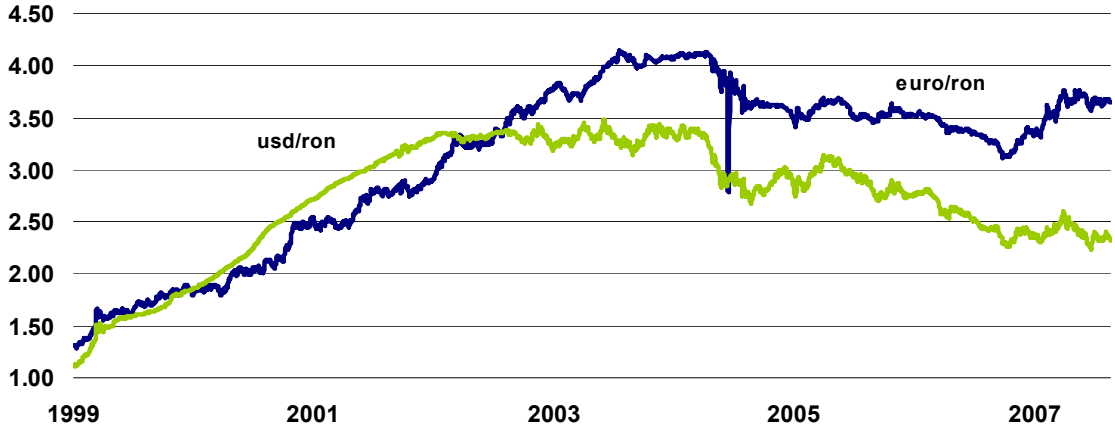
Increased consumption can directly affect the economy because a high aggregate demand stimulates domestic production. Thus, the economy grows. But we cannot speak for the large demand made on the basis of imports.

"Dutch disease" is another issue closely related to imports and exports which also takes the form through currency appreciation. The leu appreciated in the period 2004-2008, depreciating in 2009 and then stabilizing. Thus, one can say that the national currency follows the remittances trend, but we cannot say with certainty that this assessment is an effect caused by remittances.

In what follows, I tried to highlight the link between remittances and GDP per capita, using annual data over the period 1990-2006 for remittances, GDP per capita, FDI and the number of migrants. All the following correlations and regressions are made using the EViews 5 statistical package.



Source: IMF
Chart 4 Evolution of consumption and remittances (real values)



Source: National Bank of Romania
Chart 5. The evolution of the exchange rate

In the first instance, I made the chart below to illustrate the direct relationship between remittances and GDP per capita. As far as it can be seen, it would seem that there is a direct linear correlation between the two variables.

Through the simple univariate regression, using the method of least squares we obtained the data found in the table below. These data reinforce the assumption that between GDP per capita and remittances there is a direct linear correlation. The high R-squared (0.9325) shows how much variation can be explained by variation of GDP/capita by remittances and zero values for samples and F-statistic indicates the validity of the model and that the two coefficients are statistically significant.

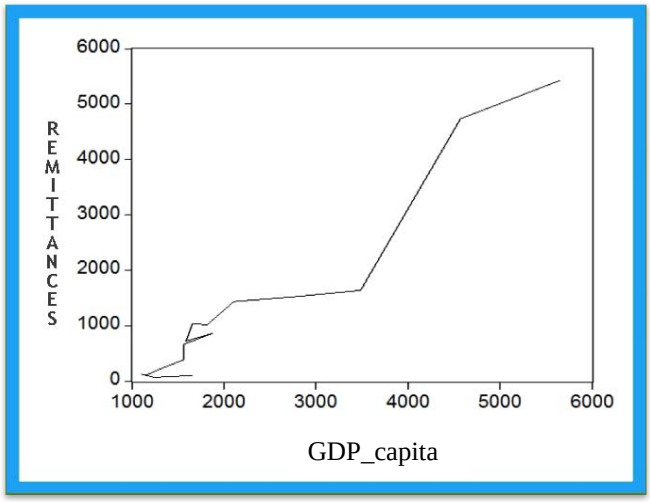


Chart 6 Correlation between GDP/capita and remittances

By slightly complicating the model, we want to see how much of the growth is due to remittances, foreign direct investment, namely the number of emigrants. For this, we used a multivariate regression, with GDP per capita as dependant variable and FDI and the number of migrants as independent variables.

It is noted that the parameter is statistically significant number for only 10% level of significance, but for $\alpha = 0.05$, this is not statistically significant. In this model, the greatest influence on economic growth is due to, as expected, foreign direct investment. The influence of the number of immigrants is very low.

Table 1. Univariate simple regression between GDP per capita and remittances
Dependent Variable: GDP_CAPITA
Method: Least Squares
Sample: 1990 2006
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMITTANCES	0.795212	0.055205	14.40459	0.0000
C	1187.173	106.4590	11.15146	0.0000
R-squared	0.932582	Mean dependent var		2154.437
Adjusted R-squared	0.928087	S.D. dependent var		1270.151
S.E. of regression	340.6104	Akaike info criterion		14.60949
Sum squared resid	1740232.	Schwarz criterion		14.70751
Log likelihood	-122.1806	F-statistic		207.4921
Durbin-Watson stat	1.871687	Prob(F-statistic)		0.000000

Table 2 Multivariate regression between GDP per capita and remittances, FDI and number of emigrants

Dependent Variable: GDP_CAPITA
Method: Least Squares
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Sample: 1990 2006
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMITTANC	0.491389	0.112900	4.352437	0.0008
FDI	4.190867	1.327508	3.156943	0.0076
EMIGRANTS	0.006020	0.003390	1.776025	0.0991
C	1017.110	127.5061	7.976951	0.0000
R-squared	0.964627	Mean dependent var		2154.437
Adjusted R-squared	0.956464	S.D. dependent var		1270.151
S.E. of regression	265.0217	Akaike info criterion		14.19982
Sum squared resid	913074.2	Schwarz criterion		14.39587
Log likelihood	-116.6985	F-statistic		118.1696
Durbin-Watson stat	1.323489	Prob(F-statistic)		0.000000

Trying to improve the model, we removed the number of migrants from the variables. We obtained a model that explains the GDP per capita variable proportion of 95.6%, both parameters being statistically significant for a significance level of $\alpha = 0.05$.

Table 3. Multivariate regression between GDP per capita, remittances and FDI
Dependent Variable: GDP_CAPITA
Method: Least Squares
Sample: 1990 2006
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMITTANCES	0.488657	0.121264	4.029700	0.0012
FDI	3.859385	1.411826	2.733611	0.0162
C	1189.265	88.98187	13.36525	0.0000
R-squared	0.956044	Mean dependent var		2154.437
Adjusted R-squared	0.949764	S.D. dependent var		1270.151
S.E. of regression	284.6826	Akaike info criterion		14.29941
Sum squared resid	1134619.	Schwarz criterion		14.44645
Log likelihood	-118.5450	F-statistic		152.2497
Durbin-Watson stat	1.222042	Prob(F-statistic)		0.000000

4. CONCLUSIONS

There are many studies on migration and remittances, but most of them deal with the short-term effects of these phenomena. There is a long debate regarding long-term effects and conflicting results in different places.

In my opinion, through a rigorous economic analysis we could establish long-term effects of remittances at the local level, but generalising the results for all countries is extremely difficult if not impossible, due to differences that occur from country to country .

In the present study, it was tested if there is a link between the amount of remittances and GDP per capita and calculated its power and sense of connection. There were also taken into account two other factors, FDI and the number of migrants. The result is that in Romania, for the set of data from the period 1990-2006, FDI and remittances strongly influence the value of GDP per capita, whereas the impact of the number of migrants is not significant. Since the estimated relationship between GDP per capita and remittances is direct and linear in the period following the decrease of remittances, we can expect a decrease in GDP/capita to a certain extent due to reduced remittances.

In the short term, reduced remittances will lead to a lower level of consumption, leading to a decrease in state revenue (lower import duties and taxes on consumption). There are also chances of an increased budget deficit, which is not desirable, especially taking into consideration external debt, which should cover it. However, on the long term, with the decrease in remittances, inflation is no longer threatened if the other conditions remain the same.

As with any economic process, there is a trade-off between short and long term even between different phenomena such as inflation and unemployment characterized by the Phillips curve. What matters, ultimately, is achieving a balanced state, identifying the optimal level for both long term and short-term ones.

In conclusion, I believe that a certain level of remittances is good for any developing economy, but when this level is exceeded and constantly becomes higher, it can become a risky phenomenon on the long term.

ANNEX

The data used for the regression can be found in the tables bellow and was taken from the National Institute of Statistics, Eurostat and IMF websites.

Obs	PIB/CAPITA ($)	REMITTANCES (mil $)	FDI MIL LEI PRICES 1990	EMIGRANTS (no. people)
1990	1650.330	102.0000	0.000000	96929.00
1991	1244.200	69.00000	1.750000	44160.00
1992	1100.980	122.0000	4.270000	31152.00
1993	1158.480	116.0000	3.750000	18446.00
1994	1322.980	234.0000	6.290000	17146.00
1995	1564.180	392.0000	7.200000	25675.00
1996	1562.880	613.0000	9.340000	21526.00
1997	1564.510	662.0000	8.470000	19945.00
1998	1871.550	858.0000	6.930000	17536.00
1999	1584.840	722.0000	9.270000	12594.00
2000	1650.970	1024.000	124.3700	14753.00
2001	1815.500	1019.000	149.9000	9921.000
2002	2101.740	1437.000	126.9800	8154.000
2003	2736.970	1517.000	170.9300	10673.00
2004	3481.200	1640.550	256.6700	13082.00
2005	4568.880	4733.000	306.2800	10938.00
2006	5645.240	5417.564	440.8700	14197.00

REFERENCES

[1.] Ratha Dilip (2003), „Worker Remittances: An Important and Stable Source of External Development Finance", in *Global Development Finance: Striving for Stability in Development Finance*, Washington, DC: International Monetary Fund

[2.] Analysis and Prognosis Report, edited by Romanian Academic Society

[3.] Global development finance – edited by World Bank, International Monetary Fund – balance of payments

[4.] Integrating migration and remittances into a development strategy. The case of Moldova, Alexandru Culuic, 2006.

[5.] The Impact of Overseas Workers' Remittances on Indigenous Industries: Evidence from Bangladesh, The Developing Economies, Stahl and Habib, 1989.
[6.] Is structural adjustment with a human face possible? The case of Mexico, Journal of Development Studies, Adelman si Taylor, 1992.
[7.] İnsan Tunali, "Rationality of Migration", International Economic Review, Vol. 41, No. 4 (Nov., 2000), pp. 893-920, Published by: Blackwell Publishing for the Economics Department of the University of Pennsylvania and Institute of Social and Economic Research -- Osaka University
[8.] World Investments Report 2009, Transnational Cooperation, Agricultural Production and Development, United Nations, New York and Geneva, 2009
[9.] www.bnr.ro
[10.] www.insse.ro
[11.] ec.europa.eu/eurostat
[12.] www.imf.org

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DECISION MAKING AND BUSINESS INTELLIGENCE SOLUTIONS

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ABSTRACT:
Good decision making is as important in the working world as it is in the rest of our lives. Every day a number of decisions must be made that determine the direction and efficiency of the organizations we work for. Decisions are made concerning production, marketing, and personnel. Decisions are made affecting costs, sales, and margins. The key to organizational success is to make good choices. This paper highlights the relevance of business intelligence solutions within an effective decision making process. Business intelligence is not just technology, nor is it just practices and methods. It is more a combination of the best of both the business world and the technical world – using advanced algorithms and data management techniques to better implement the way a business works. The authors aim to provide a knowledge base for the decision maker to determine the value of integrating these kinds of technologies into the company and to offer a clear explanation of the utility of this technology.
KEYWORDS: business analysis, decision support, dashboard

1. INTRODUCTION

Most real life problems are complex and multi-facet, and involve many criteria in the decision making process. Automated tools and systems for decision support are always in demand. Business intelligence is a window to the dynamics of a business. It reveals the performance, operational efficiencies, and untapped opportunities. Business intelligence (BI) is a set of technologies and processes that allows people at all levels of an organization to access, interact with and analyse data to manage the business, improve performance, discover opportunities, and operate efficiently (Loshin, 2003; Howson, 2007).

Used effectively, business intelligence allows organizations to improve performance. Business performance is measured by a number of financial indicators such as revenue, margin, profitability, cost to serve, and so on (Larson, 2008). In marketing, performance gains may be achieved by improving response rate for particular campaigns by identifying characteristics of more responsive customers. Eliminating ineffective campaigns saves companies millions of euros each year.

Business intelligence allows companies to boost revenues by cross-selling products to existing customers. Accounting personnel may use BI to reduce the aging of accounts receivable by identifying late-paying customers. In manufacturing, BI facilitates gap analysis to understand why certain plants operate more efficiently than others. In all these instances, accessing data is a necessary first step. However, improving performance also requires people's interaction to analyse the data and to determine the actions that will bring about improvement.

This paper underlines the importance of considering business intelligence tools as a solution that transforms the mountains of raw data within an organization into valuable information that is understandable and useful to decision makers. The authors focus on the benefits of multidimensional analysis and on the competitive advantage that intelligent technologies can bring to businesses and detail on the impact of BI solutions for both executive and operational personnel. The paper considers at the same time the current limitations of business intelligence solutions and also the fact that measuring the business impact of business intelligence can be difficult as improvements in performance are attributable to factors beyond business intelligence.

2. BUSINESS VALUE THROUGH BUSINESS INTELLIGENCE

An effective decision makes the difference between the success and the failure of an organization. The key ingredients necessary for making effective decisions can be summarized as follows (Larson, 2008):

- determine a set of goals to work towards;
- define ways to measure whether a chosen course is moving towards or away from those goals; and
- provide the information based on those measures to the decision maker in a timely manner.

Information technology (IT) plays a significant role in our business life, making everything more connected, faster, mobile, potentially more efficient, and at the same time more demanding for the average users (Stănescu & Chețe, 2009; Turban et. al, 2010). The latest IT developments include business intelligence tools that aim to enhance the decision making process on all the levels of a company and allow employees to improve their overall performance in their daily work.

2.1 Business success through BI Tools

Business intelligence means different things to different people. To one businessperson, business intelligence means market research; to another person, accessing a static report; others will use terms such as business analytics or decision support. In its most basic sense, business intelligence provides managers information to know what is going on in the business. Without business intelligence managers may talk about how they are "flying blind" with no insight until quarterly financial numbers are published. With business intelligence, information is accessible on a timelier and more flexible basis to provide a view of:

- how sales are tracking in various regions and by various product lines;
- if expenses are on plan or running over budget;
- if warehouse capacities are at optimal levels;
- if sales pipelines are where they should be.

Business intelligence does not address only to managers, and cuts across all functions and all industries. BI interacts with any employee of a company and beyond to customers and suppliers (Moss & Atre, 2003). When any particular metric is not where it should be, business intelligence allows users to explore the underlying details to determine why metrics are off target and to take action to improve the situation. In the past, if managers monitored the business via paper-based reports, they had no flexibility to explore why the business was operating a certain way.

For example, many companies use BI to monitor expenses to ensure costs do not exceed budgets, rather than waiting until the close of the quarter to discover that excessive expenses have reduced profitability, timely access to expense data allows managers first to identify which business unit is over budget and then to take immediate action to reduce overtime pay or travel expenses, or to defer purchases (Vercellis, 2009).

Successful BI initiatives provide businesspeople with the information they need to do their jobs more effectively and they result in (Vitt et. al, 2002; Howson, 2007):

- Increased profitability;
- Decreased costs;
- Improved customer relationship management (CRM); and
- Decreased risk.

These goals can be achieved when the BI technologies available to organizations are used to positively impact organizational behaviour. The success of BI initiative depends on the level of technology acceptance among the employees of a company and is built upon a long-term strategy. No matter how complex a BI solution is, it is still up to the people to use it. The employees need to become aware of the impact that BI tool can have on their work and gradually integrate them in their activity.

2.2 BI Solutions in Practice

Business intelligence tools provide monitoring, performance analysis and effective business planning by providing a tool for rapid data access, while the time saved can be used to identify solutions and act on the data obtained.

2.2.1 The Executive Director

The Executive Director of a company must ensure that employees are aligned with the business strategy, must be able to analyse the regular progress in comparison with the business objectives and must be able to easily and continuously monitor performance at the company level.

Companies currently develop an annual plan because the development a plan on a shorter interval of time is proving too costly and complex. Executive Directors must assume the role of a guide to other decision makers so that they can effectively carry out their work, be responsible for their work, in relation to the general objectives of the company.

BI Solutions allows the Executive Directors to:

- **Align business operations at the company level**: The detailed overview, the updated dashboard and scorecards allow users to align their actions with strategic objectives. All users can learn about the business and developers can collaborate more effectively using analysis and detailed contextual information obtained on the basis of structured and unstructured information.
- **Support responsibility**: Users may assume responsibility for the results of an evaluation sheet, drawing the responsibility and organization-wide alignment.

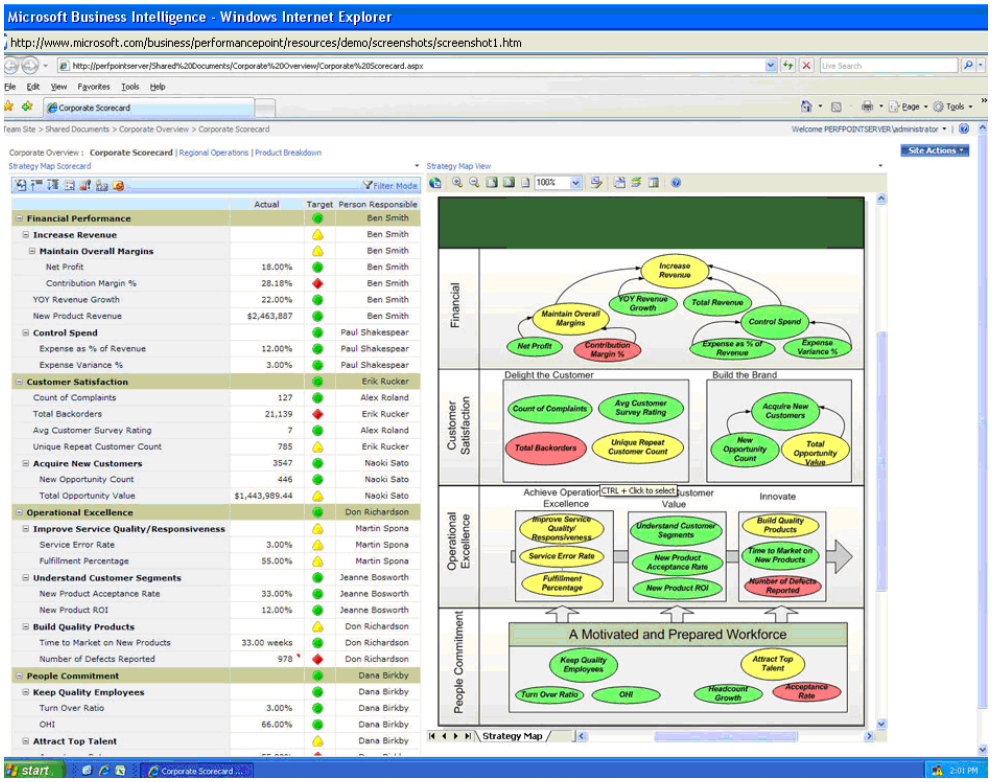

Figure 1. The integration of financial intelligence mechanisms

2.2.2 The Financial Manager

The activity undertaken within a company is based on many financial data. This makes the quality and continuity of data extremely important. The financial manager must be able to rely on the information used is accurate and can be used in internal and external reports. Currently, reports are done mostly manually, consuming time and present the risk of presenting wrong data.

The implementation of a BI solution provides access to regular updates of the performance indicators monitored by financial managers, helping them to respond promptly to a changing business environment and allowing the decision makers on the last hierarchical level to take effective decisions.

The financial manager can:

- **Monitor, analyse and plan using an integrated solution**: Evaluation sheets and KPIs reflect changes to the planning, budgeting and forecasting, which occur in real time by helping policy makers to understand the levers of business operation, challenges and opportunities.
- **Integration of advanced solutions for financial intelligence**: BI solutions provide mechanisms to ensure the consolidation and standardization of business logic, including foreign exchange for various currencies, intercompany agreements and allocations on multiple levels. The product also allows customization of business rules, calculations and assumptions.
- **Obtaining a full picture of business**: Users can easily integrate information from multiple sources (internal and external) and multiple versions of planning and budgets in a single plane to facilitate analysis and reporting.
- **Support the consistency of the performance management process**: Real-time calculations and business rules managed at server level allow users to manage processes and consistent data allows them to simplify multiple budgets. Data entry forms, workflow, data transmission, approval, templates and other forms facilitate the standardization of planning, budgeting and forecasting processes.

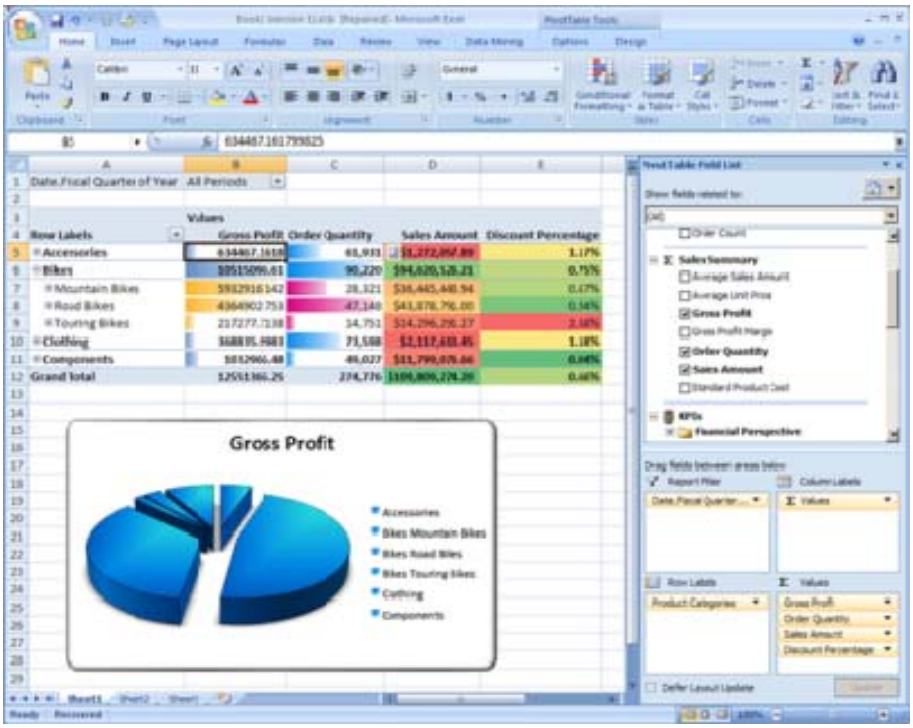

Figure 2. Ad-Hoc Reporting with Microsoft Excel and OLAP

2.2.3 The Analyst

The analysts support the planning process within a company and are those who analyse data in order to identify ways in which efficiency can be improved. The analysts need an easy to use tool that allows them to spend less time on collecting data and more time on analysing them. By using BI solution, analysts can:

- Obtain very detailed data: Users can obtain data with a high level of detail, from which they can make better decisions faster.
- Carry out complex analysis: BI solutions enable data acquisition from multiple sources and prepare them to be used in different contexts, facilitating data mining and analysis of the causes that drew decreases or increases in performance.
- Perform predictive analysis: Users can access data mining models from the SQL Server, enabling them to the develop forecasts and analyze trends.
- Model different scenarios: Users can build and can replicate the business model to implement different scenarios and methodologies, such as analysis of "what if" and modelling to maximize the profit.

2.3 How BI provides business value

The business intelligence infrastructure allows the implementation of business information on a secure, scalable, qualitative platform and allows a company to (Stănescu & Ştefan, 2010; Kimball & Ross, 2010):

- benefit of data integration facilities. The SQL Server 2005 Integration Services (SSIS) carry out the full integration, transformation and synthesis of large volumes of data at high speeds.
- ***develop complex analytical models that can be included in business applications***. Data search capabilities and online analytical processing (OLAP) of the SQL Server 2005 Analysis Services make searching for data more accessible in an environment with enhanced security.
- ***develop comprehensive and complete reporting solution***. Using SQL Server 2005 Reporting Services it is possible to create, manage and deliver both traditional printed reports and also Web-based, interactive reports.
- ***use the relational database engine, which is scalable and secure***. The relational database management system, SQL Server 2005, sustains performance improvement and support for structured and unstructured XML data, as well as verified performance and availability.
- ***use a rich and familiar development environment***. The integration with Microsoft Visual Studio 2005 provides developers with a platform that enables productive development and secured collaboration solutions

3. CONCLUSIONS

The key to win in the Information Age is making decisions that are consistently better and faster than the competition. Business intelligence is an approach to managing business that is dedicated to providing competitive advantage through the execution of fact-based decision making. This paper presents the business intelligence technology as a mean to achieve this goal by applying a decision-making cycle of analysing information, gaining insight, taking action, and measuring results. The authors underline the fact that technology enables business intelligence, but it is the people that interpret and act on the information. Business intelligence it is not only about the technology, but also about creativity, culture, and whether people view information technology as a critical asset.

The implementation of today's information management is limited to providing mostly analysis of financial data and such approaches do not cover the area of knowledge management systems. The authors aim to extend their research and identify solutions that facilitate real-time availability of know-how in desktop and merging mobile environments.

REFERENCES

[1.] Larson, B. (2008). Delivering Business Intelligence with Microsoft SQL Server 2008, McGraw-Hill Osborne Media.
[2.] Loshin, D. (2003).Business Intelligence: The Savvy Manager's Guide (The Savvy Manager's Guides), Morgan Kaufmann.
[3.] Howson, C. (2007). Successful Business Intelligence: Secrets to Making BI a Killer App, McGraw-Hill Osborne Media.
[4.] Kimball R. & Ross, M. (2010). The Kimball Group Reader: Relentlessly Practical Tools for Data Warehousing and Business Intelligence, Wiley.
[5.] Moss, L. & Atre, S. (2003). Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications, Addison-Wesley Professional.
[6.] Stănescu I.A. & Chete G.C. (2009). Knowledge Enriched Decisional Environments, published in the ISI proceedings of the 15th International Scientific Conference "Knowledge Based Organization" – KBO, Sibiu, Romania, November 28-29, 2009.
[7.] Stănescu I.A. & Ştefan A. (2010). Web-Based Knowledge-Driven Decision Support Systems, published in the ISI proceedings of the 12th LSS Symposium, Large Scale Systems: Theory and Applications, Villeneuve d'Ascq, France, July 11-14, 2010.
[8.] Turban, E., Sharda R., Delen D. & King, D. (2010). Business Intelligence, Prentice Hall.
[9.] Vercellis, C. (2009). Business Intelligence: Data Mining and Optimization for Decision Making, Wiley.
[10.] Vitt E., Luckevich M. & Misner S. (2002). Business Intelligence: Making Better Decisions Faster, Microsoft Press.

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IMPLEMENTATION OF TOTAL PRODUCTIVE MAINTENANCE

[1.] S.C. REVA S.A. SIMERIA, ROMANIA

ABSTRACT:
Total Productive Maintenance (TPM) is a system of maintenance covering the entire life of the equipment in every division including planning, manufacturing and maintenance. Because of its targeted achievement to increase productivity out of the equipment, the term Total Productive Maintenance is sometimes known as Total Productivity Management.
KEYWORDS:
Maintenance, TPM, equipments, productivity

1. INTRODUCTION

In modem day manufacturing and service industries, improved quality of products and services increasingly depend on the features and conditions of organizations'equipment and facilities. In the late 70's, there was heavy snow in Sapporo, the northern-most island of Japan. Because the workers could not get to work, Matsushita's vacuum cleaner factory stood still. Mr. Matsushita thought, „Can we not rely on our workers for production?" A year later, the first unmanned-factory in the world was born. As the production relied 100% on equipment, Total Productive Maintenance became mandatory. Today, there are many similar examples such as Fujitsu-Fanuc, the world's most advanced unmanned-factory, which uses reliable computer controllers for manufacturing automation. Likewise super-computers run 24 hours a day all over the world to provide uninterrupted services to the banking, finance, air-flight, hotel, tourist, telecommunication and other service industries. However, this would not be possible without Total Productive Maintenance.

Total Productive Maintenance is a program for fundamental improvement that involves the entire human resources. When implemented fully, Total Productive Maintenance dramatically improves productivity and quality and reduces costs. As automation and laborsaving equipments take production activities away from humans, the condition of production and office equipments increasingly affects output quality, cost, delivery, health and safety, and employee morale. In a typical factory, however, many pieces of equipment are poorly maintained. Neglected equipment results in chronic losses and time wasted on finding and treating the causes.

Both operations and maintenance departments should accept responsability of keeping equipments in good conditions. To eliminate the waste and losses hidden in a typical factory environment, we must acknowledge the central role of workers in managing the production process. No matter how thoroughly plants are automated or how many robots are installed, people are ultimately responsible for equipment operation and maintenance. Every aspect of a machine's performance, whether good or bad, can be traced back to a human act or omission. Therefore no matter how advanced the technology is, people play a key role in maintaining the optimum performance of the equipment.

When company employees accept this point of view, they will see the advantage of building quality into equipment and building an environment that prevents equipment and tools from generating production or quality problems. This company-wide team-based effort is the heart of Total Productive Maintenance. It represents a dramatic change from the traditional „I make-you fix" attitude that so often divides workers. Through Total Productive Maintenance, everyone cooperates to maintain equipment the company depends on for survival and ultimately for

profitability. The goal of Total Productive Maintenance is to increase the productivity of plant and equipments. Consequently, maximized output will be achieved through the effort of minimizing input-improving and maintaining equipments at optimal levels to reduce its life cycle cost.

2. THE STUDY

The Japan Institute of Plant Maintenance runs the annual Productive Maintenance Excellence Award and they provide a checklist for companies applying for the award. There are 10 main items in the checklist:

a. Policy and objectives of Total Productive Maintenance.
b. Organization and operation.
c. Small-group activities and autonomous maintenance.
d. Training.
e. Equipment maintenance.
f. Planning and management.
g. Equipment investment plans and maintenance prevention.
h. Production volumes, scheduling, quality and cost.
i. Safety, sanitation and environmental conservation.
j. Results and assessments.

How to Implement the Total Productive Maintenance:

a. Element losses based on project teams organized by the production, maintenance, and plant-engineering departments.
b. Planned maintenance carried out by the maintenance department.
c. Autonomous maintenance carried out by the production department in seven steps.
   Step 1: Initial cleaning
   Step 2: Actions to address the causes and effects of dust and dirt
   Step 3: Cleaning and lubrication standards
   Step 4: General inspection training
   Step 5: Autonomous inspection
   Step 6: Workplace organization standards
   Step 7: Full implementation of autonomous maintenance
d. Preventive engineering carried out mainly by the plant-engineering department.
e. Easy-to-manufacture product design carried out mainly by the product design department.
f. Education and training to support the above activities.

Total Productive Maintenance can be successful in achieving significant results only with universal cooperation among all constituents involved with the six activities listed above. Once a decision has been made to initiate Total Productive Maintenance, company and factory leadership should promote all six of these activities despite excuses that may come from various quarters.

Through these activities, the company can gradually eliminate the losses, establish a more effective relationship between operators and machines, and maintain equipment in the best possible condition.

The continuous request that managers provide better customer service, improve space comfort, supply reliable mechanical and electrical energy performance, and to do so at no more cost than last year's operating budget. Overall, this fresh look at how building operation and maintenance is done is a very good idea.

Today's economic and competitive environment requires that industry sustain full production capabilities and minimize capital investment. From the maintenance perspective, this means finding ways to maximize equipment reliability and up time, and extend plant and equipment life through cost effective maintenance. To achieve these objectives, industry must move away from the traditional reactive maintenance mode and move to proactive maintenance and management philosophies. Maintenance processes that fully address the program and technical concerns of maintenance must be adopted and the process must realize the value of integration, engineering, planning and quality. Such change requires a complete shift in the maintenance approach. Total Productive Maintenance is such an approach.

Total Productive Maintenance is based on the premise that effective maintenance requires that the elements of maintenance be defined, operational and interactive. The phases and concepts to implement the Total Productive Maintenance in a dependent or independent maintenance facility (figure 1).

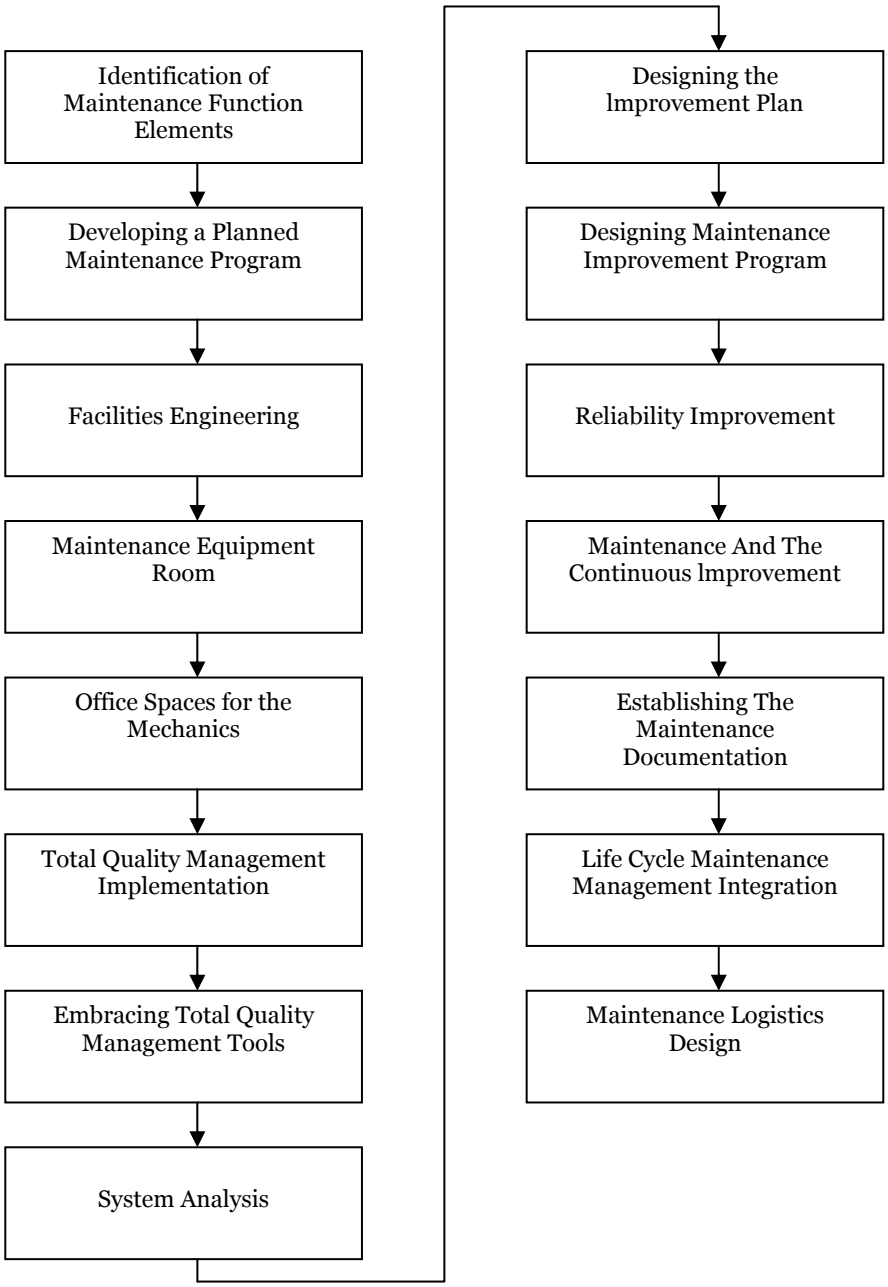

Figure 1. Total Productive Maintenance Implementation Phases

One of the difficulties in implementing TPM as a methodology is that it takes a considerable number of years. The time taken depends on the size of the organization. There is no quick way for implementing TPM. This is contradictory to the traditional management improvement strategies. Following are the other difficulties faced in TPM implementation:

- Typically people show strong resistance to change.
- Many people treat it just another „Program of the month" without paying any focus and also doubt about the effectiveness.
- Not sufficient resources (people, money, time, etc.) and assistance provided.
- Insufficient understanding of the methodology and philosophy by middle management.
- TPM is not a „quick fix" approach, it involve cultural change to the ways we do things.
- Departmental barrier existing within Business Unit.
- Many people considered TPM activities as additional work/threat.

3. CONCLUSIONS

Total Productive Maintenance is a maintenance and management philosophy that advocates planning all maintenance (i.e., preventive, predictive, corrective and inactive) and the control of quality in maintenance. It is a concept that addresses both programmatic and technical concerns of maintenance and considers maintenance an integrated function rather than a specific activity. Today, with competition in industry at an all time high, TPM may be the only thing that stands between success and total failure for some companies. It has been proven to be a program that works. It can be adapted to work not only in industrial plants, but also in construction, building maintenance, transportation, and in a variety of other situations. Employees must be educated and convinced that TPM is not just another „Program of the month" and that management is totally committed to the program and the extended time frame necessary for full implementation. If everyone involved in a TPM program does his or her part, an unusually high rate of return compared to resources invested may be expected.

REFERENCES

[1.] Hartmann, Edward, Maintenance Management, Norcross, Georgia, Industrial Engineering and Management Press, pp3-239, 1987.
[2.] Maggard, Bill N., P.E., TPM That Works, Allision Park, PA, TPM Press, Inc., pp7-123, 1992.
[3.] Moubray John, Maintenance Management - A New Paradigm, Maintenance, Volume, 11, n° 1, 1996.
[4.] Niebel, Benjamin W., Engineering Maintenance Management, New York, N.Y., Marcel Dekker, Inc., pp 123-197, 1985.
[5.] Robinson, Charles J., Ginder, Andrew P., Implementing TPM, Productivity Press, Portland Oregon, 1995.
[5.] http://www.plant-maintenance.com/maintenance_articles_tpm.shtml.
[6.] http://www.maintenanceresources.com.
[7.] http://www.reliabilityweb.com.

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RELIABILITY-CENTERED MAINTENANCE (RCM)

[1.] S.C. REVA S.A. SIMERIA, ROMANIA

ABSTRACT:
RCM is a common sense approach for achieving reliability. It is the best known proven method for developing a preventive maintenance (PM) program for any type of plant or facility. RCM is defined as a set of tasks generated on the basis of a systematic evaluation that are used to develop or optimize a maintenance program. RCM incorporates decision logic to ascertain the safety and operational consequences of failures and identifies the mechanisms responsible for those failures.
KEYWORDS:
RCM, PM, evaluation

1. INTRODUCTION

Due to a competitive environment, many companies are required to reduce their overall costs while maintaining the value and reliability of their assets. The use of Reliability-Centred Maintenance, RCM, can help organisations to develop a systematic maintenance programme, meeting these requirements in a cost-effective manner. RCM basically combines different techniques and tools in a systematic approach to manage risks as a basis for maintenance decisions.However, a long-term approach may be difficult to manage since it involves many people. Although RCM is an organised common sense approach to improvements of preventive maintenance, it still represents a very new and revolutionary idea for many people.

When introducing RCM with the aim of changing the overall way of working with maintenance in the organisation, i.e. on a full-scale basis, a long-term introduction approach should preferably be used. In several cases organisations have experienced severe difficulties when introducing RCM on a full-scale basis. Some of the reason are technical in nature, but the majority are managerial obstacles.

2. THE STUDY

F. Stanley Nowlan and Howard F. Heap, at the United Airlines under the Department of Defence, in US, established the concept „Reliability-Centered Maintenance", RCM, in 1978. The principles of RCM arose from a rigorous examination of certain questions that were often taken for granted (Nowlan & Heap, 1978):

- How does a failure occur?
- What are its consequences?
- What good can preventive maintenance do?

The RCM method can be described in four unique features, see e.g. Smith (1992) and Anderson & Neri (1990):

- Preserve functions.
- Identify failure modes that can defeat the functions.
- Prioritise function need, via the failure modes.
- Select only applicable and effective preventive mainenance tasks.

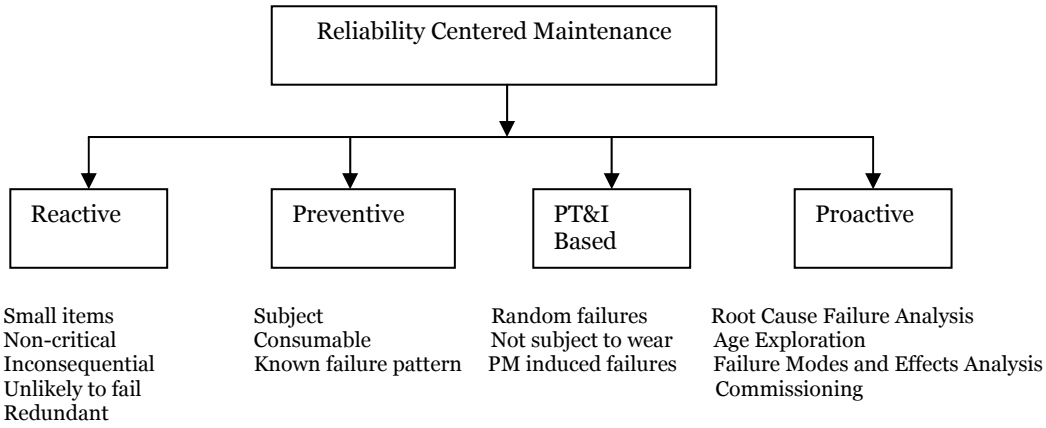
Moubray (1997) defines RCM in two ways:
1) „A process used to determine the maintenance requirements of any physical asset in its operating context";
2) „A process used to determine what must be done to ensure that any physical asset continues to do whatever its users want it to do in its present operating context".

Another definition is „A systematic approach for identifying effective and efficient preventive maintenance tasks for items in accordance with a specific set of procedures and for establishing intervals between maintenance tasks" (IEC 60300-3-11, 1999).

The RCM analysis carefully considers and answers the following questions:

- What does the system or equipment do; what are its functions?
- What functional failures are likely to occur?
- What are the likely consequences of these functional failures?
- What can be done to reduce the probability of the failure, identify the onset of failure, or reduce the consequences of the failure?

Reliability-Centered Maintenance (RCM) integrates Preventive Maintenance (PM), Predictive Testing and Inspection (PT&I), Repair (also called reactive maintenance), and Proactive Maintenance to increase the probability that a machine or component will function in the required manner over its design life-cycle with a minimum amount of maintenance and downtime. These principal maintenance strategies, rather than being applied independently, are optimally integrated to take advantage of their respective strengths, and maximize facility and equipment reliability while minimizing life-cycle costs. The goal of this approach is to reduce the Life-Cycle Cost (LCC) of a facility to a minimum while continuing to allow the facility to function as intended with required reliability and availability. The basic application of each strategy is shown in figure 1:



The goal of an effective maintenance organization is to provide the required system performance at the lowest cost. This means that the maintenance approach must be based upon a clear understanding of failure at each of the system levels. System components can be degraded or even failed and still not cause a system failure. The role of the maintenance and operations (M&O) staff is to recognize the margin to failure, estimate the time of failure, and pre-plan required repairs in order to minimize the Mean Time to Repair (MTTR) and associated downtime in order to achieve the maximum Overall Equipment Effectiveness within budgetary constraints.

The benefits and advantages of using RCM are several and have an impact on operations, safety, logistics, configuration and administration (Smith, 1993). Some of the benefits are tangible and others are intangible. Examples of potential benefits of using RCM:

- Cross-discipline utilisation of knowledge;
- Traceability of decisions;
- A broader and more attractive way of working;
- More condition monitoring;
- More systematic maintenance;
- More comprehensive documentation;
- Fewer maintenance hours;
- Improved operational feedback;
- Higher quality maintenance plans;
- Better availability of maintenance history;
- Significant reductions in preventive maintenance costs while maintaining or even improving the availability of the systems;
- Less corrective maintenance;
- Establish an uniform and consistent approach asset maintenance across the company;
- Improved understanding between representatives of the operations and maintenance functions;
- Improved operating performance;

- Improved plant reliability;
- Improved availability;
- Greater safety;
- Maintenance optimisation;
- Greater staff motivation;
- Educational capabilities.

Examination of the RCM benefits reveals that their effects can be grouped into five categories (Bowler & Leonard, 1994a):

- Reduced maintenance activity;
- Improved maintenance management systems;
- Improved productivity;
- Greater safety and environmental integrity;
- Other benefits.

It should be noted that several of the benefits can belong to more than one category. According to Johnston (2002), benefits of RCM can usually be traced back to two broad categories:

- Risk reduction;
- Cost savings.

Full benefit of RCM can only be achieved when we have access to reliability data for the items being analysed, when considering the optimising of preventive maintenance intervals. The operating organisation must be prepared to collect and respond to real data throughout the operating life of the equipment (Nowlan & Heap, 1978; Vatn et al., 1996).

The primary RCM principles are:

- RCM is Function Oriented
- RCM is System Focused
- RCM is Reliability Centered
- RCM Acknowledges Design Limitations
- RCM is Driven by Safety, Security, and Economics
- RCM Defines Failure as "Any Unsatisfactory Condition"
- RCM Uses a Logic Tree to Screen Maintenance Tasks
- RCM Tasks Must Be Applicable
- RCM Tasks Must Be Effective
- RCM Acknowledges Three Types of Maintenance Tasks
- RCM is a Living System.

RCM is applicable to:

- Where large, complex equipment is used
- Where equipment failures pose significant economic, safety or environmental risk:
  - aero/astro industries;
  - navy;
  - utility companies;
  - offshore industry;
  - manufacturing process.

Instituting an RCM Program depend on:

- Nature of the business;
- Risks posed by equipment failure;
- State of the existing maintenance program.

3. CONCLUSIONS

RCM in its purest form is a resource hungry process that should only be applied to the most critical of assets. The results from the process if performed properly and coupled with assessment of historical failures will produce efficient and effective maintenance strategies, but this will be at the expense of a significant amount of time for plant staff and the project analyst.

RCM yields results very quickly; most organisations can complete an RCM review on existing equipment and achieve substantial benefits in a matter of months. It is also an ideal approach for determining the maintenance requirements of new equipment of all kinds. When applied correctly, it transforms both the maintenance requirements themselves and the way in which the maintenance function as a whole is perceived.

REFERENCES

[1.] Anderson, R. T. and Neri, L., Reliability-Centered Maintenance, University Press, Great Britain, Cambridge, 1990.
[2.] Bowler, D. J. And Leonard, R., Economic considerations underlying the adoption of Reliability-Centered Maintenance. Proceedings of Life Management of Power Plants, Edinburgh, UK, pp. 14-20, 1994a.
[3.] IEC 60300-3-11, Dependability Management – Part 3-11: Application Guide – Reliability Centered Maintenance. Standard IEC 60300-3-11:1999, International Electrotechnical Commission, Geneva, 1999.
[4.] Johnston, D. C., Measuring RCM implementation. Proceedings of The IEEE Annual Reliability and Maintainability Symposium, Seattle, WA, pp. 511-515, 2002.
[5.] Moubray, John, Reliability-Centered Maintenance II, Industrial Press, New York, NY, April 1997.
[6.] Nowlan, F. Stanley and Heap, Howard F., Reliability Centered Maintenance, Dolby Access Press, 1978.
[7.] Smith, Anthony M., Reliability-Centered Maintenance, McGraw Hill, New York, NY, September, 1992.
[8.] Vatn, J., Hokstad, P. and Bodsberg, L., An overall model for maintenance optimisation. Reliability Engineering and System Safety, Vol. 51, No. 3, pp. 241-257, 1996.
[9.] http://www.wbdg.org.
[10.] http://reliabilityweb.com.

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ROLE OF RURAL DEVELOPMENT IN THE PRODUCTION OF THE HUNGARIAN TRADITIONAL HORTICULTURAL PRODUCTS

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ABSTRACT:
Union and their development is not controlled by strict quota systems. In Hungary a lot of unique products of excellent quality are produced. Here in this essay we would like to find the answer to the question how the two significant products of the southern part of the Great Hungarian Plain can provide the families with the income that they can live on. We aim at the economical examination of the cucumber grown in Méhkerék and asparagus of Homok. To do this we will apply the so called Standard Gross Margin. The agriculture of the states of the European Union is measured with the help of this method. It can also help us in the future to decide whether the different farms belonging to families are economically viable in Hungary.
KEYWORDS:
unique products, SGM of cucumber and asparagus

1. INTRODUCTION

We would like to find the answer to the question how some significant products of Hungary can provide the families with the income that they can live on. I aim at the economical examination of the asparagus, the cucumber. To do this I will apply the so called Standard Gross Margin. The agriculture of the states of the European Union is measured with the help of this method. It can also help us in the future to decide whether the different farms belonging to families are economically viable in Hungary. I make suggestions regarding the sizes of the area, which would be required to provide a livelihood for a Hungarian family. Agriculture has been and probably will be a significant branch in the south part of the Great Plain in the future as well. Besides the mass products and in many cases instead of them when forming the agricultural structure, this region has to pay more attention to the branches that were important in the past (Berde, 2000). Hungarian experts who are famous in foreign countries as well deal with these branches and they provide excellent products (Juhász et al., 2006). The rules referring to these products are more liberal in the market places of the European Union and their development is not controlled by strict quota systems.

2. MATERIAL AND METHOD

2.1. THE STANDARD GROSS MARGIN (SGM)

Our calculations were carried out with the help of a method worked out and applied in the European Union. In the European Union the agricultural enterprises have been regularly assessed (since 1966) and comparative data have been given to the decision-making organisations of the Union. Because of the number and the variations of the enterprises more than one form of measuring was applied such as the territory of the factory, the number of the employees, the number of the animals bred and the price of the products sold. As it was experienced the

achievement of the agriculture in a state could not have been defined by these forms of measuring and by the combination of them. Similar to this they were not sufficient to determine the economic size of an enterprise and to compare the different factories from economic aspect (Kovács, 2001). The unified classification system (the economy typology) was accepted in 1978 that pays attention to two aspects, the type of farming (the structure of production) and the size of the economy. In order to define the economic size the Standard Gross Margin (SGM) was worked out (Kovács et.al., 1999). The natural data referring to the structure of the factory cannot say anything about the achievement of the agriculture of a country and they are not good for economic comparing. The size of the factory is defined the best of all by the potential profitable capacity which equals with the total standard gross margin (SGM) of the particular factory -which is the same as the added value (Agriculture in the European Union 2001, European Commission).

2.2. THE CALCULATION OF THE STANDARD GROSS MARGIN

According to the regulations of the European Union, in cultivation of plants the costs of the seeds, the propagation, the artificial fertilizers, the insecticides, the heating, the irrigation, the processing, the classification, the packing, the insurance and other variable costs that are connected with the particular production activity have to be taken into consideration among the direct variable expenses. The indirect variable costs are also defined. The variable expenses in connection with the machines belonging to the factory (such as fuel, lubricants, repairing costs) are listed here. These two groups together mean the variable costs of the economy (Hajduné et.al., 2008). It does not include the costs of amortization and the rent of the agricultural land. This method takes into consideration every wages and their complementary costs as constant expenses without paying attention to whether they were paid to the owner of the farm or to a family member or to an employee. The amortization costs of the tangible assets, the rent of the agricultural land and the general costs are referred to as constant expenses.

The SGM1 and SGM2 index numbers can be calculated on the basis of the relations mentioned above.

SGM1 = sales – direct variable cost (direct material costs)

SGM2 = sales – direct variable cost – indirect variable cost (the direct material costs and the direct costs of machine work are deducted from the sales).

The SGM2 index number is in fact the gross income.

2.3. THE NECESSITY OF LIVE LABOUR

The basis of the economy producing unique Hungarian products is to deal with growing plants that assure the costs of living for a long time; can be easily produced in the south of the Great Hungarian Plain, can be easily sold in the market and can be produced by own live labour.

The necessity of live labour has to be determined especially in the harvesting and the selling period. It can be calculated on the basis of detailed producing technology. In this essay we determine the area that a family can cultivate on its own – without employing workers seasonally. If we take a family with four members we calculate with three manpower units. In our earlier research the working days and working hours in cultivation of plants were defined. These data are essential to calculate the necessity of live labour especially when we plan the working peak. In the harvest phase we calculate with 7-10 working hours per manpower units a day. The family can perform 200-250 hours every ten days.

3. RESULTS AND DISCUSSION

3.1. THE ECONOMIC ASSESSMENT OF THE CUCUMBER GROWN

The training system for growing cucumber assures bigger quantities and better quality comparing to the plough-land cultivation. The cost of it is 3600-4400 euro per hectare that does not include the farmer's labour. This system can be planned for ten years and can be applied when growing tomatoes as well. A particularity of growing cucumbers intensively is that the size of the desired product is in inverse relation to its yield and average price. The yield is lower if we pick cucumbers every day which are 1cm-3cm, 2cm-5cm and 3cm-6cm big and their price is higher. In the model we plan to pick 3cm-6cm and 6cm-9cm big cucumbers every two days.

From among the direct variable expenses the costs of artificial and organic fertilizers, pesticides, plants, irrigation and other variable costs were calculated in our project. The direct variable cost of the cucumbers grown on family farms with the help of training system and irrigation is 600 euro per hectare. In our technology 800 euro per hectare variable cost was calculated taking into consideration the running and the repairing costs of the machines of own

property. The total variable cost in a year (1.400 euro) was compared to the probable income. The yield can reach 80 tons per hectare in the south of the Great Hungarian Plain if irrigation is applied. The 0,24 euro/kg average price could assure the farm a 19.200 euro income. We must not forget about the fact that such an intensive planting culture requires 800 euro costs per hectare at the beginning taking only an average data. This cost cannot be taken into consideration among the expenses (according to the terminology of the European Nations). Similarly to this the salary cannot be deducted although the application of live labour is the highest in case of growing plants in the fields. SGM1 = 19.200 euro income – 600 euro direct variable cost = 18.600 euro/year/hectare. SGM2 = 19.200 euro income – 600 euro direct variable cost – 800 euro indirect variable cost = 17.800 euro / year / hectare. The need for live labour is the greatest first when planting starts. If own labour is used, the work can be finished in time. The next peak of work appears during harvest when 540 working hours of live labour per hectares are needed. Taking into consideration the number of the working hours, one family can manage 0.51-hectare-post system area without employing working seasonally. The area that can be cultivated by the family on average assures only 9.076 euro SGM.

3.2. THE ECONOMIC ASSESSMENT OF THE ASPARAGUS

The basis of the production is the asparagus plantation, which has a good effect on the farming. After planting there are three or four years without harvest but the field must be cultivated although there is no income and no other plants can be grown meanwhile to utilize the area. The cost of plantation and cultivation is 8.0000 euro in the proportion of 85+5+5+5 every year. Besides this 1600 working hours are needed. The factor cost of one hectare is 10.400 -12.000 euro. The length of the period when there is harvest is 6-8 years. The accountable depreciation is 15% a year. During this period the quantity of the yield is not the same: in the first two or three years it is growing, then it is stagnating for two or three years and after that it is decreasing. In this model we calculate with the yield of a stagnating year. The variable cost of the enterprise is encumbered with almost 220 euro per hectare. This includes the costs of the materials, the artificial and organic fertilizers, the pesticides, the packing and the processing. The indirect variable cost of the farm – according to our survey - is 170 which give a result of a total 400 euro variable cost. In the south of the Great Hungarian Plain – taking into consideration the areas not abounding in nutrients – we can calculate with a five- tonne average yield per hectare.

The distribution must be calculated with care with a 16 euro/kg - average price. The income is 8.000 euro per hectare. The biggest peak of work appears during the harvest. Taking into consideration the number of working hours 0.97 hectare of asparagus plantation ripening at the same time can be accomplished without employing workers for this season.

SGM1 = 8.000 euro income – 220 euro direct variable cost = 7.780 euro / year / hectare

SGM2 = 8.000 euro income – 220 euro direct variable cost – 170 euro indirect variable cost = 7.610 euro / hectare/ year.

The SGM2 for a 0.97 hectare is 7.390 euro.

4. CONCLUSIONS

4.1. THE BREAD WINNING CAPACITY OF THE CUCUMBER IN HUNGARY

In order to get the income expected the cucumber should be grown with the help of post system on a 0.72 hectare big area. On such a big area other workers have to be employed during the harvest period for 540 working hours. The cost of it is 780 euro.

This kind of cucumber growing makes it possible for the family to make ends meet. On the basis of the significant export, the market for the cucumber can be said to be steady. The income depends on the Hungarian sale ring and the processing. The cost of introducing the post system is high but the income of the first year can cover this cost on a successful farm.

4.2. THE BREAD WINNING CAPACITY OF THE ASPARAGUS GROWN IN HUNGARY

In order to get the income expected the pale asparagus should be grown on a 1.66 hectare big area. On such a big area other workers have to be employed during the harvest period for 469 working hours. The cost of it is 680 euro. The kinds of the asparagus make it possible for the family to make ends meet. On the basis of the significant export, the market for the asparagus can be said to be steady. The income depends on the Hungarian sale ring. Because of the frost in late spring it is not recommended to base the whole income of the farm on the asparagus. Other recommended products can be the ones the harvesting time of which not the beginning of April is or the middle of June.

REFERENCES

[1.] Agriculture in the European Union 2001, European Commission.
[2.] Berde, Cs (2000): Changes of Approaches to Management Functions in Agriculture. Zbornik, Vedekych Prac, Nitra p. 217-222.
[3.] Juhász, Cs.-Berde, Cs. (2006): Synchronisational problems in organisational motivation in agriculture. Studies in Agricultural Economics. No. 104. p. 129-142.
[4.] Hajdu I-né- Nótári M. (2008): Fogyasztói attitűdök vizsgálata a hungarikum jellegű kertészeti- és élelmiszeripari termékek piacán. Acta Oeconomica Kaposvariensis 2008. No.1. p. 25-32.
[5.] Kovács G.-Keszthelyi Sz.(1999):A tesztüzemek 1998.évi gazdálkodásának eredményei, AKII Füzetek,1.
[6.] Kovács G. (2001). Mérethatárok és lefedettség, Magyar Mezőgazdaság XII. p. 12.

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THE CENTRAL AND THE LOCAL SYSTEMS OF RURAL DEVELOPMENT IN THE REGION MANAGEMENT

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ABSTRACT:
The sustainability is strongly connected to the conception of Food Sovereignty, which became an everyday issue again in the last years among the people dealing with agriculture. Considering the philosophy of the movement, the farmers have a right to produce local food, and the consumers have a right to decide by whom and how produced provisions intend to buy. In our research we examined the attitude of the consumers toward the natural foodstuff. The tools of the marketing have a role in the positioning of these products.
KEYWORDS:
region marketing, rural development

1. INTRODUCTION

Regional marketing is a new concept, which is not widely known in Hungary, there are only very few and limited experiences with it. It is a total of all the activities and at the same time a way of thinking, the aim of which is to take a product to the customers very efficiently (Berács, 2006). The task of regional marketing is to explore the competitive assets and attractions of a region, to help the realization of the plans in order to support achieving the goals of economic and community life. In the South Great Plain Region several top-quality products are made and these products are Hungarian specialties (Piskóti, 2006). In this immense competition an image formed about a country, a part of a country or about a region has a considerable influence on the decision of customers – both on the national and international market.

2. MATERIAL AND METHODS

Region marketing is barely known in Hungary and we have only limited experience in connection with its Hungarian applications. Region marketing is by all means part of marketing. It is a mixture of such activities which purpose is to effectively channel products to the customers. It must be considered, that there is a strong competition in satisfying consumer demand. Main goal of region marketing is to help discovering the competitiveness and charm of the region in order to reach multilateral development-, economic- and life-conduct objectives. Being a member of the European Union, it is vital for Hungary that its food industry could reserve its traditional role. Numerous high-quality, special products are produced in the South Great Plain Region. Farming experience – gained throughout centuries - resulted in special, unique products representing national values

Europeanisation is about opening up political, economic, geographic and social space. This is being carried out through the reduction of a wide range of traditional protection mechanisms of these spaces. The process serves the interests of the *economic centre*, the market, international capital and multinational companies. Nationally or regionally specific rules and regulations currently represent obstacles for the free movement of people, goods and capital (Camagni, 1995). Business needs to have *access* to local and regional economies. To achieve this, generally accepted

regulations and policies, to ensure the necessary conditions (stability, proper relations, common technical standards, etc.), are needed. The European Union, the *political centre* of Europe, can be seen as a central organisation, which can design, negotiate and enforce these conditions. The continuously growing common regulations on markets, trade, safety, environment and different aspects of production, aim to provide for the access required by the *economic centre* (Picchi, 1994).

3. RESULTS AND DISCUSSION

3.1. REGION MARKETING IN THE REGION OF DÉL-ALFÖLD OF HUNGARY

The contradiction of the present time is the "global-local paradox". While global competition is intensifying, more and more companies have been concentrating in one region, where the local environment provides appropriate conditions for production. The reason of that is that among the advantages of the association, the advantages coming from a local environment secure increasing revenue levels.

In the Region of Dél-Alföld, the image was created in a way that it reflects the characteristics of the countryside, the atmosphere of the land, values of local people and history and traditions of the region. The region possesses a number of good quality agricultural products that have great prospects for the future. The positive image of the regions enhances the identity of local communities that assist them in finding their interest locally.

The figure 1 shows the aspects of situation survey basing marketing strategy.

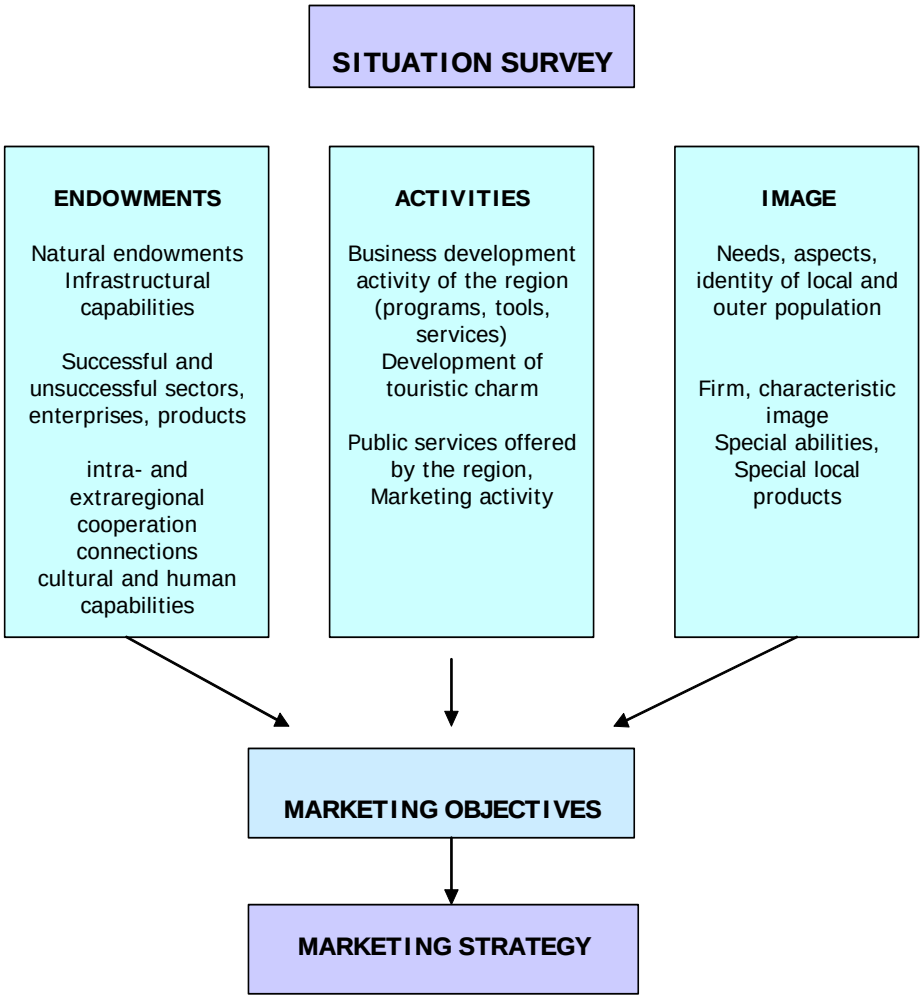

Figure 1. The aspects of situation survey basing marketing strategy

3.2. THE CENTRAL AND THE LOCAL SYSTEM OF RURAL DEVELOPMENT

One type could be called the central administrative system of rural development, based on fundamentally top-down interventions of the political centre (Gusztáv, 2005). It comprises such elements as: European and domestic policies; centrally redistributed resources; institutional networks; skills, technical and procedural knowledge of various level bureaucrats; strategic

development plans. It has a formalised and institutionalised character. It is based on written rules, established procedures and controlled by bureaucratic institutions. It uses external resources for intervention, usually works with a very narrow flow of information, with high transaction costs and aims at quantifiable results. At the same time it can have a large scope and embrace higher level or long term strategic objectives, which are above short term economic rationality (Amin et al., 1994). The other type could be called the local heuristic system of rural development, based on essentially endogenous, bottom-up processes (Ray, 2001). It comprises such elements as: local economic, political and social actors; local development plans; social networks and kinship relations; local authorities, innovative individuals, development associations and partnerships as well as the development skills and experiences of these local actors (Gusztáv, 2005). Although it builds upon local resources, rural values and synergistic effects of multiple activities, it often needs external finance and encouragement: financial resources, technical assistance, mediation, expert knowledge, etc. (Terluin, 2003).

3.3. SWOT ANALYSIS OF THE REGION

Strengths of the region:
- Role of agriculture is dominant in the Region, the food industry is competitive even by international comparison;
- Number of sunshine hours is very high and the average yearly temperature is also amongst the highest in Hungary;
- Number of tertiary educational-, research- and cultural centers is outstanding in national comparison.
- Many famous firms with high level of professional culture and brands connected to them works in the Region.
- There are a number of unique, excellent quality traditional product, which are unambiguously characteristic to the region.

Weaknesses:
- The GDP per capita has remained unchangedly below the national average in the past years;
- Quality and quantity of transportation infrastructure is insufficient;
- Proportion of foreign capital is lower than the national average;
- Many small regions of the Region belong to the group of small regions currently being in critical position.

Threats:
- Regional effects of the EU's Agricultural Policy;
- Appropriate environmental protection agreements and cooperations wouldn't be signed with the neighbouring countries;
- Sharpening competition between the domestic region and the regions of neighbouring countries.

Possibilities:
- Growth of the role of euroregional organizations;
- Affirmation of the South-Western European gate role with the reconciliation of the Balkanic situation;
- Change in consumer preferences;
- Positive international image of certain kinds of foods;
- Demand for unique, special provincial products.

4. CONCLUSION

Material and immaterial products which are manufactured in, and are representative exclusively to the Region should be supported practically in regional cooperation. Beside measurable economic profits the following advantages can be achieved:
- conservation of traditions and cultural heritage, strengthening the idea of belonging to the same community among the people living in the region;
- forming the peculiar image in the competition among the regions and in the accelerating globalization processes of our days.

It can be expected only as a result of a long-term, coordinated marketing strategy that the image of South Great Plain Region becomes widely known and attractive. One precondition of this is that the Region should successfully represent the selected image and to develop a positive affection for its special local products. This affection could be formed inside the region by positive local-patriotism, while outside the region with the sympathetic and valuable features.

This is important because the South Great Plain Region has its competitors by now – certain domestic and neighbouring country regions. In the future, the enhancement and specialization of the competition between regions could be expected. The South Great Plain Region only has its chance to effectively join the domestic and international competition if conscious preparations and image-forming takes place.

REFERENCES

[1.] Amin, A. Thrift, N. (1994): Globalisation, Institutions, and Regional Development in Europe Oxford University Press
[2.] Berács J. (2002): Nemzeti imázs és versenyelőny. Marketing és menedzsment, No.1 p. 8-11.
[3.] Camagni, R. (1995): Global network and local milieux: Towards a theory of economic space in: Conti, S. Malecki, E. and Oinas, P. (eds) The industrial enterprise and its environment: spatial perspective Avebury, Aldershot
[4.] Nemes, G. (2005): Disintegration, the reason for policy failure – an analytical model of integrated rural development. Hungarian Academy of Sciences – Institute of Economics. ESRS XXI Congress, WG8 – Keszthely
[5.] Picchi, A. (1994): The relation between central and local powers as context for endogenous development, in. Van der Ploeg, D.J. and Long, A. (eds)
[6.] Piskóti (2006): Régió- és település marketing. KJK Kerszöv Kiadó Budapest, p.31-41.
[7.] Ray, C. (2001) Culture Economies – A perspective on local rural development in Europe CRE Press, University of Newcastle upon Tyne
[8.] Terluin, I.J. (2003): Differences in economic development in rural regions of advanced countries: an overview and critical analysis of theories, Journal of Rural Studies 19, 327-344

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PROPOSAL OF THE INTEGRATION OF THE METHODS SADT AND GRAI IN THE ENTERPRISE

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ABSTRACT:
The restructuring of enterprises constitutes a complex process allying various points of view that the conventional approaches don't manage to satisfy. Indeed, the restructuring of enterprises cannot be achieved only according to a global approach of analysis. In order to contribute to the restructuring of an enterprise, we present a proposal of the integration of tow systemic methods: SADT and GRAI. In fact, we interest in this paper to the use of the global approach that allows us to act not only on the organisation and the management system of the enterprise but also on its information system.
KEYWORDS:
Enterprise modelling, Global approach, Systemic methods, SADT, GRAI

1. INTRODUCTION

The system approach enables us to analysis the complex process elements as components of a whole in reciprocal dependence relation. Its field of survey doesn't limit itself to the mechanisation of the thought. In fact, the systemic analysis is a methodology that organises knowledge to optimise an action. The objective of a system approach is to schematise a complex process, to lead to a modelling that enables to act on it, after we understand its architecture and its dynamic structure [1] [2].

The systemic analysis has for role to define the general strategy of the modelling survey to achieve. This strategy must enables to fix a way that specifies the limits of the modelling while defining the borders of the system to model and to specify among the data that are really exchanged between the different components of the system those that the modelling will cover [3][4].

Because of the complexity of activities of the enterprise and the interdependence of its various functions, its restructuring cannot achieve itself only according to a global approach of analysis based on the use of systemic methods [5] [6].

The use of systemic and participative approach facilitates the adoption of the strategy of restructuring of enterprises. It is therefore necessary to adopt a scientific gait based not only on the structured analysis but also on the modelling technique that will act not only on the organisation and the management system of the enterprise but also on its information system (See Figure 1).

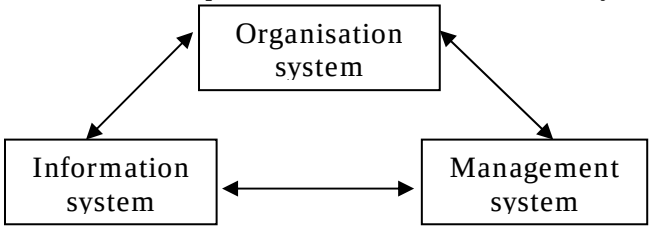

Figure 1- Representation of the enterprise

The principal objectives waited of the analysis of a system of the enterprise are: to offer a support of communication between operators of the system; to lead to a tool of performance analysis and to incline a tool of help to the decision making.

The object of this work is to propose a global approach based on the use of two systemic methods SADT (Structured Analysis Design Techniques) [7] [8] and GRAI (Graphes et Réseaux d'Activités Inter-reliés) [9] [10] enabling to reach the aimed objectives. This approach requires a new and suitable tools conceptualization that would be used by the various actors in the enterprise.

2. REVIEW ON PARTICIPATIVE METHODS

There are many methods that have been used to enhance participation in Information System (IS) planning and requirements analysis. We review some methods here because we think them to be fairly representative of the general kinds of methods in use. The methods include Delphi, focus groups, SADT, OOPP method, multiple criteria decision-making (MCDM), total quality management (TQM) and GRAI.

The objective of the Delphi method is to acquire and aggregate knowledge from multiple experts so that participants can find a consensus solution to a problem [11].

A second distinct method is focus groups (or focused group interviews). This method relies on team or group dynamics to generate as many ideas as possible. Focus groups been used for decades by marketing researchers to understand customer product preferences [12].

MCDM views requirements gathering and analysis as a problem requiring individual interviews. Analysts using MCDM focus primarily on analysis of the collected data to reveal users' requirements, rather than on resolving or negotiating ambiguities. The objective is to find an optimal solution for the problem of conflicting values and objectives, where the problem is modelled as a set of quantitative values requiring optimization [13].

TQM is a way to include the customer in development process, to improve product quality. In a TQM project, data gathering for customers needs, i.e., requirements elicitation may be done with QFD [14].

The SADT method represent attempts to apply the concept of focus groups specifically to information systems planning, eliciting data from groups of stakeholders or organizational teams [15]. They are characterized by their use of predetermined roles for group/team members and the use of graphically structured diagrams. SADT enables capturing of a proposed system's functions and data flows among the functions.

The OOPP method also referred to as Logical Framework Approach (LFA), is a structured meeting process [16]. This approach seeks to identify the major current problems using cause-effect analysis and search for the best strategy to alleviate those identified problems. OOPP method has become the standard for the International Development Project Design. Team Technologies have continued to refine the approach into TeamUP.

3. PRESENTATION OF THE METHODS SADT AND GRAI

In this part, we present two methods of enterprise modelling [17-20] SADT and GRAI that we propose to use for restructuring approach of the enterprise.

3.1 SADT method

The SADT method [7] represent attempts to apply the concept of focus groups specifically to information systems planning, eliciting data from groups of stakeholders or organizational teams. SADT is characterized by the use of predetermined roles for group/team members and the use of graphically structured diagrams. It enables capturing of proposed system's functions and data flows among the functions.

SADT, which was designed by Ross in the 1970s, was originally destined for software engineering but rapidly other areas of application were found, such as aeronautic, production management, etc.

SADT is a standard tool used in designing computer integrated manufacturing systems, including flexible manufacturing systems [8]. Although SADT does not need any specific supporting tools, several computer programs implementing SADT methodology have been developed. One of them is Design: IDEF, which implements IDEF0 method. SADT: IDEF0 represents activity oriented modelling approach (See Figure 2).

IDEF0 representation of a manufacturing system consists of an ordered set of boxes representing activities performed by the system. The activity may be a decision-making, information conversion, or material conversion activity. The inputs are those items which are transformed by the activity; the output is the result of the activity. The conditions and rules describing the manner in which the activity is performed are represented by control arrows. The

mechanism represents resources (machines, computers, operators, etc.) used when performing the activity.

The boxes called ICOM's input-control-output-mechanisms are hierarchically decomposed. At the top of the hierarchy, the overall purpose of the system is shown, which is then decomposed into components-subactivities [15]. The decomposition process continues until there is sufficient detail to serve the purpose of the model builder. SADT: IDEF0 models ensure consistency of the overall modelled system at each level of the decomposition. Unfortunately, they are static, i.e. they exclusively represent system activities and their interrelationships, but they do not show directly logical and time dependencies between them. SADT defines an activation as the way a function operates when it is 'triggered' by the arrival of some of its controls and inputs to generate some of its outputs. Thus, for any particular activation, not all possible controls and inputs are used and not all possible outputs are produced. Activation rules are made up of a box number, a unique activation identifier, preconditions and postconditions.

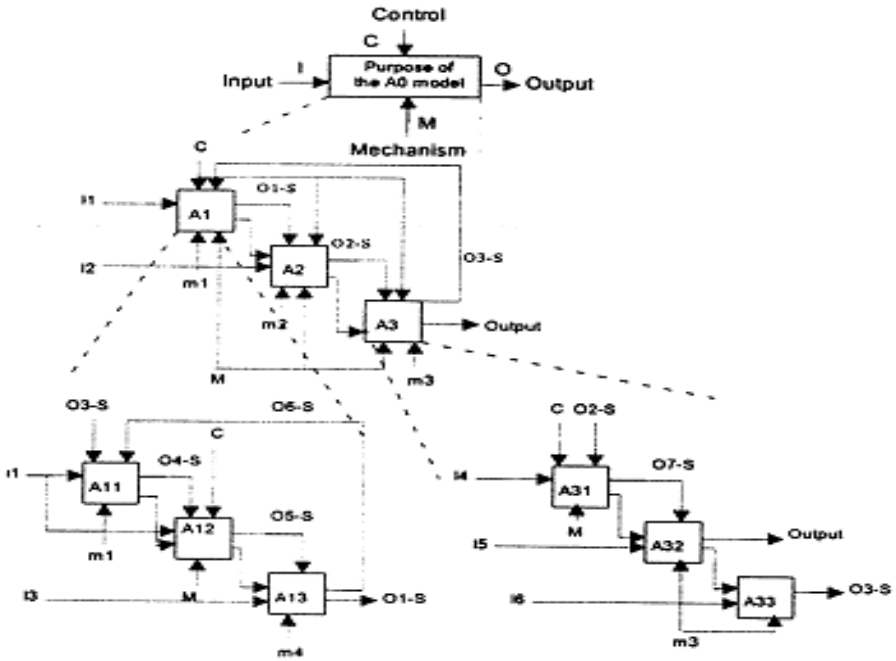

Figure 2- Top-down, modular and hierarchical decomposition of SADT method

3.2 GRAI method

Developed by the laboratory for automation and production at the university of Bordeaux-France since 1970's [9]. Before developing the GRAI method, some existing works had been reviewed, notably SADT method. It was found that the decisional aspects were not very well taken into account in these methods. So, it was important for the GRAI method particularly to deal with the decisional aspects of manufacturing systems. Based on the GRAI models, two formalisms were developed to model the macro decision structure and the micro decision center; the GRAI grid and the GRAI nets. A structured approach was defined to show how to apply the method (See Figure 3).

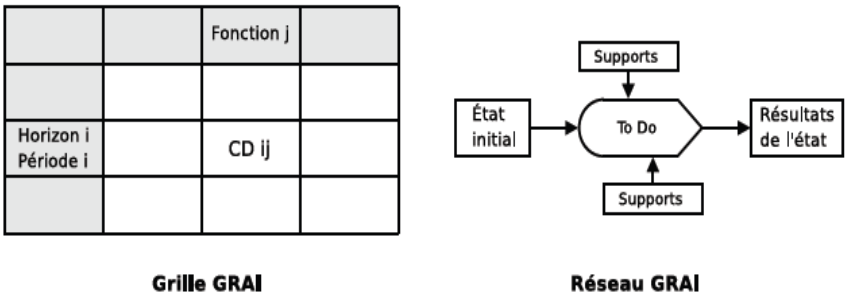

Figure 3- Formalism of the GRAI method

Another work performed at the GRAI laboratory was the extension of the GRAI method to GRAI-GIM (GRAI Integrated Methodology) [10].

GIM is composed of the following elements:

- GRAI conceptual model: a representation of basic concepts of a manufacturing system decomposed into three sub-systems: physical system, decision and information system.

- GIM modeling framework (RA) with three dimensions: views, life cycle, and abstraction level.
- GIM structured approach: guide to show how to perform analysis and design of the manufacturing system in three main phases: analysis, user-oriented design, and technical-oriented design.
- GIM modeling formalisms (languages): GRAI grid and GRAI nets for decision system modeling, IDEF0 and stock/resource for physical system modeling, ER for information system modeling, IDEF0 for functional system modeling.

The GRAI model is a reference through which various elements of real world can be identified. The macro conceptual model is used to express one's perception and ideas on the manufacturing system which is decomposed into a decision subsystem, an information subsystem and a physical subsystem. Particularly within the decision subsystem one finds a hierarchical decision structure composed of decision centres. Decision centres are connected by a decision frame (objectives, variables, constraints and criteria for decision making). The operating system is an interface between the decision system and the physical system. The micro conceptual model is used to represent the internal elements and structure of the decision centre.

GRAI-GIM contains a user-oriented method and a technically-oriented one. The user-oriented method transforms user requirements into user specification in terms of function, information, decisions and resources. The technically-oriented method transforms the user specification into technical specifications in terms of information and manufacturing technology components and the organization. The technical specification must allow the implementer to choose (buy, commission, or develop) all the components needed to implement the system. A computerized support tool knows as CAGIM (Computer Aided GIM) is being developed at the GRAI Laboratory within the framework of the IMPACS project on Unix systems with X-Windows, to support the GRAI-GIM method.

4. METHODOLOOF INTEGRATION OF THE TWO METHODS

In order to establish a global approach for the restructuring of the enterprise (See Figure 4), it's necessary to proceed first of all to the instruction of the situation with the decision-makers according to a Brainstorming gait; thereafter, we exploit an analysis of the existing led by a support committees constituted to this effect. This analysis will be driven according to a participative gait while associating the various structures of an enterprise and while adopting an environment of Quality. It is necessary to organize different production workshops. These workshops are organized implying very well collectively all concerned by the various functions assigned in enterprise, either of a manner dedicated to a specific function.

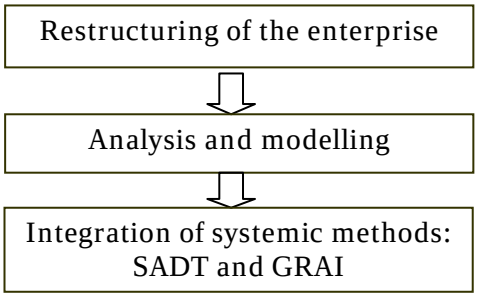

Figure 4- Systemic analysis of System Organisation

1st stage: Functional model

The modeling oriented functions consist in describing processes of the enterprise. They must be capable to show interactions between these processes and to proceed to a decomposition of functions or activities.

In the first stage, we proceed to the functional modelling of the organisation that is not other that the exam of the situation of the enterprise in order to better understand its working. This stage enables us to decompose the system of the enterprise in a hierarchical manner in order to lead it in to elementary situations.

The first type of workshops enables to first of all to identify basis functions of an enterprise; it also enables to identify participants to the dedicated workshops and to establish a first work planning. Thereafter, it is during these workshops that various validations and various adjustments will be made and this thanks to the phenomenon of synergism of group and complementarities of functions.

The dedicated workshops enable to exploit the appraisal of People Resources to describe by a logical and hierarchical manner the various activities of every function. We exploit the formalism of SADT method witch represent a general method that tries to encourage the communication between claimants and users, on the one hand, inventors and producers, on the other hand.

2sd stage: Informational model

The architecture of information is composed not only of a combination of structures fixed but also of objects that have some short life cycles.

Methods of modelling are destined to model the information system of the enterprise. They permit to assure the circulation of information in the enterprise concerning processes, functions, resources, the organization...

Once functions and activities of every function have been identified, the following stage of the methodology proposed consists in analyzing the informational environment of these activities using the SADT method.

The performances of a system as complex it depends especially on the performance of its information system. This is why the development of the information system of the enterprise and the efficiency of its exploitability is important. It enables to adapt constraints of measure and collection of information to those of treatment and exploitation.

The modelling of the information system of the enterprise offers the tools of analysis and help to the decision making. These elements contribute to illuminate the decision or merely to encourage the consistency between the evolution of the process, objectives and the system of values to the service of which one is placed.

3rd stage: Decisional model

This stage aims the detailed description of decisions to take in a very definite time horizon and according to activities. In fact, the decision is about an interfacing between the strategy and the operation in the enterprise.

We propose to use the GRAI method. In fact, the GRAI modelling is the only existing modelling that proposes a representation of decisional structure of the enterprise. This representation is important to detect incoherencies in the coordination and the synchronization of decision makings and in the dynamics of evolution of the enterprise. Then, we propose to adopt the three element of this approach: models of reference, formalisms of modelling and structured approaches.

5. CONCLUSION

The process of modelling of the enterprise is a methodological gait well structured aiming the representation of an enterprise while developing models or languages of modelling and with contribution of all actors of the enterprise to arrive to a well identified finality.

A proposal of the integration of two systemic methods SADT and GRAI is presented in this paper in order to contribute to the restructuring of the enterprise. This approach is developed according to three essential stages: functional model, informational model and decisional model of the organisation system of the enterprise.

REFERENCES

[1.] Melese J., (1990) « Approches systémiques des organisations », Editions d'organisation, p. 43, Paris, France.
[2.] Landry M., Banville C., (2000) « Caractéristiques et balises d'évaluation de la recherche systémique », *Revue Tunisienne des Sciences de Gestion*, vol.2, N°1.
[3.] Larvet P., (1994) « Analyse des systèmes : de l'approche fonctionnelle à l'approche objet », InterEditions, Paris.
[4.] Sticklen J., William E., (1991) « Functional Reasoning and Functional Modelling », *IEEE Expert: Intelligent Systems and Their Applications*, p. 20-21.
[5.] Vautier J.F., (1999) « Méthodes systémiques appliquées aux facteurs humains », *Techniques de l'ingénieur, traité Génie industriel*.
[6.] Lakhoua M.N, (2008) « Analyse systémique d'un environnement de production en vue d'implanter un système d'information : étude de cas d'un silo de stockage des céréales », Thèse, ENIT, Tunisie.
[7.] Jaulent P., (1989) « SADT un langage pour communiquer », IGL Technology, Eyrolles, Paris.
[8.] Jaulent P., (1992), « Génie logiciel les méthodes : SADT, SA, E-A, SA-RT… », Armand Colin, Paris, France.
[9.] Roboam M. (1993), La méthode GRAI. Principes, outils, démarche et pratique, Teknea.
[10.] Doumeingts G. (1984), La méthode GRAI, Thèse d'Etat, Université de Bordeaux I.
[11.] R.M. Roth, W.C.I. Wood (1990) A Delphi approach to acquiring knowledge from single and multiple experts, in: Proceedings of the 1990 ACM SIGBDP Conference on Trends and Directions in Expert Systems.

[12.] M. Parent, R.B. Gallupe, W.D. Salisbury and J.M. Handelman (2000), Knowledge creation in focus groups: can group technologies help? Information & Management 38 (1), pp. 47–58.
[13.] H.K. Jain, M.R. Tanniru and B. Fazlollahi (1991), MCDM approach for generating and evaluating alternatives in requirement analysis, Information Systems Research 2 (3), pp. 223–239.
[14.] A.C. Stylianou, R.L. Kumar and M.J. Khouja (1997), A Total Quality Management-based systems development process, The DataBase for Advances in Information Systems 28 (3), pp. 59–71.
[15.] K. Schoman, D.T. Ross (1977), Structured analysis for requirements definition, IEEE Transaction on Software Engineering 3 (1), pp. 6–15.
[16.] LFA (1999), Handbook for objectives-oriented planning. Norad. Fourth edition.
[17.] Vernadat, F. (1996). Entreprise modeling and integration. England: T.J Press Ltd, Padstow.
[18.] A.Errasti, (2008). Engineer to order supply chain improvement based on the GRAI meta-model. Entreprise interoperability III. London. pp. 524-531.
[19.] Talbi I A., (2002). Analyse de l'entreprise dans une démarche d'intégration. Journal Européen des Systèmes Automatisés, 33.
[20.] Andrew P. Sage, W. B. (2009). Handbook of system engineering and management. USA.

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USING METHODS AND APPROACHES IN IS PLANNING AND REQUIREMENTS ANALYSIS

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ABSTRACT:
After a presentation of different methods and approaches used to enhance participation in Information System (IS) planning and requirements analysis, we present the Logical Framework Approach (LFA) also referred to as Objectives Oriented Project Planning (OOPP) and how to refine it into TeamUP. In fact, the OOPP method constitutes a tool of a global systemic modelling enabling to analysis a complex situation by a hierarchically decomposition until reaching an elementary level allowing an operational planning. Some applications of the OOPP method in Tunisia are presented.
KEYWORDS:
Strategic Planning, OOPP method, Problem tree, Objective tree

1. INTRODUCTION

The purpose of this paper is to introduce the different methods and approaches used to enhance participation in Information System (IS) planning and requirements analysis. We review some methods and approaches here because we think them to be fairly representative of the general kinds of methods and approaches in use. The methods include Delphi, focus groups, Structured Analysis Design Technique (SADT), multiple criteria decision-making (MCDM), and total quality management (TQM) and the approaches include Future Search, Open space, SWOT (Strengths, Weaknesses, Opportunities and Threats) and ZOPP/OOPP/LFA. These different approaches are in use to define the strategic objectives.

The objective of the Delphi method [1] is to acquire and aggregate knowledge from multiple experts so that participants can find a consensus solution to a problem.

A second distinct method is focus groups (or focused group interviews) [2]. This method relies on team or group dynamics to generate as many ideas as possible. Focus groups been used for decades by marketing researchers to understand customer product preferences

MCDM [3] views requirements gathering and analysis as a problem requiring individual interviews. Analysts using MCDM focus primarily on analysis of the collected data to reveal users' requirements, rather than on resolving or negotiating ambiguities. The objective is to find an optimal solution for the problem of conflicting values and objectives, where the problem is modeled as a set of quantitative values requiring optimization.

TQM is a way to include the customer in development process, to improve product quality. In a TQM project, data gathering for customers needs, i.e., requirements elicitation may be done with QFD [4].

The SADT method [5] represent attempts to apply the concept of focus groups specifically to information systems planning, eliciting data from groups of stakeholders or organizational teams. They are characterized by their use of predetermined roles for group/team members and the use of graphically structured diagrams. SADT enables capturing of a proposed system's functions and data flows among the functions.

The approaches of strategic planning have some principles in common: a belief that the future can be changed and is not pre-destined and a belief that the whole system, which is all significant stakeholders, should be involved in the process of defining the desired future.

The approaches differ in several ways and each has its strengths and weaknesses. For example, the focus on present problems and problem analysis found in the LFA (Logical Framework Approach) [6] can lead to groups getting bogged down in the negative feelings of persistent problems or in trying to apportion blame for the problems to a particular part of the organization. This is often not conducive to resolving the situation. However, there are occasions where it is vital to identify the cause of a problem if a cure for that problem is to be found.

In practice, combinations of these approaches may be used. For example, the initial step might be a future search conference to define the strategic objectives. The second step might be to use part of the LFA approach to examine alternative strategies to achieve those objectives and to produce the detailed plans and to test their validity.

Future search is a structured planning meeting that makes possible actions once thought beyond reach in large, divers groups. These include projects and programs based on new forms of cooperation devised by participants. This approach is popular in non-business communities. In Future search the emphasis is to "leap forward" in time to identify the desired future condition and work back to find ways to reach that situation.

Open space was a precursor to Future search. It is far less structured than most other methods. There is no preset agenda other than the topic previously agreed to and the time allotted to the meeting. There are no planned panel discussions and no plenary sessions. The agenda is created through the facilitator inviting everyone present to nominate issues that he or she feels strongly about and is prepared to take responsibility for.

The approach SWOT is popular in business environments. It seeks to identify what the organization is currently doing well (Strengths), what it is not doing well (Weaknesses), what market conditions can be exploited to advantage (Opportunities) and what factors, internal and external can derail the organization's efforts (Threats).

This paper can be loosely divided into three parts. First, we present the strategic planning, and we present the issues involved in defining the strategic objectives. In order to deal with these issues, we present the case study of the Logical Framework Approach (LFA). The last section concludes the article, presenting likely some attempts to refine the LFA approach.

2. PRESENTATION OF STRATEGIC PLANNING

Strategic, or long term planning, is an attempt to shape the future. This implies that some vision of the desired future is has to be formulated. Strategic planning therefore starts by seeking to define this vision [6]. The current approach to strategic planning assumes that it will be a collaborative process, rather than one person deciding what the vision and goals should be. The strategic plan will define a small number, usually less that ten, of strategic objectives, which, if they are met will result in achieving the goal of the group or organization.

Organizations plan strategically with a number of expectations for example:

- To increase their probability of survival.
- To improve their competitive position.
- To increase their market share.
- To plan mergers and acquisitions.
- To help the organization better manage the effects of external forces.
- To motivate key people within the organization.
- To plan a quantum leap to a new phase of company growth.
- To plan for renewal and to consider to a new direction for the organization.

The planning process is the sequence of steps the group go through to produce the plan [7]. For example:

- Articulate the core values of the planning group.
- Develop a mission statement.
- Develop a vision statement.
- Determine the strategic objectives.
- Define the main activities and responsibilities.
- Disseminate and implement the plan.
- Monitor results and amend the plan as required.

The essential features of a process are:

- There are several steps; each step will involve a number of activities.
- All steps must be executed.
- The steps must be executed in the correct order.
- If the order is incorrect, or if any step is compromised, all following steps of the process will be compromised.

3. LOGICAL FRAMEWORK APPROACH (LFA)

The Logical Framework Approach (LFA), also referred to as Objectives Oriented Project Planning (OOPP) and in German as Ziel Orientierte Projek Planung (ZOPP) [8][9][10] is a structured meeting process. This approach seeks to identify the major current problems using cause-effect analysis and search for the best strategy to alleviate those identified problems.

The two terms Logical Framework (Logframe) and the LFA are sometimes confused. The LogFrame is a document; the LFA is a project design methodology.

The logical framework document is a 4 column by 4 row matrix. The cells of the matrix contain text that succinctly describes the most important features of a project. If the correct process was used to develop the content of the logframe, the document will reveal the quality of the design and make flaws readily apparent.

We might note that one common misuse of the logframe is to design the project first and attempt to "fill in" the logical framework matrix as an after thought. This defeats the whole purpose of the logical framework and the design methodology.

There is a logical connection between the cells of the matrix. The logic that connects the cells in the left most columns is referred to as the vertical logic; the logic that connects the remaining three columns is referred to as the horizontal logic. The vertical logic is the hierarchy of objectives of the project. The horizontal logic is rather more involved. For a given level of objective (equivalent to a horizontal row of cells) the horizontal logic describes:

- How the achievement of the objective will be measured or verified.
- How this information will be obtained.
- What are the external factors that could prevent the project manager and staff from achieving the next level objective?

3.1. Design methodology of LFA

The design methodology of LFA is a rigorous process, which if used as intended by the creators will impose a logical discipline on the project design team [11]. If the process is used with integrity the result will be a high quality project design. The method is not without its limitations, but most of these can be avoided with careful use of ancillary techniques. Many things can go wrong in the implementation phase of a project, but if the design is flawed, implementation starts with a severe handicap.

The first few steps of LFA are [12][13]: situation analysis; stakeholder analysis; problems analysis.

The document of "**Situation Analysis**" describes the situation surrounding the problem. The source could be a feasibility study, a pre-appraisal report, or be a compilation done specifically for the project design workshop. Typically, the document describes the problem situation in detail, identifies the stakeholders and describes the effects of the problems on them.

The stage of "**Stakeholder or Participation Analysis**" is an analysis of the people, groups, or organizations that may influence or be influenced by the problem or a potential solution to the problem. This is the first step to understanding the problem. We might say, without people or interest groups there would be no problem. So to understand the problem, we must first understand the stakeholders. The objectives of this step are to reveal and discuss the interest and expectations of persons and groups that are important to the success of the project.

If there is no agreement between participants on the statement of the problem, it is unlikely there will be agreement on the solution. This stage of "**Problem Analysis**" therefore seeks to get consensus on the detailed aspects of the problem [8]. The first procedure in problem analysis is brainstorming. All participants are invited to write their problem ideas on small cards. The participants may write as many cards as they wish. The participants group the cards or look for cause-effect relationship between the themes on the cards by arranging the cards to form a problem tree (Fig.1).

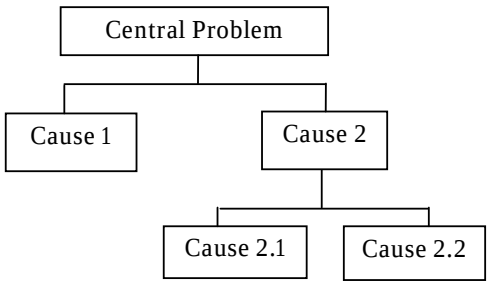

Fig. 1 - Problem tree

In the step of "**Objectives Analysis"** the problem statements are converted into objective statements and if possible into an objective tree (Fig.2). Just as the problem tree shows cause-effect relationships, the objective tree shows means-end relationships [14] [15]. The means-end relationships show the means by which the project can achieve the desired ends or future desirable conditions. Frequently there are many possible areas that could be the focus of an "intervention" or development project. The next step addresses those choices.

The objective tree usually shows the large number of possible strategies or means-end links that could contribute to a solution to the problem. Since there will be a limit to the resources that can be applied to the project, it is necessary for the participants to examine these alternatives and select the most promising strategy. This step is called "**Alternatives Analysis"**. After selection of the decision criteria, these are applied in order to select one or more means-end chains to become the set of objectives that will form the project strategy.

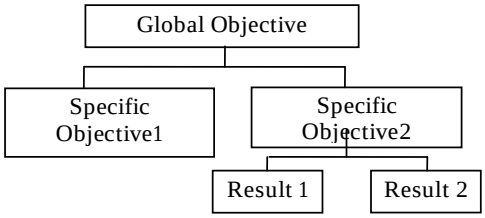

Fig.2- Objective tree

After defining the objectives and specifying how they will be measured (OVIs) and where and how that information will be found (MOVs) we get to the detailed planning phase: "**Activities Planning**". We determine what activities are required to achieve each objective. It is tempting to say; always start at the situation analysis stage, and from there determine who are the stakeholders.

3.2. Logical framework document

The Logical Framework as a document (Tab.1) is deceptively simple. There are 16 cells in a 4 column by 4 row matrix. To provide the text in the cells of the logframe (sometimes called the project matrix) the project designers are asked to address and answer a number of questions which, on the surface seem self evident. However, articulating the answers to these apparently self evident questions exposes many unstated assumptions and hypotheses.

Tab.1- Logical framework document

Narrative Summary	OVIs	MOVs	External Factors (Assumptions)
Development Objective			
Immediate Objective			
Outputs (Results)			
Activities	Inputs		

The process of examining these unstated beliefs should cause them to be questioned more closely during the design of the project. This examination often reveals that the assumptions and hypotheses are often questionable. If we test these assumptions and hypotheses and return the results of our work to the project design, we should produce a higher quality design [16][17].

The term Narrative Summary used to describe the text that "narrates" the objectives. It could have been given the title "Hierarchy of Objectives", but this might be misleading because the bottom cell in the column is a summary of the activities.

The Objectively Verifiable Indicators (OVIs) are the measures, direct or indirect that will verify to what extent the objectives have been fulfilled. The term "objectively" implies that if these should be specified in a way that is independent of possible bias of the observer.

The Means of Verification (MOVs) are statements that specify source of the information for the measurements or verification specified in the indicators column. For example, will statistics from an external source be used for the verification or will project resources be used to gather the statistics.

The External Factors (Assumptions) are important events, conditions, or decisions which are necessarily outside the control of the project, but which must remain favorable for the project objective to be attained. The implication here is the design team has an obligation to consider what might derail their efforts and to plan responsibly to reduce that risk of "derailment".

The Development Objective is the higher level objective that the project is expected to contribute to. The addition of the word "contribute" implies that this project alone is not expected to achieve the development objective. Other project's immediate objectives are expected to also contribute.

The Immediate Objective is the effect which is expected to be achieved as the result of the project delivering the planned outputs. There is a tendency for this to be expressed in terms of the "change in behavior" of a group, or institution and the project outputs are expected to facilitate this change.

The Outputs are the "deliverables" the tangible results that the project management team should be able to guarantee delivering. The objective statements should specify the group or organization that will benefit. Outputs are delivered, usually on a certain date or dates.

The Activities have to be undertaken by the project to produce the outputs. The activities take time to perform. The Inputs are the resources that the project "consumes" in the course of undertaking the activities. Typically they will be human resources, money, materials, equipment, and time.

The "Vertical Logic" is the reasoning which connects the three levels of objectives in the matrix; the outputs, the purpose, and the goal. For example achievement of all the output level objectives should lead to achieving the purpose. Each of these links between the objectives is connected by hypotheses.

The "Horizontal Logic" has similar features to the vertical logic. In this case, the links between the levels of objectives are the items in the External Factors column. For example, if the project is successful in implementing all of the planned activities, we ask ourselves, what circumstances or decisions (outside the project's control) could prevent the delivery of the project outputs.

4. REFINING THE LFA INTO TEAMUP

The LFA approach has become the standard for International development project design. Team Technologies expert staff assisted in the original method development and has continued to refine the approach into TeamUP: the team-based Logical Framework method. In fact, Team Technologies has worked with numerous international aid organizations to implement its Project Cycle Management method organization-wide based upon the LFA.

TeamUP developed in the late 1980s by the World Bank's World Bank Institute and Team Technologies, uses the basic ZOPP method and then expands it. TeamUP assumes that the past and future are two different sources on which to draw when designing and implementing project related events [18].

ZOPP, mainly concerned with anticipating and avoiding problem situations, looks to the past to understand the present. TeamUP, concerned with problems and opportunities, looks to the past and the future to understand the possibilities that offer themselves to the present. Furthermore, TeamUP adds depth to basic problem identification and design features by encouraging teams to anticipate implementation arrangements and inform the quality of their designs with these realities.

TeamUP's twelve steps are arranged so that earlier steps help a team build identity and later steps help them take action [19][20]. These twelve basic steps are: Opening round; Clarify representation ; Set norms; Identify client; Review history; Define mission; Define deliverables and assumptions; Clarify work plan; Define roles and responsibilities; Define learning system; Establish budget; Implement and improve.

The latest software from Team Technologies, integrates the most popular, proven set of tools for international development planning and implementation into an easy-to-use, windows based software application supporting program portfolios and their associated project. The modules of the software include Program and Project Information, Stakeholder Analysis, Trees Analysis, Program and Project Structure, Conflict Analysis, Logical Framework, Schedule, Performance Tracker, Performance Budget.

5. USING THE OOPP METHOD IN TUNISIA

The OOPP method, widely used in the planning of complex projects, involves many operators and partners. In Tunisia, The OOPP method was used in Development projects financed by bilateral or multilateral co-operation mechanism (with Germany, Belgium, Canada, World bank,...), in upgrading different structures (Training and Employment through MANFORME project, Organization of the Tunis Mediterranean Games 2001,...) and in restructuring private and public enterprises.

An effort has been provided in order to bring improvements to this method [21]. This is how the OOPP method has been spread and a new MISDIP denomination (Method of Specification, Development and Implementation of Project) was adopted. The MISDIP method adopts the OOPP analysis and the complete it to specify the system of organization, to specify the system of information, and to contribute to its development and implementation.

N°	Code	Activity	If_1	If_2	If_3	If_4	If_5	If_6	If_7	If_8	If_n
1		A_1	0	0	1	1					
2		A_2		0	0		1	0			
3		A_3	1	0	0	0		0	0	1	
4		A_n									

Fig.3. Information matrix associated to the OOPP analysis

In order to specify this information, information matrix (Fig.3) associated to OOPP analysis was defined enabling the determining of the relations between the activities or between the concerned structures identify the information sources, determine the manner in which the information is exploited [21].

In addition of the information matrix of the new MISDIP method as well as the different tools developed, the development of the organization chart constitutes an essential stage. Indeed, variants of the organization chart are elaborated according to the strategy of the enterprise while taking account of the hierarchy of entities and the balancing of stations according to their complexity. These variants constitute a tool the decision making.

6. CONCLUSION

In this paper, we presented different methods and approaches used to enhance participation in IS planning and requirements analysis and the different approaches in use to define the strategic objectives. Many attempts are presented in order to refine the LFA approach. The methods LFA and TeamUP are described and commented and some applications of the OOPP method in Tunisia are presented.

REFERENCES

[1.] R.M. Roth, W.C.I. Wood and A Delphi approach to acquiring knowledge from single and multiple experts, in: Proceedings of the 1990 ACM SIGBDP Conference on Trends and Directions in Expert Systems, 1990.
[2.] M. Parent, R.B. Gallupe, W.D. Salisbury and J.M. Handelman, Knowledge creation in focus groups. Information & Management 38 (1), 2000, pp. 47–58.
[3.] H.K. Jain, M.R. Tanniru and B. Fazlollahi, MCDM approach for generating and evaluating alternatives in requirement analysis, Information Systems Research 2 (3), 1991, pp. 223–239.
[4.] A.C. Stylianou, R.L. Kumar and M.J. Khouja, A Total Quality Management-based systems development process, The DataBase for Advances in Information Systems 28 (3), 1997, pp. 59–71.
[5.] K. Schoman, D.T. Ross, Structured analysis for requirements definition, IEEE Transaction on Software Engineering 3 (1), 1977, pp. 6–15.
[6.] Cracknell, B. Evaluating the Effectiveness of the Logical Framework System in Practice, Project Appraisal, 1989.
[7.] Kensing F., Simonsen J, "Participatory design: issues and concerns. Computer Supported Cooperative Work", The Journal of Collaborative Computing, 7 (3/4), p.243-271, 1998.
[8.] McLean D., Logical Framework in Research Planning and Evaluation, International Service of National Agricultural Research Working, Washington, 1988.
[9.] GTZ, ZOPP: an Introduction to the Method, Eschborn, Germany 1988.
[10.] GTZ, Methods and Instruments for Project Planning and Implementation, Eschborn, Germany 1991.
[11.] Administration Générale de la Coopération au Développement, Manuel pour l'application de la «Planification des Interventions Par Objectifs (PIPO)», 2ème Edition, Bruxelles 1991.
[12.] Walter EM., Introduction à la méthode de Planification des Projets par Objectifs, Rapport de l'atelier de formation REFA, Maroc 1998.
[13.] Killich S., TeamUp, a software-technical support-tool, businesses of the future, Aachen, 2002.
[14.] Killich S., Luczak H., Support of Interorganizational Cooperation via TeamUp at Internet-Based Tool for Work Groups, Work With Display Units, Proceedings of the 6th internationally Scientific Conference, Berchtesgaden, May 22-25, Berlin 2002.
[15.] Killich, S., Fahrenkrug C., Intercompany Cooperations smaller and middle Businesses in the automobile-supply-industry, VDI-Verlag, Düsseldorf 2002.
[16.] Luczak H., Nölle T., Kabel D., "Benchmark of team-performance in the Product development: use a model-was based tool", Ergonomia, Stuttgart 2003.
[17.] Weissenbach, M., Killich S., TeamUp: An Internet based tool to the support cooperation, VDI-Verlag, Düsseldorf, 2002.
[18.] Team Technologies, LogFrame R&D Software and User Manual, Virginia, 1991.
[19.] P. Gu and Y. Zhang, OOPPS: an object-oriented process planning system, Computers & Industrial Engineering, Volume 26, Issue 4, October 1994, Pages 709-731.
[20.] Peffers K. and Ture Tunanen T, Planning for IS applications: a practical, information theoretical method and case study in mobile financial services, Information & Management, Volume 42, Issue 3, March 2005, pp 483-501.
[21.] Annabi M., PIPO étendue : Méthode Intégrée de Spécification, de Développement et d'Implémentation de Projet (MISDIP), STA'2003, Sousse, 21-23 déc. 2003.

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DEVELOPMENT OF FORECASTING SYSTEMS

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ABSTRACT:
In this paper we demonstrate a detailed overview of the history of forecasting software applications over the past decades, concentrating especially on the interaction between hardware and software. Additionally we present a framework by describing important developments of forecasting techniques in terms of hardware and software environments. We then focus on the application areas of forecasting software modules in business and planning environments which are often partially automated due to the large number of time series involved. Finally we make some suggestions about in which direction forecasting software should be improved.
KEYWORDS:
forecasting software applications, detailed overview

1. INTRODUCTION: THE HISTORY OF COMPUTER DEVELOPMENT AND FORECASTING METHODS

The history of forecasting and time series methods began in the 17th century when numbers of sunspots and price indices were analyzed by scientists. However, the practical use of statistical techniques has been made possible by the invention of computers in the 1950s.

At the beginning, the use of computers for forecasting was limited by inadequate processor speed, random access memory and disk space. In the 1960s, forecasting was capable to analyze short and isolated series, collected in flat files, and processed by batch runs using Hollerith cards on mainframes. In these days programming was mainly done in Assembler and FORTRAN under a variety of different and largely incompatible operating systems.

The introduction of OS/360 in 1967 as a scalable operating system for IBM mainframes resulted rapid migration between hardware platforms, simplifying the movement of programs. It was developed by IBM (Brooks, 1974) with the intention of creating programs that could be run on IBM computers of different sizes. Prior to the development of OS/360, operating systems were only designed for individual computer architectures. With the arrival of the system, software could finally be moved from one computer to another.

The appearance of UNIX in 1969 resulted in the development of portable software for smaller systems. The introduction of personal computers such as IBM PCs and Apple Macintoshs in the first years of the 1980s allowed the use of computers at everywhwre, independent of mainframes.

Many advances in computer science had an influence on forecasting. The continous increase of processor performance, memory and disk space allowed scientists to deal with larger data sets and more complex algorithms. Later cathode-ray terminals supported the design and use of interactive applications with their character user interfaces (CUI), screen reports, and graphs. This development occurred in the 1970s, when a lot of mainframe management information systems and manufacturing resource-planning systems appeared on the market. The next step to graphical user interfaces (GUI) in the 1980s changed the software environment, as allowed a much larger community to use forecasting software.

Application software also changed in the 1960s, when forecasting methods were individually programmed using either Assembler or FORTRAN. This allowed later the selective use of new techniques such as smoothing or complex techniques such as Box–Jenkins models. Several

statistical and econometric software systems were developed in the 1970s. In the meanwhile, material replenishment systems, which focused on inventories and production, were developed independently of the statistical forecasting tools. Later these became the roots of enterprise resource planning (ERP) and management information systems (MIS). This is important because this difference has never been closed entirely. Only in recent years have the data produced by ERP systems been used as input data into forecasting software.

Databases were developed simultaniously. At the beginning, data was collected manually and stored on punched cards, or transferred to text files on disks and tapes. While this remained the primary method of data input into statistical systems for a long years, transaction and planning data were migrated to database management systems (DBMS) quite quickly. The development process started from hierarchical and network databases in the 1970s to relational database systems in the 1980s, enhanced by object-oriented DBMS in the 1990s. The last two resulted in the object-relational database systems used these days. Within business planning, data processing was often replaced by PC-based spreadsheets, which were saves and modified on local PCs. This separation of local planning data and centralized transaction data still can be detected today, often resulting in problems of consistency and concurrency of the database. In a further step, the integration of database systems and transaction systems happened. With the constant increase of available data, databases moved on to data warehouses, offering also a wide range of tools for extraction (on-line analytical processing, OLAP), visualization, and analysis, including predictive data mining techniques.

2. DEVELPMENT PERIODS OF FORECASTING SOFTWARE

While computer development was evolutionary, the development of forecasting software can be categorized into periods. These are:

- Period I.: Mainframe forecasting software
- Period II.: PC and workstation forecasting software
- Period III.: Process-oriented and highly integrative forecasting software

2.1. Period I.: Mainframe forecasting

Mainframe software, either in batch or timesharing mode, dominated forecasting software in Period I. However, some very popular programs took quite a while to offer even basic forecasting features. For example, SPSS surprisingly had no forecasting functionality until it added the „Trends” module in 1994. On the other hand, SAS/ETS was first released in 1980.

In industry, commercial firms devoted to forecasting for industrial clients did so with mainframe computing capabilities. The main packages offered were DAMSEL, TROLL, AUTOBJ. B34S, and TSP were available not only to industry but also to academical use.

Prior to this time, microcomputers had been the domain of computer programmers, primarily because of the lack of application software. The first popular spreadsheet package, Visicalc, turned the microcomputer into an effective business application. Lotus 1-2-3, released in 1982, offered the combination of spreadsheet, presentation graphics, and simple database functionality to for the PC. However, there was no forecasting in this field in Period I. There were two main reasons for this. First, the lack of solid compilers. Second, mainframe packages could not be moved directly to the PC, as the PC was still not powerful enough. Only some parts of the mainframe software could be used on a PC version, and even then it should have to be rewritten in BASIC instead of the original FORTRAN.

2.2. Period II.a: IBM PC and forecasting packages

By 1985, the succesful IBM PC and its clones had been around long enough that forecasting software was available. By 1989, more than one hundred software forecasting packages were available for the PC (Rycroft, 1994).

In this period, universities also began to move away from mainframes, setting up PC laboratoriums. For industrial companies, the situation was slightly different. Corporate IT departments, in order to controlling the mainframe, had long dictated computer use. Every single department could buy and use a PC, and they didn’t need the IT department to approve the purchase or maintain the computer. For such departments, the PC had become effective enough to work in large scale forecasting, for example for production and inventory purposes.

However this decentralization generated new problems. Different organizational units might track the same data but maintain them differently, or use different numbers to represent the same facts. Therefore, the databases would also produce conflicting data, and different forecasts too. The PC was at this stage just a batch engine, it was capable of only to produce forecasts for large numbers of items, and then write these forecasts to a file. It was still not good enough to do this work interactively.

The wide spread of standalone PCs produced its own urgent need. These PCs might solve the problems of individual organizational units, but they did nothing to improve the flow of information between these units. The persons making the forecasts for production had no idea how many parts were in inventory. Solving this incompleteness would be up to Enterprise Resource Planning (ERP) systems.

2.3. Period II.b: modern PCs and forecasting software

The Intel 486 processor appeared in the market 1989, and the class of forecasting problems for which mainframes were necessary become much smaller. The capabilities of forecasting software had reached a stage where even persons with no technical training could benefit from methods that previously had required technical training and support. After this, given just a univariate time series, a program could determine which method best suited the data (for example exponential smoothing or ARIMA) and then optimize the parameters for the chosen model. The importance of this advance was that people could work out very good forecasts without consulting an expert. However for these forecasts to be good, they also needed reliable data. In this period, each department maintained its own database and each database had to be updated individually, so multiple databases could not be updated from the same source. Consequently, in these databases there were conflicting information and could not serve the entire organization. ERP vendors such as ORACLE, SAP and People- Soft realized the opportunity, connecting the disparate computers and databases via a client/server architecture. However, it required many years before this task was completed.

2.4. Period III.: PC and client/server architectures with forecast software

After ERP systems has been implemented, with all the data flowing back and forth, forecasts were comletely missing from them and were often made with Excel 6, if at all (Sanders, Manrodt, 2002). Forecasting methodology has made great developments (Chatfield, 1996), but the pace at which these advances have been included into software were not fast enough. As far as industrial software is concerned, ERP vendors can't produce forecasting software. The solution was the integration of existing forecasting software with the ERP systems.

3. DEVELOPMENT OF FORECASTING SYSTEM FOR BUSINESS AND OPERATIONAL PLANNERS

3.1. Business and operational planning

Business planning repeted on a regular basis, often with the creation of a monthly sales plan. Accordingly, the sales plan is the basis for marketing plans, purchase and production decisions or investment planning. A sales plan differs from an operational plan in that it addresses a higher level of aggregation in terms of both time and product, and is expressed in revenues rather than volume. Business planning forecasts are usually worked out on a monthly, quarterly or annual basis for product groups (instead of products), brands, and different business units such as sales regions. The average forecasting horizon usually ranges from 1 to 5 years.

Production and logistic decisions are supported by an operational plan. The main aspects of these plans come from the company's supply chain:

- demand plan,
- inventory plan,
- transport or distribution plan,
- replenishment plan,
- production plan,
- maintenance plan, and
- collaborative plans.

For operational planning, forecasting programs are used to calculate future demand per stockkeeping-unit (SKU) on a daily, weekly or monthly basis. For example in energy planning, forecasts are required by the hour and at 15 minute intervals. In general, forecasts at the SKU-level needed for a large number of items, very often in the thousands, and these items are usually grouped into a product hierarchy, by distribution channels and by sales regions. When numerous items must be forecasted on a frequent regular basis, the uses of pre-defined or automatic forecasting techniques are critical. Forecasting systems must not only meet organizational requirements for accuracy but also for processing speed and robustness (Hartványi, Nagy, 2009).

The difference between business planning and operational planning depends on the way a firm organizes it's planning processes. Ideally, a forecasting system should integrate both elements into a consistent set of plans. This is not easy for many companies today, where we find separation more often than integration. In operational planning, the forecast time interval is short and often not more than 6 weeks. These forecasts heavily affect decisions on the production levels per line, lot sizes, transportation schedules, and the purchasing of materials for particular time periods. In

business planning forecasting the number of time series is usually low, allowing individual inspection and modification by the planner. On the other hand, in operational planning the number of time series is huge, which severely limits the possibility of individual inspection and modification. So automatic procedures for forecast calculation are necessary.

Additionally, business planners are usually less experienced in forecasting techniques than in the functional areas of the business, such as marketing, finance and accounting. For operational planners it is the same, because they are often engineers or business administrators with a detailed knowledge of the logistical and technical processes, but with limited knowledge with forecasting methodologies.

3.2. Forecasting system for business and operational planners

Although forecasting libraries in FORTRAN and Assembler were used from the 1960s, but their use was very limited. Practically this meant that, sales plans were still set up on paper. Very slowly, larger companies began to implement these routines for business planning. However, these routines only provided forecasts, without any integration to other systems. To calculate forecasts, batch runs had to be programmed and intervention in the forecasting process itself (for example alteration of parameters) was not possible. While an analyst concentrating on forecasting a few series has enough time to try out different forecasting models to improve forecast accuracy, the time needed for an operational planner with a much larger number of series was too much. Therefore, they used only basic, standard models within the business forecasting process. As a result, forecasting accuracy was usually poor. It took a long period of time for companies to inplement forecasting for business planning and even longer for operational planning.

In simple batch processing systems, the user could not interact with the software as it was described. This deficiency was remedied by the introduction of lineoriented terminals, which allowed the software to ask the user for his input during the different processing steps. For example, a seasonal decomposition could be calculated before deciding whether to apply seasonal or nonseasonal forecasting models.

With the appearance of character-based user interfaces the user could move the cursor all over the monitor, and enter instructions without following a prescribed sequence. This was the first time the planner could make technique selections by setting all parameters simultaneously on the same screen before starting the forecast calculation.

The first software products that allowed business planners to interact closely with the forecasting process appeared in the 1970s. These offered simple planning methods such as administration of time series, aggregation and disaggregation of series, planning screens, report generators, and functions to modify data and produce simple graphs.

Simultaneous progress was being available in data base programs (for example dBase) and spreadsheet systems. These, along with rapidly increasing hardware capabilities, offered major advances in forecasting software including parameter optimization (optimizing smoothing constants in exponential smoothing), multi-level forecasting for product and geographic hierarchies, data and forecast overrides, and so on.

Graphical elements, interfaces to databases, spreadsheets, external data sources, numerically and statistically robust methods, and simple automatic algorithms for the selection and specification of forecasting models were now common tools of business forecasting software. Not surprisingly, awareness of forecasting program tools grew rapidly, although the majority of companies at the end of the 20th century still used spreadsheets to develop sales plans.

Most recently, with the emergence of computing networks and intranets, participants in the forecasting process who were located at different sites could more readily collaborate with each other, particularly on sales plans. Collaborative forecasting capabilities were implemented into systems such as Demand Solutions, Futurmaster and Futurcast.

The difference between business planning and operational planning was now disappearing. Softwares such as Peer Planner and Logol could be used to calculate forecasts at the product level for operational planning, as well as at the product-group level for business planning. The emphasis in such softwares was not on the planning process but on the forecasting engine. However, the use of methodologically sophisticated forecasting softwares strongly linked to production scheduling, transport planning, inventory and purchasing was unknown in the past. After a long period of time the main obstacles were the missing interfaces between the forecasting and the production planning components.

The first commercial forecasting softwares, like IMPACT, were simply operational forecasting and replenishment systems, providing SKU forecasts. However, product-level forecasts were needed to support production scheduling and material replenishment. As a result, simple forecasting models were included in production planning systems, including BAAN, i2, Peoplesoft and SAP/ R3 (Fandel et. al., 1998). In comparison to the business forecasting softwares, these

operational systems (SAP/R3, mySAP) incorporated only simple methods such as trend curves, elements of exponential smoothing and tracking signals. Standard techniques, such as probability-based prediction intervals and out-of-sample evaluations, were not implemented. This difference was partially closed by the end of the 1990s. SAP for example developed an application called APO, where forecasting methods and sophisticated optimization routines augment the simpler functions included in SAP/R3. Still, sophisticated modeling such as the automatic Box–Jenkins systems as implemented in Autobox and SCA-Expert, as well as rule based forecasting (Collopy, Armstrong, 1993), have not developed into operational planning.

3.3. The future of forecasting systems for business and operational planners

The most business and operational planners focusing on similar data, mainly sales figures. Sales effects at both the product and group levels have common origins, such as seasonality, trading days, and promotions, so it would seem that the same forecasting methods could be applied. On the other hand, there are significant differences. While a business planner focuses on forecasting a small number of aggregated series and makes effort to provide detailed explanations and reporting, operational planners have to keep their attention across a large number of series and frequent forecast rounds. So the operational planner can intend much less time to the specific features of the data and the forecast models, and seeks to automate the forecast process as much as possible.

Future challenge is to integrate the business and operational planning components in one application. First of all DBMS interfaces are required, just as they are made by analysts. However, for rolling planning systems it is not so important to have many interfaces. Instead, a stable, solid and fast interface to the transaction database or online data warehouse needed. Obviously this technique is simplified (and cheaper) if little or no interface programming is required. The reliability and online synchronization of the forecasting database with the actual enterprise database are the most important factors here.

Additionally, in supply chains of consumer products bullwhip effects often occur, which can be described as an increase in variability as fluctuations move up the supply chain. This means that retailers directly detect the customer demand without much variation while inventory and reorder levels fluctuate considerably across their supply chain. An possible method to handling this problem is the introduction of collaborative planning and forecasting replenishment (CPFR) and vendor managed inventory (VMI) applications. Because these forecasting processes involve several organizations of the supply chain, the software must come with a standard interface by which data can be exchanged. Some companies have developed standards regulating the data exchange processes, as well as the data structures and contents. For example, a standard for exchanging information within the German consumer goods industry has been worked out by the Centrale für Coorganisation (CCG, 2002). Standardization of supply chain management processes is also began, according to the Supply Chain Council (2004), which developed the „Supply Chain Operations Reference". More and more SCM vendors follow this process architecture, so forecasting system vendors will also have to pay attention to it.

There is a special problem with truncated supply chains which quite common in practice. In the case of a surplus demand, most systems usually do not archive the actual demand but only the actual sales, so that only sales data can be used for forecasting. Consequently all forecasting techniques, with the exception of subjective approaches, generate biased forecasts which lag behind real demand. Another frequent problem which sometimes happens in practice is that sales data are archieved on the day of invoicing which often does not fall on the day of shipment. Shipment being relevant for production and logistics scheduling. Such problems cannot be solved by methodological inventions but only by correct database structures. Nevertheless, application and database vendors should set up solutions to save this information jointly with the time series to be forecasted to allow more detailed analysis and to make the application suitable for future methodological enhancements.

Additionally, when inplementing special effects like advertising and calendar events, modeling is still often on a case-specific base requiring user interaction, for example by setting up a distributed lag structure for the advertising effect. With the huge number of time series in planning, some of the techniques indicated above (pre-defined effect profiles and lag specifications) should be run automatically and over hierarchies. Manual modification must be limited to a small number, requiring the use of some kind of effect prorating or automatic modeling.

Error prone procedures can only be used if exceptions will be caught by trap mechanisms. Unfortunately there are still many softwares that are not able to detect and handle numerical errors (such as overflow and insufficient data) suitably. Furthermore there are still wellknown and widely sold softwares where the forecasting methodology is limited to a small number of trend curves and exponential smoothing methods.

While many methods usually work satisfactorily for some longer series, especially on a monthly base for short time intervals, the increased application of high frequency data needs the incorporation of causal effects. Unfortunately, current softwares do not offer a well established but simple methodology. As a result, most planners are forced to limit their forecasting repertoire to techniques which do not take causal effects into account.

Forecasting systems has been designed as standalone applications focusing on model selection for obtaining accurate forecasts. The forecast sotware vendors invest little in the processing of the forecasts for important decisions such as those involved in inventory replenishment and production scheduling. Moreover, many of them do not offer interfaces to other information systems.

An important deficiency of planning systems is the lack of attention paid to the theoretical basis of modeling, and therefore to the measurement of uncertainty in the forecasts. Without measures of uncertainty, the forecasts are not directly useable to replenishment and scheduling decisions. If, for example, forecast error distributions were computed and passed on to ERP software, forecast uncertainty could be involved into the computing of lot sizes and replenishment levels and intervals.

It is expected that forecast method selection should not be based simply on forecast error metrics but also on the costs of forecast errors in terms of replenishment decisions (Gardner, 2004). For example, the frequency of out-of-stock occurrences resulting from a certain method should suggest the need to change to a different method, as should excessive inventory costs. The required feedback between the forecast and the decision is not resolved in planning softwares. The problem is aggravated by the concentration on point forecasts in optimization routines for production scheduling. Consequently they fail to provide the capabilities of modern forecasting methodologies to measure uncertainty.

In production systems, the number of out-of-stock situations are often tracked by key-performance indicators (KPI). Most KPI-systems do not include reliable indicators of forecast errors, the difference of forecasts from actual demand. While recording signals have been around since the 1960s, these metrics are more often found in planning system than in forecasting system. Sometimes statistical metrics can be found in systems with a primary focus on planning, but the majority of advanced planning systems only give non-statistical alerts. From a business point of view, out-of-stock percentages and excess stock are useful, but these statistics are hardly used for reporting forecast accuracy. For the last static and dynamic forecast simulations are suggested, but their availability in integrated planning and forecasting softwares is not common.

4. CONCLUSIONS

Only a few forecasting systems offer state-of the- art functionality. Too many softwares rely on outdated techniques. Examples are non-optimized smoothing parameters, poor initialization in exponential smoothing, erroneous formulas for computing safety stocks, graphs with inefficient time scales, lack of capability for forecast adjustments, aggregation of individual item forecasts and prorating of aggregate forecasts, as well as erroneous prediction intervals. Forecasting vendors need to upgrade to incorporate more recent methods.

Many new techniques in forecasting are not included into forecasting software within a reasonable time. Software vendors usually have to wait to see which new methods stand the test of time, but these methods are tend toward the simpler ones. If a scientist wishes to apply a new method, he must duplicate the effort of the inventor, as he must rewrite code that already has been written once. This is not the right way for science to progress. By given the choice between programming a difficoult method and a simple method, many researchers will choose the simple method, because it is easier. So these are the easily programmable methods that get used in applied journals.

Software vendors concentrate to new techniques face an additional obstacle. They discover that a new technique has become popular in the applied literature, and then try to write their own code for the proposed forecasting model. Often they must make educated guidence about the details of the algorithm that were publicated in the article. Moreover, testing new techniques is even more difficult than it should be because inventors of the methods were not required to create an archive of the data used. Sometimes it is impossible for the developer to decide that his version of the program gives the same answer as the inventor's published results.

So while hardware processes are much faster, software advances are lagging behind. In order to test a new method, the developers and researchers have to program the code from the start. In the age of the internet, there is no reason not to record the data and the code used as the basis for an article. Imagine how easy it would be for a researcher to compare two or three different techniques if he did not have to program each one from the beginning.

We believe that development in forecasting needs forecasting methodology to be closely linked to the available data and to the environment in which business decisions are made. We would require much closer integration between the information offered by forecasting and the use of this information in optimization and decision-making.

REFERENCES

[1.] Brooks, P. (1974). The mythical man-month. Reading, Massachusetts Addison-Wesley
[2.] CCG (2002). Der Weg zum erfolgreichen supply chain management. Köln Centrale für Coorganisation
[3.] Chatfield, C. (1996). Forecasting in the 1990s. The Statistician
[4.] Collopy, F., Armstrong, S. (1993). Rule-based forecasting: Development of an expert system approach to combining time series extrapolations. Management Science
[5.] Fandel, G., Francois, P.(1998). PPS- und integrierte betriebliche Softwaresysteme. Grundlagen, Methoden, marktanalyse. Berlin, Springer
[6.] Gardner, S. (2004). Exponential smoothing: The state of the art: Part II. Paper presented at the ISF 2004, San Antonio
[7.] Hartványi, T., Nagy, V. (2009): In-sourcing Model for Food Storage and Forwarding. Acta Technica Jaurinensis, Series Logistica. Vol. 2. No. 3.
[8.] Rycroft, S. (1994). Microcomputer software of interest to forecasters in comparative review, International Journal of Forecasting
[9.] Sanders, R., Manrodt, B. (2002). Forecasting software in practice: Use, satisfaction, and performance. Interfaces
[10.] Supply Chain Council (2004). Supply chain operations reference model (SCOR) 6.1. www.supply-chain.org

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INVENTORY LEVEL REDUCTION BY INSERTING UNPACKING STATIONS IN PRODUCTION SUPPLY PROCESS

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ABSTRACT:
This paper deals with questions of production supply of assembly plants. It is a general aim to resolve the trade-off between production supply service level and engrossed component stock level in production. On the one hand by pumping components to production in larger portions supply processes become simpler and quicker. On the other hand large portions cause high level of component stock. By inserting unpacking stations between warehouse and production lines, optimal system can be achieved. With the help of computer simulation software a model a single-stage kanban controlled production supply system was modeled where production lines receive components directly from warehouse. After that we simulated the effects of establishing unpacking stations that distribute components for production lines and determined the inventory level reduction.

KEYWORDS:
Production, inventory level, unpacking station, simulation

1. INTRODUCTION

New trends of manufacturing systems concentrating fully on perfect customer fulfillment (e.g.: MCM - Mass Customized Production) emerged in the previous decades. Manufacturers are facing with the problem that mass production should be run according to diverse claims. Because of diversity large lots are split into smaller ones which results in set up time increase; which of course results in decrease of production capacity and increase of costs. In order to find optimal solution of these kinds of trade-offs several methods, philosophies exist. In this paper we deal with a narrow problem which is a decrease factor of production costs that affect the mentioned trade-off at kanban system supplied manufacturers. The size of packaging units delivered from warehouse to production firmly influences inventory level and cost. In order to minimize this inventory level by unpacking packaging units into smaller ones may be one possibility. During our research we used logistic simulation software to validate the assumptions.

2. REVIEW OF KANBAN PRODUCTION SUPPLY SYSTEMS

Kanban originates from the Japan word “card”. Several researches were made in this topic Junior and Filho gives a broad overview of kanban features [9].

In production systems cards, empty boxes or digital signals indicates the consumption of production processes. Kanbans usually contain part number, lot number, part description, location, destination, quantity, lot quantity, and other additional information.

Reaching a pre-defined inventory level – e. g.: certain number of empty boxes accumulates at an inventory buffer – starts the supply process; inventories are filled with kanban quantity. By kanban philosophy WIP (work in process) level can be decreased drastically since only the used up quantity is ordered from warehouse or partner. However packaging unit quantity, size and material handling circumstances – e.g.: lead time - often strongly determine kanban batch size and affect

WIP level. Also safety factor is built in the system; these are the causes why zero inventory level can not be achieved in manufacturing practice. The schematic figure of kanban material flow is illustrated on Fig. 1.

Just in time (JIT) manufacturing systems produce according to production schedule, which is generated by ERP (enterprise resource planning) systems based on customer orders. Purchase orders and incoming deliveries fit to production schedule; the right product is delivered/produced at the right time. According to Chan the most appropriate tool for supporting JIT manufacturing is kanban [3].

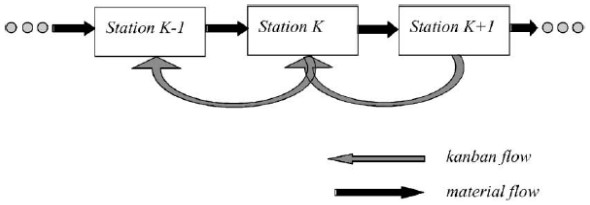

Fig. 1. Mechanism of the material and message flow in a Pull-type manufacturing system [3]

Sharma and Agrawal established a simulation model in order to aid control policy selection; their simulation result showed that in case of manufacturing systems the most preferred control policy is kanban [15]. Simulation is widely used to investigate features of manufacturing systems or whole supply chains applying kanban control policy – e.g.: [5],[6],[10],[13],[21]. Also applications of mathematical models confirm advantages of kanban [20].

The kanban size has a prior importance on determining in-process inventory level. The number of kanbans can be calculated with Toyota's formula [3], [4], [8] in Eq. 1.

$$n = \frac{d_a \cdot (t_w + t_{pc}) \cdot s}{k} \tag{1}$$

where d_a means the average consumption of the particle during given period, t_w means the waste and waiting times, t_{pc} means the processing time, s is a safety factor, k is the quantity of kanban packaging unit, kanban box or container.

The demand of a production line is a stochastic value, methods to calculate variability of production lines exist [7]. Also optimal planning methods support demand estimation [14],[11].

An approach for determining the optimal location of inventory control points in serial production systems with pull control has been presented by Askin and Krishnan [2].

The trade-offs between optimal base stock levels, numbers of kanbans, and planned supply lead times are demonstrated by Liberopoulos and Koukoumialos [10]. When designing single-stage kanban system the main parameters are the workstation production capacity and processing rate, utilization factor of the system, number of servers in the system, and the ordering rate of raw material [1]. However kanban systems are getting more and more complicated Sarker and Balan indicate that the issues of raw material orders, WIP inventory and finished goods setups (batch sizing) have to be considered together rather than separately in order to minimize the total cost of the inventory system [13].

In adaptive kanban systems the number of kanbans changes according to the consumption and inventory level [17], [19]. The design of adaptive systems is supported by mathematical models (Genetic algorithm, Simulated annealing-based heuristics) [16], [17].

3. BUILDING SIMULATION MODEL

During our research we have collected production data from electronic assembly company that used single stage kanban system. In this case operations on products are taken by only one single work center; material movement between work centers is not present.

In our research the current kanban system is compared with a modified system:

I. The current is a simple single-stage shop-floor kanban system in which raw materials are delivered from warehouse to work centers in the package provided by vendor. This means fix, non-optimal kanban number and quantities.

I. In the other version unpacking station is applied. We assume that by applying unpacking station inventory level would decrease smaller buffers at work centers and in warehouse is needed.

At many cases it is not recommended to unpack packaging units without proper identification process, because it would damage product traceability. This is problem is especially present at participants of automotive, industry, machinery, food industry, etc. If the connection between new package and the parent package is registered traceability is feasible.

We examined 5 raw materials used at 3 work stations. This survey is an initiative investigation to a broad company research; in the future this simulation model will be expanded to most problematic material. There is a company directive regarding raw material inventories namely the inventory located at shop-floor should not exceed inventory level enough for half an hour production. Of course if packaging unit quantity exceeds this half an hour inventory level, it can not

be achieved. Considering this the installation of unpacking stations is not a possibility but compulsory.

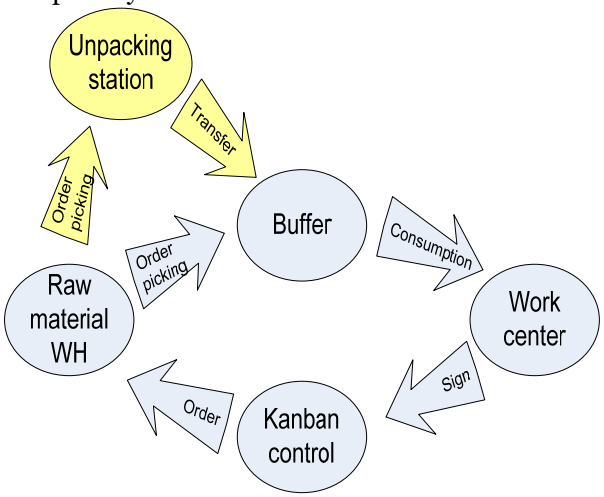

Fig. 1. Simple scheme of manufacturing system

Fig.1. shows the schematic model of current manufacturing system and manufacturing system installed with unpacking station. At each work center maximum 2 packaging units can be present, one with whole quantity and one in process. At the point when the whole packaging unit is opened a new kanban is forwarded to the warehouse, the order is picked and delivered to the work center.

Basic input data of the model are the followings:

N_{RM}: quantity of raw centers

Q_{PU}: Packaging unit material per finished good, retrieved form BOM list

T_{CWC}: Cycle times of work quantities

T_{CP}: Cycle time of picking process

Table. 1. Input parameters of simulation

Work center	Part_01	Part_02	Part_03	Part_04	Part_05	Throughput of production line (pcs/min)	Cycle time (sec/pcs)
Work center 01	0	0	0	4	2	2	33
Work center 02	5	0	2	12	0	1	74
Work center 03	0	1	6	0	1	2	55
Quantity of packaging unit (pcs)	300	25	1 000	300	10		

The numeric data used for simulation are demonstrated in table 1. The size of packaging units are determined by the vendors, the company has some influence on it during the product and packaging design phase. The packaging unit quantity is usually size dependent. For example Part_05 is a larger box that is why the packaging unit quantity is only 10. Naturally in case of smaller kanban quantities more picking cycles should be made and higher kanban number should be determined and also unpacking would not have significance in the simulation. Based on simulation results the kanban number of Part_05 at Work center 01 is 3 so the maximum number of packaging units can be 12 (11 whole and 1 in use).

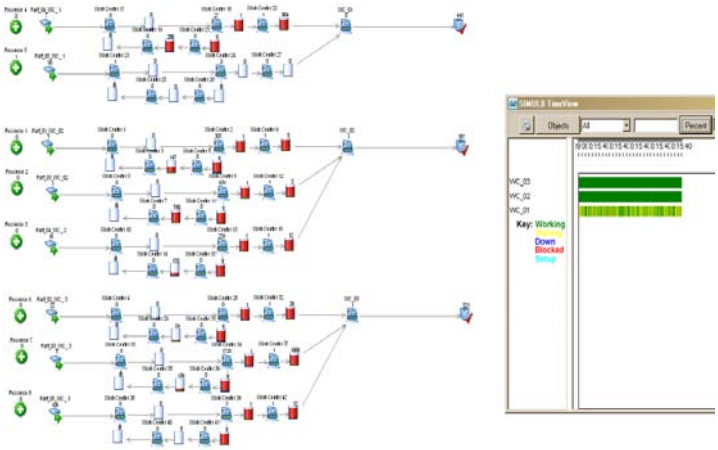

Fig. 2. Graphics of simulation model

The picking process lasts at about 300 sec with normal distribution, the material handling between buffer and production process is negligible, it is contained in the processing cycle time of the production line. The operators have some extra time to unload buffers without setting back production.

The simulation was made by Simul8 software, the graphics of the model is represented on Fig. 2. In the first part of the simulation the material flow of units separately in reality picking cart is used, this negligence is not significant considering inventory relations.

4. SIMULATION RESULTS

A. Current single-stage kanban manufacturing supply control

After running model described in previously the inventory quantities engaged at work centers was collected (Table II.), which values were compared to results of improved system.

It is a common problem at kanban systems that kanban orders are put on when packaging unit consumption starts,

Table 2. Results of simulation of current system

	WC_01	WC_02	WC_03	Total
Part_01		449		449
Part_02			39	39
Part_03		1553	1513	3066
Part_04	425	456		881
Part_05	54		17	71

since the inventory in one single packaging unit may cover several day long production (e.g.: tiny screws, microchip, micro compounds for SMT – Surface Mount Technology or other typical fields.

B. Two-stage kanban manufacturing supply control with unpacking station.

The material flow between the raw material warehouse is interrupted with unpacking. However unpacking is not worth in all cases of packaging units. Table III. indicates that in cases of Part_02, Part_04 and Part_05 packaging unit is smaller than consumption during 30 minutes, which is the company directive, so unpacking has no advantage.

Table 3. Raw material consumption during 30 minutes

	Part_01	Part_02	Part_03	Part_04	Part_05
WC_01	0	0	0	220	110
WC_02	121	0	48	291	0
WC_03	0	56	338	0	56
Consumption in 30 min	121	56	386	510	166
Packaging unit quantity	300	25	1000	300	10
Number of kanbans	1	3	1	2	17

In case of Part_01 the suggested modified packaging quantity is 150 (enough for 37 minutes), it is recommended to use rounded quantities when unpacking is made by operators and not by machine.

The situation is a bit complicated in case of Part_03. The packaging unit quantity is 1000 pieces; the total consumption during 30 minutes is 386. The problem is that the consumption difference between Work center 02 and Work center 03 is significant. In practice it is often too complicated to distinguish packaging quantities according to destination. Sometimes even adding information to each raw material is a very hard task. We took the simpler case when a common quantity is defined for both work places; 400 pieces. Although the inventory level will cover 44 minutes at Work center 03 and 310 minutes at Work center 02 least developed informatics system is capable handling this version.

Table 4. Results of simulation of modified system

	WC_01	WC_02	WC_03	Buffer	Total
Part_01		229		183	412
Part_02			39		39
Part_03		731	753	823	2307
Part_04	425	456			881
Part_05	54		17		71

By installing unpacking stations the shop-floor inventory of raw materials involved in unpacking decreased significantly. In case of Part_01 the decrease was 8,2% at Part_03 the decrease was 24,8%.

Considering kanban quantities the inventory of unpack station buffer is relatively low. (Part_01: 183, Part_03: 823). The unpacking station coherences were demonstrated in this paper through a simple example, in practice much more production lines and raw materials are usually included. It can be assumed that the average inventory in the unpack station buffer would increase in a low rate as more work centers are included.

5. CONCLUSION

During the research single-stage kanban system was investigated at a electronic assembly-type manufacturing system. Two versions were examined: one without another with unpacking station. We assumed that the inventory level can be decrease radically in case of the second version; the aim was to determine the extent of this decrease.

After installing unpacking station the work centers stopped ordering separately from raw material warehouse, they ordered from unpacking station. Previously for example in case of Part_03 in the moment of delivering new packaging unit to work stations 4 packaging units were reserved in production.

As the result of this the main buffer of unpacked materials evolved at the unpacking station, the kanban quantities between the work centers and the unpacking station decreased. Smaller kanban quantities resulted smaller in-process inventory level, significant cost savings can be achieved by unpacking stations. The advantages come out especially at relatively large packaging unit quantities and high value products. The rate of cost saving can reach 25-30 % of the engaged inventory.

However we have to mention that unpacking may have disadvantages; it may damage or weaken traceability features. The other additional drawback is the extra information handling constraint and extra material handling processes may occur.

Further researches focus on the material flow intensity in case of different type of supply control policies. By installing unpacking stations the material movement tasks also change this way

the utilization of resources modifies. Unpacking is an extra handling process, the deliveries from unpacking station to production lines should be solved a different way. It is not that obvious which version is the more cost-, and time effective, if unpacking stations cause a growth in material handling intensity than we are facing a new trade-off – for which simulation is an effective tool to investigate.

REFERENCES

[1] Al-Tahat, M. D.; Mukattash, A. M.: Design and analysis of production control scheme for Kanban-based JIT environment, Journal of the Franklin Institute 343 (2006) 521–531
[2] Askin, R. G.; Krishnan, S.: Defining Inventory Control Points in Multiproduct, Stochastic Pull Systems, International Journal of Production Economics (2009)
[3] Chan, F.T.S.: Effect of kanban size on just-in-time manufacturing systems, Journal of Materials Processing Tecnology 116 (2001)
[4] Co, H. C; Sharafali, M.: Overplanning factor in Toyota's formula for computing the number of kanban, IIE Trans, 29 (5) (1997) 409-415
[5] Donner, R.; Scholz-Reiter B.; Hinrichs, U.: Nonlinear characterization of the performance of production and logistics networks, Journal of Manufacturing Systems, 2009
[6] Hao, Q.; Shen, W.: Implementing a hybrid simulation model for a Kanban-based material handling system, Robotics and Computer-Integrated Manufacturing 24 (2008) 635–646
[7] He, X. F.; Wu, S.; Li, Q. L.: Production variability of production lines, International Journal of Production Economics 107 (2007) 78–87
[8] Huang, C. C.; Kusiak, A.: Overview of kanban systems, International Journal of Computer Integrated Manufacturing 9 (10) (1996) 169-189
[9] Junior, M., L.; Filho, M. G.: Variations of the kanban system: Literature review and classification, International Journal of Production Economics 125 (2010) 13–21
[10] Liberopoulos, G.; Koukoumialos, S.: Optimal models for a multi-stage supply chain system controlled by kanban under just-in-time philosophy, International Journal of Production Economics 96 (2005) 213–232
[11] Mascolo, M. D.: Analysis of a synchronization station for the performance evaluation of a kanban system with a general arrival process of demands, European Journal of Operational Research 89 (1996) 147-163
[12] Pettersen, J.A.; Segerstedt, A.: Restricted work-in-process: A study of differences between Kanban and CONWIP, Int. International Journal of Production Economics 118 (2009) 199–207
[13] Sarker, B. R.; Chidambaram, V. B: Operations planning for a multi-stage kanban system, European Journal of Operational Research 112 (1999) 284-303
[14] Sarker, B.R.; Diponegoro, A.: Optimal production plans and shipment schedules in a supply-chain system with multiple suppliers and multiple buyers, European Journal of Operational Research 194 (2009) 753–773
[15] Sharma, S.; Agrawal, N.: Selection of a pull production control policy under different demand situations for a manufacturing system by AHP-algorithm, Computers & Operations Research 36 (2009) 1622-1632
[16] Shahabudeen, P.; Gopinath, R.; Krishnaiah, K.: Design of bi-criteria kanban system using simulated annealing technique, Computers and Industrial Engineering 41 (2002) 355-370
[17] Shahabudeen, P.; Sivakumar, G. D.: Algorithm for the design of single-stage adaptive kanban system, Computers & Industrial Engineering 54 (2008) 800–820
[18] Takahashi, K.; Nakamura, N.: Decentralized reactive Kanban system, European Journal of Operational Research 139 (2002) 262–276
[19] Tardif, V.; Maaseidvaag, L.: An adaptive approach to controlling kanban systems, European Journal of Operational Research 132 (2001) 411-424
[20] Wang, S.; Sarker, B. R.: Optimal models for a multi-stage supply chain system controlled by kanban under just-in-time philosophy, European Journal of Operational Research 172 (2006) 179–200
[21] Hartványi, Tamás and Nagy, Zoltán András, Logisztikai „trade-off" a transzkontinentális ellátási láncokban, Logisztikai Évkönyv, Magyar Logisztikai Egyesület, 2007.

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STUDIES ABOUT THE TOTAL QUALITY MANAGEMENT CONCEPT

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ABSTRACT:
The paper presents some fundamentals aspects about the Total Quality Management (TQM) concept. In is pointed out the representative models: Oakland, SOHAL, three dimensional and also some representative areas of TQM interest

KEYWORDS:
quality, management, TQM, models, areas of interest

1. INTRODUCTION

Total Quality Management is an organizational strategy founded on the idea that performance in achieving a quality education is achieved only through involvement with the perseverance of the entire organization in improving processes permanently. The objective is to increase the efficiency and effectiveness in satisfying the customers.

The concept of Total Quality Management (Total Quality Management - TQM) has been proposed by Dr. Edwards Deming in 1940 but its use started in 1985 with the takeover by American principles of working in Japanese industry:

- focus on process improvement permanent, so that processes are visible, repeatable and measurable;
- focus on analyzing and eliminating undesirable effects of production processes;
- consideration of how the users use products in order to improve product;
- expanding beyond concerns of product management.

TQM is a description of culture, attitude and organization of a company that strives to provide clients with products and services that meet their needs and expectations. This culture involves all the processes as the company did so well in the first, zero defects, zero waste.

The concept of quality has undergone several stages, adapting to every level of technology and market requirements. Thus, gradually, the selection of finished class performance has been replaced by statistical control of quality parts on-stream, then to extend the process, becoming, through the concept of quality an important factor in delivering products and services.

Charge on a gate of which are increasingly a concern for quality led to the appearance TQM as a full definition concept which has a dimension in time correlate thus competing with the concept and simultaneous engineering.

2. METHODOLOGY

To successfully implemented TQM organization should focus on 6 key elements:

1. CONFIDENCE;
2. TRAINING;
3. TEAMWORK;
4. LEADERSHIP;
5. RECOGNITION;
6. COMMUNICATION

1. CONFIDENCE – It is a result of integrity and ethics of the organization without trust cannot be built within the work of TQM. The trust helps the full participation of all employees.

Allows every employee empowerment which leads to involvement and engagement. Allow decisions to be made at levels closest to the problem, encourages risk taking individual and continuous improvement to help ensure that everyone on measurement indicators is made to accuse employees.

Trust is essential to ensure customer satisfaction and is one that builds a climate of cooperation essential for TQM.

Ethics – It is discipline which transposes each situation in terms of good or bad. Has two components represented the organization's ethics and individual ethics.

Organizational Ethics establishes a code of ethics guidelines emphasize that you should join all the employees when operating. Ethics include the individual opinion of what is right and what is bad.

Integrity - honesty involved, morals, values, honesty, sincerity and support with facts. It is important that expects and deserves to get the client (internal or external). As opposed to the integrity of character have duplicity. In a duplicity atmosphere, TQM cannot work.

2. TRAINING – Training is very important for employees to be very productive. Supervisors are responsible for implementing TQM in their departments and to spread the philosophy of TQM among employees operate.

Training of employees who need to refer to interpersonal skills, the ability to work as a team, techniques for solving, the ability to make decisions, performance analysis in order to improve the work, understanding the business is located. You have to be trained to become more efficient and more effective.

3. TEAMWORK – To be successful in business teamwork is an essential element of TQM, with the team can find solutions faster and better to the problems that occur in the organization. Teams can provide improvement of processes and activities.

The teams people feel more comfortable to highlight problems that may occur and may receive help from colleagues to find and implement solutions. There are mainly three types of teams that TQM organizations have:

a. Quality improvement teams. Temporary teams created in order to analyze the problems that appear or reappear, often are established for periods of 3-12 months.
b. Teams to solve problems. Intended to solve certain problems and to identify the true root causes. Usually they have a duration of life between one week and three months.
c. Work Teams. These are small working groups comprised of skilled workers who share the same tasks and responsibilities.

These teams use concepts such as: employee involvement, self leadership, quality circles. These teams meet one or two hours per week.

4. LEADERSHIP – Probably the most important element of TQM. Appears everywhere in organization.

Leadership in TQM means that the manager must have the vision to inspire, to trace the strategic directions that would be understood and implemented by all employees that will lead subordinates. For TQM to be successful in business supervisor must be dedicated leadership subordinates. A leader must understand the TQM, believe in his principles and to demonstrate this fact by faith every day. Supervisor to ensure that strategies, philosophies, values and goals are transmitted down the organization in order to provide focus, clarity and direction.

A key factor is that TQM must be introduced and led by management at the highest level. Personal involvement and commitment is absolutely necessary from the top management in determining values and goals for all levels in line with company objectives and define the systems, methods and measurable indicators to achieve these goals.

5. COMMUNICATION – is one that unites all these concepts. This acts as a vital link between all elements of TQM. Communication is there a common understanding of the ideas so that it emits and the one who receives them.

TQM success is conditioned by the communication between all members of the organization, suppliers and customers. Superiors should create and maintain channels of communication through which to receive and transmit information about TQM processes.

Sharing of accurate information is vital.

For a credible communication is absolutely necessary that the message be clear that the interpretation of receptor to be in the sense in which the broadcaster has intentionally.

6. RECOGNITION – This is the last element of the system, it should be given both for and suggestions for performance, both for teams and individuals.

Employees shall endeavor to obtain recognition for themselves and for their teams. Detection and recognition of individual contribution is the most important duty that each supervisor has.

Then when people recognized the merits of producing major changes in terms of self respect, productivity, quality and quantity of effort for each task.

Recognition is the greatest impact when it is close can be a reward or just a message from top management.

3. RESULTS

It was proposed several models for the representation of TQM, in accordance with definitions given by different researchers.

Model Oakland (1989) proposes that TQM representation of a pyramid in the supply chain to customer-supplier of quality systems, tools of statistical quality control method of teamwork. These are integrated to support communication by stimulating the cultivation of a new industrial crops and immediate employment of all managerial structures.

The model focuses on meeting customer requirements in the external and the internal (which is translated by satisfying the requirements of any recipient of services or track the flow of production), the firm commitment to quality that has to start from the high level of management and should be reflected until the last level. This commitment is found both in quality investments for the specific field of activity, and by increasing the risk taken in an effort to get success.

A good quality management system covers all major aspects of business such as management, conception, design, materials, manufacturing processes, qualifications, distribution of products and services.

TQM requires a continuing review of compliance with agreed standards of clients and performance tracking tools with statistical control of processes.

The "team work" model involves promoting the idea of continuous and sustained improvement, and implementation in the organization.

Model SOHAL (1989) suggests that quality improvement continues to come from an integrated approach to quality control action plans at various operations during the business cycle.

The principal elements of the model are:

- focusing the customer: the objective of all of the organization should improve the quality of processes and services delivered.
- engage management to build a culture and an environment of quality, expressed by changing attitudes and expectations and supported by the measurement and quality control.
- total staff participation from the base to the peak, the problems associated with understanding the processes in the sense of moral responsibility and membership.
- use of statistical techniques for analysis of correlated data and to solve various problems.
- a systematic process of solving problems using the cycle execution-check-action-and concentration items on clients business process.

Three dimensional model proposed by Price and Gaskill. This model is to:

- the size of products and services, and the degree to which a customer is satisfied with our products and services;
- personal dimension and the degree to which a customer is satisfied relationship with the organization providing personnel;
- size processes and the degree to which the supplier is satisfied with the internal working processes, which are used to develop products and services provided to the client.

The three dimensions are considered together and reflect the organization and request that it can evaluate, analyze and can only improve business.

In terms of scope of TQM, there are implementations in the different areas are:

- protection of health education and research;
- government agencies;
- the environment;
- banks;
- manufacturing.

The difficulties encountered in implementing TQM come most often from:

- lack of sufficient involvement of top management;
- resistance to change;
- insufficient training and education;
- the poor communication;
- lack of resources, high costs.

For the enterprise stimulation and implementation of the TQM, the European Foundation for Quality Management (EFQM) has developed starting with 1991, European Quality Award – EQA.

Developing this reward system, was achieved with the help of European Organization for Quality and European Commission.

The pressure of new conditions in the world economy, globalization of market demand orientation and relaxation dynamics of technology and resources, orientation and expectations of customers, forcing the application of appropriate managerial concepts, this being a condition of competitiveness

By entering the European Quality Award, is meant by the European Foundation for Quality Management (EFQM) the stimulation and implementation of the TQM.

4. CONCLUSION

TQM refers to an integrated approach by management to focus all functions and levels of an organization on quality and continuous improvement.

Over the years TQM has become very important for improving a firm's process capabilities in order to achieve fit and sustain competitive advantages. TQM focuses on encouraging a continuous flow of incremental improvements from the bottom of the organization's hierarchy.

TQM is not a complete solution formula as viewed by many – formulas cannot solve managerial problems, but a lasting commitment to the process of continuous improvement.

REFERENCES

[1.] Oakland, I.S.: Total Quality Management, Heinemann Professional, UK, 1989, p. 25-37.
[2.] Lakhe, R.R., Mohanty, R.P.: Understanding TQM, Production Planning and Control, 1994, 5, p. 426-431.
[3.] Tobin, L. M.: The New Quality Landscape = TQM, International Journal of Systems Management, 1990, 41, p. 10-14.
[4.] Maxim, E.: The Quality Management, Sedcom Libris, Iasi, 1996, p. 58-64.
[5.] Stancu, I.: Total Quality Management, Cartea Universitara, Bucuresti, 2004, 120-125.

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MID-SIZE COMPANIES AND LOGISTIC IN THE CHALLENGE OF GLOBALIZATION

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ABSTRACT:
The publication is about the relationship between midsize technical companies and logistic and about the challenges they face during the growing globalization.
KEYWORDS:
Globalization, Business succession, Technical, Small and mid sized companies

1. CURRENT SITUATION

Midsize companies and Logistic are nowadays in a special relationship. With some of the mid seize company's it appears logistic is still an unknown word. Other business in contrast glances with some fabulous logistic invents. The core of the Europe logistic industries is marked of middle size companies with some global players among them. Logistic products from midsized companies are well demanded by global company's which can be seen as a prove that a lot of logistic know how must be embodied with these kind of family driven company's.

Today more and more midsize companies do business with Europe and some of them even with the whole world. With continuously growth and increasing international business the economic meaning of logistic for the companies have with grown. A lot of them nowadays own high tech logistic systems and processes. Although in the matter of globalisation these Adjustments sound evident, some of them are still representing the old fashion way and stick to historical traditions. Backwardness would rather be the right expression to that kind of behaviour.

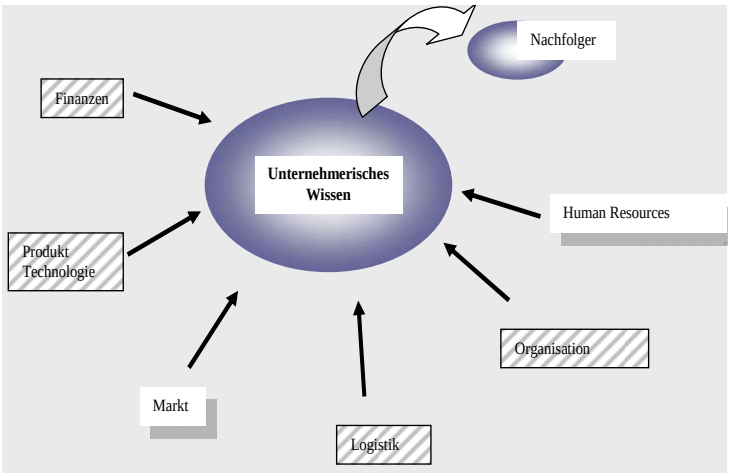

Table 1

Knowing that change is coming bring up the questions where does it come from is obvious. To explain it is necessary to rethink about the overall meaning of logistic in terms of their economic meaning. The Area of logistic accomplishes and constructs the preconditions for our working economy and therewith must be seen as the heart and nerve centre for globalisation all over the world. In order to respond in an appropriate way to this kind of new responsibility it is mandatory to investigate and double check without restriction all of the previous basic principles and system concepts. A cardinal challenge especially for owner of for mid size company who likes to stick to traditions and the old way of leading a company not acknowledging the alteration. Potential successors who are already facing the complex business succession have to acknowledge very soon that adjusting the company's

logistic for the future is a important additional task in the overall challenge of business succession. It's up to them to distinguish which direction and steps need to be taken to adjust logistic alignments in order to be competitive for tomorrow's world.

Only knowing that change is coming is certainly not enough to have the own logistic department prepared for the requirements of tomorrow. It is essential to know from which direction the logistical adjustments of the next century will come and how do they look like.
Below facts should be taken into consideration:

2. ASSUMPTIONS

Political changes and the opening of European borders have accelerated the globalisation development and cause in a worldwide business extension. Hence the work share become spacious and therefore the range of good transport all kind of carrier increased.

- Decentralised Logistic systems become more and more important. The principal of Just in Time (JIT) brings every production to the challenge of on time driving and optimisation of material and goods.
- The nowadays necessary strategies of internationality of midsized company's require a worldwide procurement and organisation.
- The World Wide Web based e-commerce caused radical change of economy and therewith lead to new challenges in logistically handling of Internet based orders.
- The general trend of reduction of manufacturing penetration in production leads to an significant increase of suppliers which on the other hand create new dependencies young entrepreneurs have to take into account.

3. CONCLUSION

This enumeration could be continued arbitrary. This argument show very clear that especially mid size companies are with logistic industry involved face huge challenges and require a much higher flexibility compared with company owner who are not affected by logistical globalisation changes. The already tough defiance of succeeding business succession will make this even more complex and difficult to resolve. An early start with a well prepared business succession plan becomes more fundamental than ever.

REFERENCES

[1] BEUMER, C.:Logistik im Mittelstand- Best Practices- Strategien für den Erfolg, 2008
[2] BADIDA, M. - LUMNITZER, E. – ROMÁNOVÁ, M.: The application of recycled materials for products that provide noise reduction in living and working environment, 2006Acta Acustica united with Acustica | Vol. 92, suppl. 1, p. 108
[2] BIĽOVÁ, M – LUMNITZER E, Comparison of measurement methods for acoustical parameters determination of sound absorbers In: AEI '2010: International Conference on Applied Electrical Engineering and Informatics: September, Italy, 2009.
[3] DELFMANN, W.: WIMMER Thomas, Strukturwandel in der Logistik, 2010

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ECONOMIC ASPECTS OF THE DEVELOPMENT OF ENVIRONMENTAL PROTECTION

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ABSTRACT:
The following publication gives an overview Economic of the development of environmental protection.
The impact of motorization, CO2 emissions and various fuels – fossil as well as biomass based fuels is given – are discussed in brief showing the need for future developments
KEYWORDS:
Environmental protection, CO2 emissions, Industry and customer

1. INTRODUCTION

Environmental protection is a term meaning the entirety of all measures for the protection of the environment, with the aim to maintain the natural basis of live for all creatures by ensuring a functioning balance of nature. The term has become popular only in the last 40 years.

The need to limit or minimise the impact of technical progress to the environment increases with the same speed as the increasing desire for comfort and the increase of world population, both of which is connected with increasing need for energy.

Environmental protection focuses on individual components of the environment, such as the climate, the soil, water and air, as well as on their interactions. Further, damage to the environment caused by human impact in the past shall be corrected.

In the past years, the focus has shifted mainly to energy generation, which is predominantly due to the climate change and to the popular opinion that global warming has been caused by the increasing CO2 contents in the air. This background implicates that it is necessary to turn away from using fossil fuels. As an aside, such turning away may be also desirable in order to secure supply.

The replacement of the fuels commonly used to date by alternative fuels, for the purposes of CO2 reduction, will be possible and reasonable only if a whole series of requirements is met.

Significant investments will be required in basically all the steps of production, distribution and consumption, even if every action is taken to adjust all their features of the alternative fuels to the fuels used by now.

The environmental requirements do not only have a huge impact on energy generation in industry and society. Environmental protection has generally great influence on everyday life and placed high demands on research, development and infrastructure.

However, the economic aspect is very important. In the following, the requirements, influencing factors and effects of environmental protection are presented from the economic point of view, on the example of operating supplies.

Does environmental protection “pay off” after all?

2. COST REVIEW – THE “VALUE” OF ENVIRONMENTAL PROTECTION

Any reduction of environmental pollution, be it due to CO2 emissions or other types of pollution, is desirable.

For many decades, the emphasis was placed on the function of machines; emissions were rather treated as an orphan. However, discussions about environmental pollution, particularly those in the USA, have led to a change of mind. For example, in California, air pollution was at some times so severe that the smog massively impaired sight and contributed to health concerns. Already in December 1952, thousands of people died in London from stagnant air pollution caused by heating with coal.

At the latest at those times, people started to reflect about ways how to reduce such emissions. In the late 70-ies and 80-ies, for the first time, exhaust catalysers were installed in vehicles powered by petrol, which was also supported by the government. Minor increases in fuel consumption were tolerated for the good of less unburned hydrocarbons and carbon monoxide being emitted.

The important question when implementing environmental protection measures is, what costs will incur and how much, for example, the emission on a ton CO2 may cost the national economy. Only the answer to that question can tell whether it will “pay off” to support so-called “climate-friendly” renewable energies or to further the reduction of fuel consumption and motivate vehicle owners to retrofit emission-reducing means, or to even purchase new, more economic vehicles.

But how can we assess what taxes are appropriate on fuel and other sources of energy? By now, the taxes were determined based on the estimated damage to the environment and to public health, for which the general public must pay the costs. However, the costs and the benefits of environmental protection are vaguely defined.

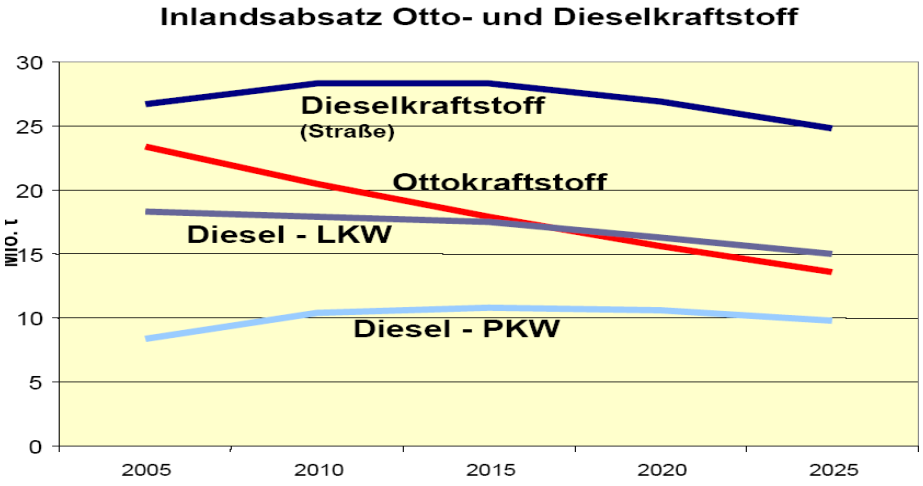
The [German] Federal Environmental Agency has now issued the recommendation, as for ensuing damage to the climate, to establish a cost rate of €70 / ton of CO2 in all areas of application. The limits are set at €20 to €280 per ton. This background allows for further considerations.

3. FUEL CONSUMPTION AND VEHICLE NUMBERS IN GERMANY

The total number of vehicles in Germany is approximately 50 million, divided into 41 million cars, a quarter of which is equipped with diesel engines, 4.5 million trucks and buses, and the rest being other vehicles.

The consumption of diesel fuel in Germany is about 30 million tons p.a., whereas petrol accounts for about 22 million tons p.a.

Approximately 150 million tons of emitted CO2 are the result of motor traffic.



Title	Domestic Sales of Petrol and Diesel Fuel
Dieselkraftstoff	Diesel Fuel
Ottokraftstoff	Petrol
Diesel-LKW	Diesel Trucks
Diesel-PKW	Diesel Cars

4. ECONOMIC REFLECTION ABOUT CO2 EMISSIONS

For the reflection below, the assumption is made that a car has a lifetime of 150,000 km and emits an average of 200 g CO_2/km.

Based on the set €70/ton CO_2, this results in the emission of 30 tons of CO_2 over the lifetime of the vehicle and in total costs of € 2,100.

A 10% reduction of the consumption would reduce the CO_2 costs to € 1,890, which corresponds to a reduction by € 210 over the lifetime of the vehicle. For the operator, the costs for reducing the consumption would be approximately € 1,500 or 1ct/km.

Accordingly, halving the CO_2 emission - which, realistically, can be achieved only in the long term - would result in potential CO_2 savings worth € 1,050 per vehicle, which then could be reinvested into the development of the vehicles. With 1 million vehicles, this would correspond to 1 billion euro in "costs" over the assumed lifetime of 150,000 km per vehicle that could be invested into further development. This is a significant amount, which would certainly make a lot of development work possible.

A 10% decrease in diesel fuel consumption, corresponding to 3 million, would mean a reduction by approximately 9 million tons CO2. With € 70/ton, this would lead to a cost reduction of € 630 million.

Promoting the installation of the particle filter in only 10% of the existing diesel-fuelled vehicles – i.e. in 1 million vehicles – would result in the payment of 330 million Euro incentives. This, again, corresponds to the costs for 4.7 million tons CO2 and is therefore, mathematically, equal to the reduction of the consumption of approximately 1.5 million tons diesel fuel. Finally, this would correspond to a 5% reduction in the annual diesel consumption.

When looking at the 22 million tons of petrol for the 30 million vehicles with petrol engine, a 10% reduction of the consumption would correspond to a cost reduction of 154 million Euros, which is a background that provides sufficient scope for justifying sales-promoting measures and, as it was done with the scrappage premium, to also implement it. However, the scrappage premium need to be also viewed from the aspect involving the processing of many tons of raw materials and the energy input required for such production. After all, over 20% of emissions are generated during the production of the vehicle – as compared to the lifetime of the vehicle.

Summa summarum, however, considering other factors such as the energy consumption in the production of new vehicles, it can be said that a reduction of CO2 emissions is and will remain a worthy goal.

5. REQUIREMENTS TO FUELS

For the evaluation of the quality of fuels as they are being generally used for combustion engines and especially in vehicles, specifications are applied that have been developed and established by consumers, manufacturers and public authorities over a long period of time.

Any developments within the industry are based on those specifications and, therefore, the use of fuels with different specifications will cause extensive changes in development and also in usage.

For the products demonstrated and specified in detail above, an infrastructure has been created over many decades which cover all the necessary steps from the exploration and production, refining, storage and distribution, in order to facilitate and secure the continuous supply of large numbers of vehicles.

The development of a different system on the basis of alternative fuels, for environmental reasons, extensive efforts will have to be made, connected with accordingly large economic effects.

Fuels Based on Fossil Raw Materials Customary by Now

The given specifications of currently customary fuels represent the current minimum requirements. Changes can be expected from the further development of combustion engines considering the reduction of emissions.

Thanks to modern engine and fuel developments, consumption is reduced and this results in lower CO2 emissions. However, it must be examined to what degree necessary modifications of the production process may result in smaller output and, in turn, again cause higher energy consumption.

Therefore, energy balances should be set up for the desired improvements.

The costs for adjusting the by now customary production and distribution system for fuels generated from fossil raw materials should be reflected in the budget with a lower amount than the construction of new production and distribution plants. The situation will be different after a complete switch to alternative products.

Fossil Fuels with Reduced CO2 Emission

A reduction of CO2 emissions on the basis of fossil raw materials, as another option, can be achieved only if the by now customary hydrocarbons with C-values of about 8 to 20 are replaced by lower-grade hydrocarbons with C-values such as 1 (methane) or 3 or 4 (propane/butane).

This is being done in different ways in different countries, by powering vehicles with natural gas (Compressed Natural Gas CNG) or petroleum gas (Liquefied Petroleum Gas LPG). In these cases, the CO2 emission is simply reduced, because more hydrogen is available, as compared to carbon, for the combustion required to generate energy.

Similar reductions of the CO2 emission are, from the start, also ensured when fuels are produced and combusted on the basis of renewable raw materials.

The costs for switching to hydrocarbons with lower C-values, which means basically to gas, requires not only plant modifications in the production and refining facilities as well as in the distribution channels, but also adjustments in vehicle components.

6. RENEWABLE RAW MATERIALS

The generation of these raw materials is, by principle, based on the photochemical reaction in plants, also called photosynthesis.

Products generated on this basis will, by principle, contain compounds with higher C-values; however, they have the advantage that they process carbon from the CO2 contained in the air and, therefore, when combusted, they do not emit more CO2 than had been extracted from air at an earlier point in time. In such cases, we speak of CO2-neutral behaviour. However, this approach does not consider the comparison between the time when the raw material was generated, and the time of its later combustion.

Ways to Utilise Renewable Raw Materials

By principle, fuels from renewable materials can be produced according to consumer demand; with that, the advantages and disadvantages always have to be weighed.

Advantages and Disadvantages of the Use of Agricultural Basic Products

Opposed to the benefit of renewable raw materials from agriculture, is a series of disadvantages the largest part of which, however, can be eliminated by means of the corresponding investments and creation of infrastructure. The time factor cannot be neglected, either, as it is clear that these are long-term measures.

Utilising Sun, Wind and Water Power

The requirement to generate energy without any release of CO2 can be met if sun energy or its daughter elements, wind and water energy, are transformed into electricity. Provided there are suitable storage media, this energy, generated entirely without CO2, can be then used for transport and traffic.

Sun power plants, as they have been put up already, focus sun beams on piping systems and heat up the working fluids contained therein which, in turn, overheat water by means of heat exchangers. The generated steam can power steam turbines in the usual manner which, in turn, power generators for electricity production. However, the storage of electric energy generated this way and ensuring its retrieval or usage on demand, still constitutes a problem. This also applies to wind and water power plants with their direct energy generation. Batteries for the storage of very large volumes of electricity are not available yet. A solution to this problem could be the generation and storage of hydrogen H2.

Electric Vehicles

At this place, reference shall be made to electric vehicles which are powered without CO2 production and also require CO2-free generation of electricity.

The transformation of sun, wind and water energy into electricity, as described above, is particularly important in this context.

7. ADJUSTMENT OF INDUSTRY AND CONSUMER

Automotive Industry

The switch from the by now customary fossil fuels to alternative fuels, in order to reduce CO2, will cause further developments in the automotive industry.

Despite of the already advanced state of technology, especially the application of electric drives, and there especially energy storage, still requires further extensive development.

Transportation Industry

The transportation industry, in particular the heavy goods traffic by trucks, will not be able to profit from the developments towards CO_2-reduced operation to the same extent as the car industry does, as the development of electrically powered trucks in particular is still in its infancy.

However, as it is also the case for all diesel-powered vehicles, the operation with bio fuels can be relatively easily implemented, and is therefore worthwhile. The connected costs are reasonable.

Fuel Production

Large efforts will be required for setting up production of the same extent as currently exists for fossil fuels. A general question that arises is the availability of renewable raw materials, as some of them are foods, too, as we all know, which means that opposed interests need to be met.

Infrastructure

With regards to infrastructure, the existing infrastructure can be used for the application of bio fuels, too. However, it must be considered that, beside the storage and filling possibilities for the by date customary fuels, the same infrastructure must be created for additional fuels, which is connected with costs.

Transport and Distribution

The transport and the distribution can be secured via the existing distribution channels without any major investments, as these facilities require modernisation in regular intervals anyway.

Agricultural Production Capacity

Cultivation Areas, Crop Yield, Environment

Cultivation areas are just as limited as is the yield per hectare. For example, replacing 30 million tons of diesel fuel by methyl ester of rapeseed (bio diesel), with a yield of approximately 1,550 l/ha (about 1,350 kg/ha), equals to a required area of more than 20 million hectare of area to be cultivated. With an agricultural area of "only" 17 million ha in Germany, this is basically impossible.

Assumed that only 10% of the agricultural area would be used for bio diesel crops, this could not cover more than 8% of the demand.

This does not even yet consider the environmental impact of cropping, harvesting and production, as the cultivation of productive land is again connected with CO2 emissions.

In the case of bio ethanol, the situation is similar, despite of the higher yield per hectare, as the so-called fuel equivalent is significantly lower and it must be accounted for an increase of about 40% in fuel consumption.

8. CONCLUSION

The traffic and transportation sector in Germany needs more than 50 million tons of fuel.

From these more than 50 million tons of fuel, realistically, not more than 5% can be covered by biological products from agricultural production in Germany.

While traffic is responsible for about 20% of CO2 emissions, fuel production based on agriculture can contribute only to an insignificant extent to their reduction. Such contribution to the CO2 reduction is very desirable, for reasons of eco-political considerations and decisions. All possible ways to reduce CO2 emissions must be utilised, in order to reach the goal of falling 20% below the values of CO2 emissions in the year 1990, which is a value that has been determined by the European Parliament within the frame of the climate package.

Therefore, it is imperative to exploit other sources of energy for traffic and transport. In principle, the only available source is sun energy, which in turn produces electric power and, with that, must and can provide power for vehicles.

A realistic calculation of the investments required for this new area is probably not yet possible. However, irrespective of economic aspects, the reduction of CO2 emissions is desirable no matter what the case may be.

Acknowledgement

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REFERENCES

[1.] Biokraftstoffe Basisdaten Deutschland, Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz Oktober 2009
[2.] Volkswagen AG, Golf V Hintergrundbericht
[3.] Methodenkonvention zur Schätzung externer Kosten am Beispiel Energie und Verkehr. Umweltbundesamt April 2007
[4.] Magazin für Menschen mit Energie 2/2008, Stadtwerke Bochum, Herne, Witten
[5.] Buch der Synergie, Achmed A. W. Khammas, S. C 4 31
[6.] Jörn Altmann: Umweltpolitik, Daten, Fakten, Konzepte für die Praxis. Stuttgart, 1997, ISBN 3-8252-1958-5

[7.] Beck IPCC Report 2007
[8.] Klaus Georg Binder: Grundzüge der Umweltökonomie. München 1999, ISBN 3, 8006-2232-7
[9.] Energie und Umwelt 4. Symposium der deutschen Akademien der Wissenschaften, Springer Verlag 2000
[10.] Alfred Endres: Umweltökonomie. 3., vollst. überarbeitete u. wesentlich erweiterte Auflage. Stuttgart 2007, ISBN 978-3-17-019721-3
[11.] Bruno S. Frey:: Umweltökonomie. 3., erw. Auflage. Göttingen 1992, ISBN 3-525-33581-4
[12.] Franz Jaeger: Natur und Wirtschaft. Ökonomische Grundlagen einer Politik des qualitativen Wachstums. Chur/Zürich 1993, ISBN 3-7253-0405-X
[13.] Rainer Marggraf/Sabine Streb: Ökonomische Bewertung der natürlichen Umwelt. Theorie, politische Bedeutung, ethische Diskussion. Spektrum, Heidelberg / Berlin 1997, ISBN 3-86025-206-2
[14.] www.wikipedia.de

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DETERMINING FACTORS INFLUENCING PRODUCTION SITE RELOCATION

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ABSTRACT:
The following publication gives an introduction concerning the discussions concerning the relocation abroad of automotive industry.
This paper shall give the basic information explaining the way to find out about influences of different aspects.
KEYWORDS:
Politics, automotive industry, labour cost, emission regulations

1. INTRODUCTION

The relocation of industrial production facilities is based on the assumption that the relocation will result in lower costs for a given product. Not only is the wage differential between two production centres decisive in this respect, but also the varying environmental legislation in different regions and countries. In the final analysis, the actual decision to buy is highly dependent upon the purchase price. The customer is at pains to buy the supposedly cheapest product. Despite the availability of these cheap products and the social acceptability of buying them, wage increases are being demanded to increase purchasing power, e.g. by the United Services Union (VERDI) in Germany. Employers argue on the other hand, that raising wages could make a relocation of the production facilities to a foreign country unavoidable.

2. AN ATTEMPT AT AN OBJECTIVE ASSESSMENT OF THE DETERMINING FACTORS FOR PRODUCTION RELOCATION

Considering the vehicle in its totality, from manufacture to recycling, it is the operation of the vehicle that is responsible for the greatest share of emissions. One may conclude from this that the greatest potential for the reduction of emissions is the optimisation of vehicles in terms of the consumption and clean burning of fuel. The fraction of emissions due to the production of the vehicle is so large that an easing of restrictions (e.g. by relocating to emergent economic regions) would have a significant impact on the material balance sheet. A relocation of the power unit production to countries with lower environmental constraints would only have a very slight effect on the overall product cost of a vehicle. As mentioned above, there are four variables in this sector, which affect the choice of production centre location and therefore also on the total emissions.

3. DIFFERENCES IN THE COST OF LABOUR AS A DETERMINING FACTOR IN THE SELECTION OF A PRODUCTION LOCATION

As demonstrated in Section 1.1, the first factor to be considered is represented by wage differences. The following overview of how the cost of labour can vary within the European Union will serve to put this in context.

The image above shows significant wage differences even within Europe. What may be required in this context, at a later date, is an evaluation relative to the country specific environmental directives. But a decision on this will be postponed until after the international analysis.

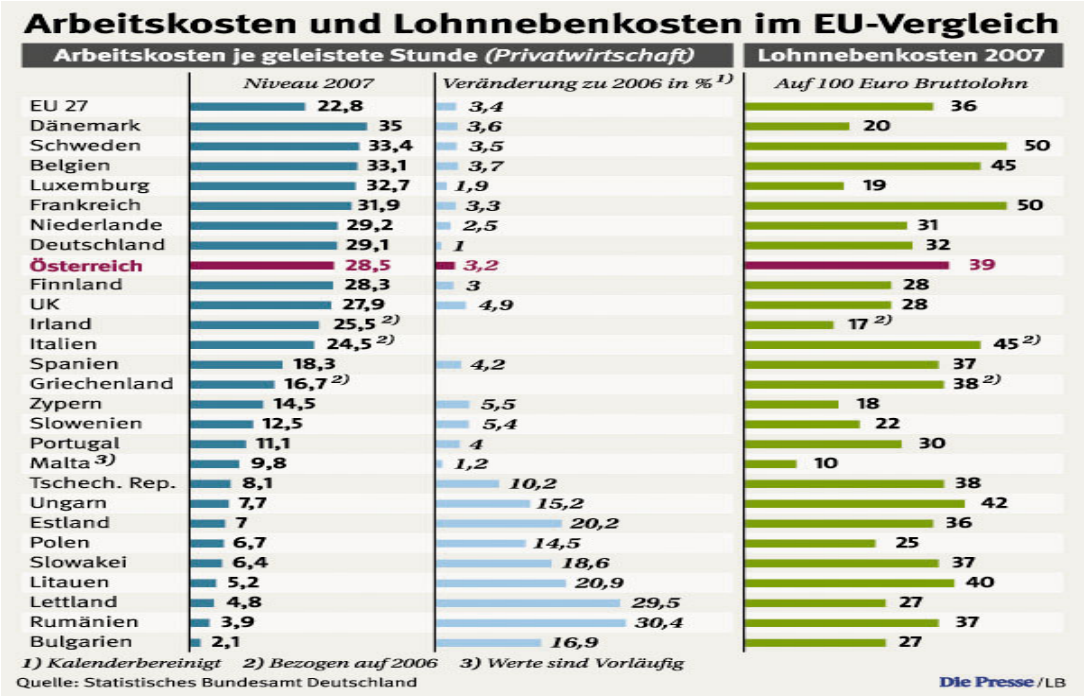

Figure 1: Source Euro per hour

Of more interest in this context are the fundamental differences per professional category. The chart below shows a comparison between Germany and China in terms of various level of qualification. This shows clearly that the wages differ in the unskilled labour category by a factor of 15 and by a factor of 3 in the high qualification bracket. It is understandable from this perspective that businesses view simple tasks falling within the domain of unskilled labour as attractive candidates for relocation to emergent economic regions.

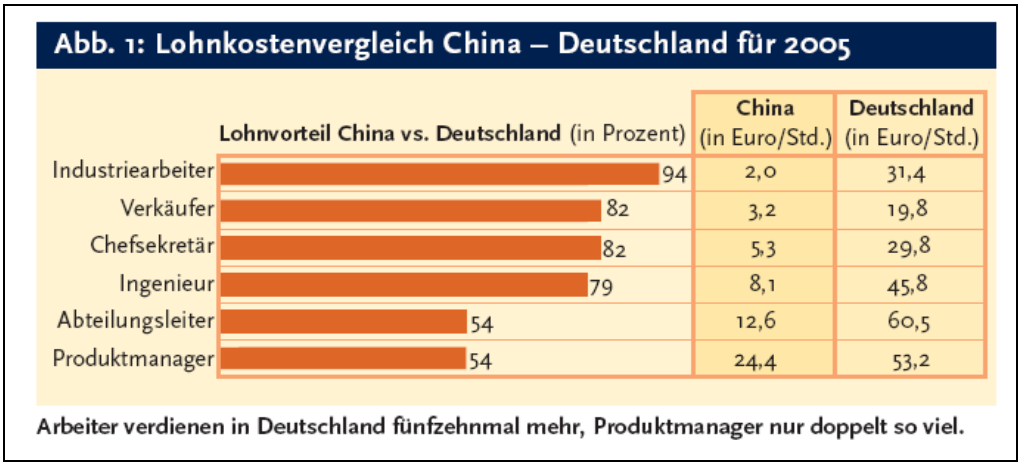

Figure 2 Source[2]

The following figure further breaks down the industrial worker's wage differential and shows the cost of labour in China, Mexico, Russia, Thailand and India next to that of the industrialised countries.

Two aspects are worthy of note in this context. The cost of labour for industrial workers in Germany are almost forty times higher than in India, whilst in China, Russia and India wages have increased by 12 to 15 percent within a single year. But as wages in Germany increased by ten percent at the same time, there has been virtually no change in terms of percentages and none at all in real terms. Nevertheless, the high wage increases in the boom regions China and India indicate that further high rates of increase can be expected in the coming years. These increases could mean that the absolute difference decreases thereby making relocation less interesting. It requires a more in-depth analysis to determine exactly what difference in hourly wages is required to reduce the attractiveness of emergent economies.

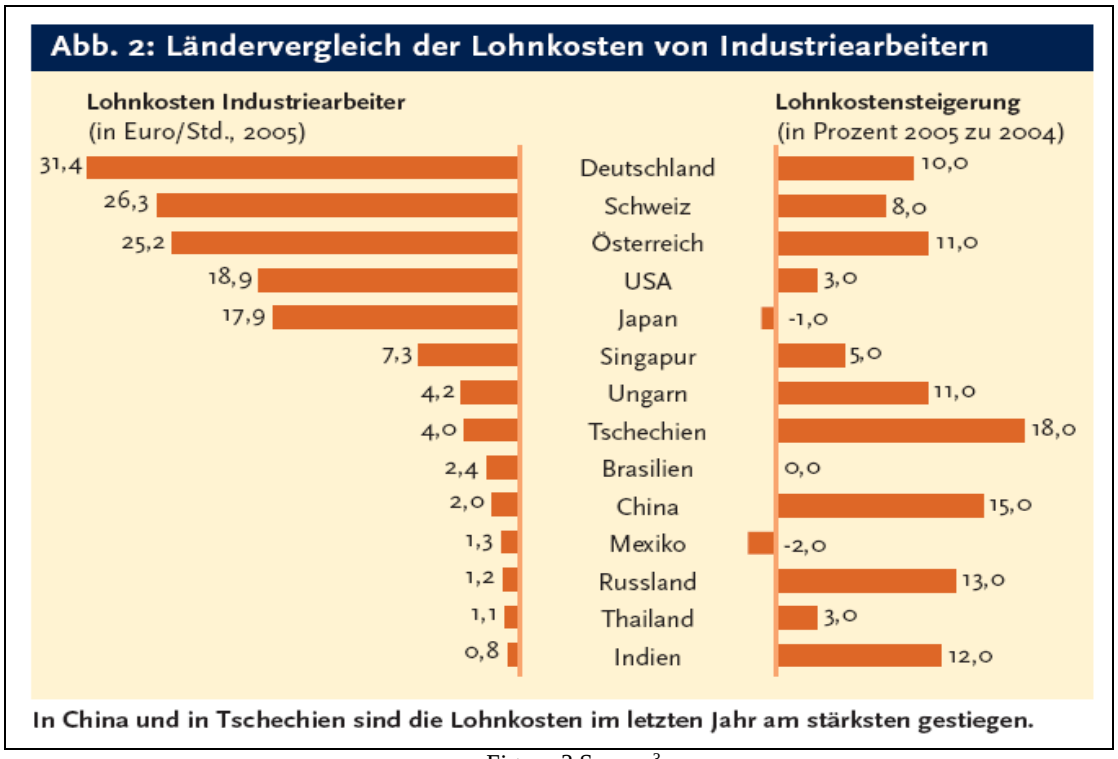

Figure 3 Source[3]

4. POWER AND LOGISTICS COSTS AS DETERMINING FACTORS IN THE SELECTION OF A PRODUCTION SITE LOCATION

One consideration in terms of relocating production facilities to emergent economic regions is the cost of component transportation. This includes finished products, e.g. toys as well as ancillary components such as circuit boards or other plastic parts for automobile manufacture. Transport costs are taken into consideration when deciding whether or not to relocate a production centre.

Wage costs are one element of transport cost, which have already been covered in Section 3.1. Another element is transport infrastructure as well as the related energy costs. Even if the cost of energy for transportation only constitutes a small fraction of the overall cost of transport and the cost of transport itself is only one small part of the cost of production, a variation in the cost of energy is relevant to the consideration of the overall cost of production. These energy costs are also reflected within the overall scope of production and have been ignored in the current model, as energy costs are similar throughout the world. The only variable in this context is in the level of taxation. Only the cost of energy for transportation can work against a business trend towards relocating and therefore represents a key variable. The graph below shows the historical development of the cost of crude oil.

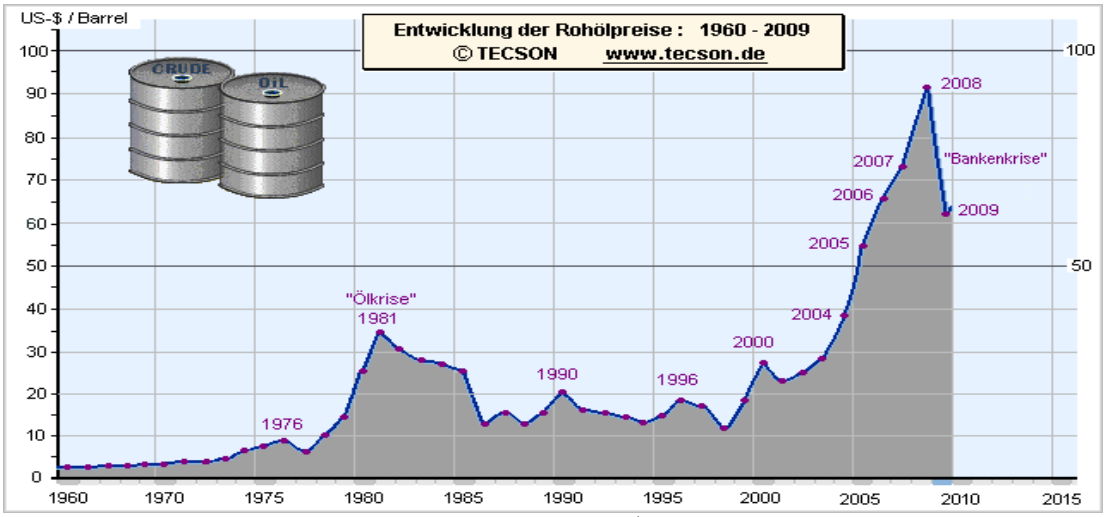

Figure 4 Source[4]

The energy cost variations, as a variable, will be of relevance to the overall model from a historical perspective, as the intention is to verify the mathematical model to be developed on the basis of the history of the various determining factors.

5. ENVIRONMENT PROTECTION COSTS AS A DETERMINING FACTOR IN THE SELECTION OF A PRODUCTION LOCATION

Environmental protection costs in this context means those costs that are necessary within a given country to meet the stipulations of the country in question. For example these can be environmental constraints on exhaust air, wastewater filtration and cleaning, noise restrictions, building regulations for production facilities including lighting, social institutions etc. The following image, designed to enable a comparison between countries, is the result of previous research. The basic data from this graph cannot be used in the mathematical model but does give an indication of the development of CO2 on a per region basis and also of the changes over a 15 year period.

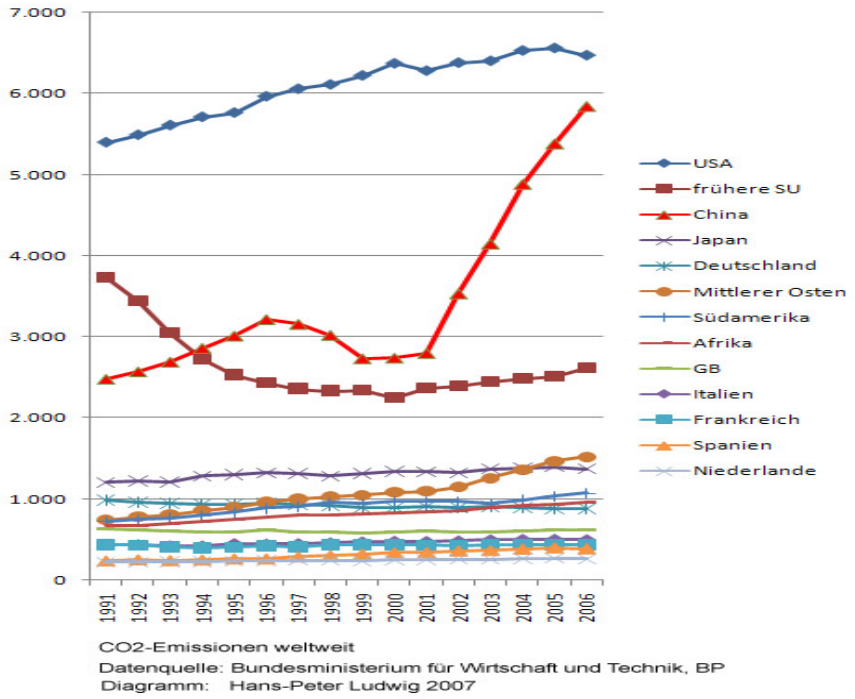

Figure 5 Source[5] CO2 in m. ton p.a.

To be able to integrate these elements into the mathematical model it is necessary to define a unit of measure for a given product to show the difference in the threshold values of pollutants. Conversely it is possible to derive the restrictions that have to be met from this data. And from these figures it is possible to calculate what investments will need to be made.

As the objective here is to discover what cost savings can be realised by lower environmental restrictions, research, perhaps in the form of a survey of companies that have already relocated, is a possibility. An additional study would show if comparative data are already available for costs arising from environmental restrictions; if not then these would have to be researched or the assumption would need to be substantiated. The assumption in terms of this point is that a change in emission restrictions, to match German restrictions for example, in the emergent economic regions or even in the USA, would lead to significant additional economic production costs, which in turn would make relocating less attractive. An initial estimate of these effects raises the suspicion that for example the reasons for not ratifying the Kyoto-protocol could have much more to do with the competiveness of home-based industry than is currently assumed.

6. ENVIRONMENTAL COSTS AS A DETERMINING FACTOR IN THE SELECTION OF A PRODUCTION LOCATION

'Environmental costs' means those costs necessary for repairing environmental damage. This refers to such things as, for example, the renaturation of land, land consumption per se and water purification. The precise nature of the correlation between the environment protection costs set out in Section 3.3 and environmental costs arising from environmental damage can only be ascertained

through an in-depth study and analysis. It is to be hoped that a mathematically definable relationship exists through which the objectification can be expedited. Should it transpire that such a relationship does not exist and that a numerical model cannot be produced, it would be regrettable inasmuch as including the cost of environmental damage would create some political leverage.

The acceptability of buying products from distant regions whilst shutting ones eyes to the environmental consequences, is directly influenced by the cost differential between a product made in China and a European product.

It may be assumed that two main variables exist in terms of countering the trend towards production site relocation. The other main element is the cost differential for production sites. Examples are modern filtering facilities for exhaust air or wastewater. Two factors apply within Europe in this context. A high investment is required in air cleansing and emission avoidance technology in Europe, as a matter of principle, due to the stringent requirements for environmental protection and the high standard of technology required to meet the target values. Further improvements in air or wastewater quality can only be achieved with yet higher expenditure for small improvements.

This situation contrasts with that in the Asian region for example. The wastewater cleansing or air filtration technologies employed there are of a very low standard, whereby significantly greater emission reductions are possible at a much lower cost than in Europe.

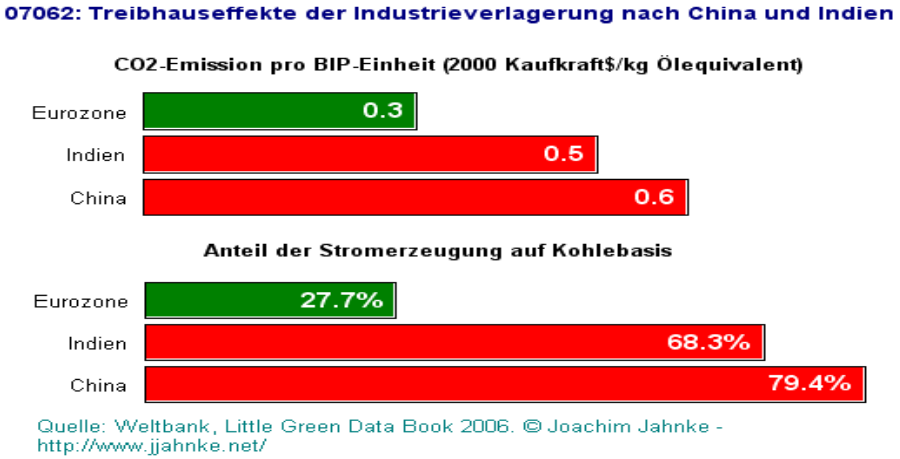

Figure 6 Source[6]

The above diagram clarifies the issues relating to the different restrictions in the context of relocating to China and India.

7. CONCLUSION

Reports about the renunciation of production sites in China are appearing in the press as well as in the publications of various institutes with increasing frequency. This rejection is happening because the cost of labour is increasing and the quality issues associated with Chinese manufacturing are no longer outweighed. These effects demonstrate that the market reacts sensitively to fluctuations in specific factors.

8. OUTLOOK

It can be assumed that relocation cycle times are influenced by wage developments on the one hand but also from the other prevailing conditions in the various countries on the other. Given the increasing cost of labour in the low-wage countries and increasing consumer sensitivity in terms of environmental compatibility in conjunction with increasing energy costs, the degree to which a return to local production may be economically viable should be investigated.

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REFERENCES

[1.] Externe Kosten kennen – Umwelt besser schützen, Umweltbundesamt, April 2007
[2.] http://www.tecson.de/poelhist.htm
[3.] http://diepresse.com/images/uploads/7/8/8/378760/23s26_Arbeitkosten_Lohnkosten_EU_Vergleich_2007_Kopie2008422205410.jpg
[4.] http://www.econbiz.de/archiv/myk/whumyk/controlling/loehne_china.pdf, S. S. 48, io new management Nr. 11 | 2005
[5.] http://www.personalvitality.com/artikel_sterne/ENNEAD_a1_co2_emission_diagram.jp
[6.] http://www.jjahnke.net/index_files/07062a.gif

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MULTIVARIATE ANALYSIS IN A WINE MARKET RESEARCH IN HUNGARY

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ABSTRACT:
Marketing managers are faced with numerous difficult tasks directed at assessing future profitability, sales, and market share for new product entries or modifications of existing product or marketing strategies. Each of the identified marketing problems may be addressed and solved using the conjoint analysis methodology. In addition, a conjoint based competitive strategy may be implemented by modifying the marketing mix, i.e., new product/concept identification, pricing, advertising and distribution.
In this article the main steps of the model is shown in a study through the research of the Hungarian wine market.
A set of wine attributes, that were anticipated as the most important factors when buying wine, were offered to respondents. These attributes included growing site, variety, quality and price. Each of the attributes were further divided into levels, e.g. growing site consisted of Kunság, Szekszárd, Eger and Villány, while other attributes had their particular levels according to their characteristics. Twenty out of the total combination of attributes were chosen and so call profile cards were made. Respondents were asked to rank order cards according to their preference, thus simulating a purchase situation. Conjoint analysis calculated the utility of each levels of attribute for all of the respondents.
KEYWORDS:
conjoint analysis, wine attributes, design

1. INTRODUCTION

Customer satisfaction and delight are core values within the quality movement. Achieving these goals in an economic way by finding the quality attributes most valuable to customers has become a key issue in today's design activities. Conjoint analysis is considered an excellent tool for this purpose. This method is included among the seven product planning tools developed by the Union of Japanese Scientists and Engineers (Nótári et.al., 2009).

Conjoint analysis is a set of techniques designed to measure the importance individual consumers attach to each attribute and their degree of preference for each level of each attribute. Respondents are asked to rank the combinations of these factors as they do in the purchasing process (Nótári et.al., 2010).

Further advantages of this model is that customers can not be influenced by the responder's will. Wider spread of this method in the past was due to the lack of high-tech computers. Now the advance of technology and user friendly software (SPSS, SYSTAT etc.) make its use possible.

In this present article the use of this method is illustrated in a wine market research case study. We tried to keep the process as simple as possible to encourage other researchers to make an effort to test the technique themselves. We followed Churchill's suggestion in compiling a research schedule (Gustaffson, 1999).

2. MATERIAL AND METHODS

A. Research problems and objectives

The first task is to identify the specific research problem and objectives. Attributes and their levels should be limited, because a strenuous survey can lead to improper answers. Green &

Srinivasan (1990) suggest to limit the number of attributes to six or fewer. A more knowledgeable or motivated person can be exposed to a larger set of attributes (Ferencz et. al., 2010/a).

The main objective of the conjoint survey is to find the ideal combination of the product attributes and their levels that are most attractive to consumers. It is essential to know before we conduct research how the market is segmented, what the competitive environment is like, and how we wish to position our product (Ferencz et. al, 2010/b).

The basic goal of this study was to reveal the preference of those wine consumers who drink wine regularly and buy bottled wine in an average of two weeks. Social-demographic segmentation was used to further analyze preferences by means of ANOVA. The following questions emerged: What are those attributes that influence purchase decision most? We hope the derived information can cease the limit of knowledge, decision makers always faced.

B. Research population

Sampling procedure can be separated into two categories: probability and non-probability. Probability sampling is more common when dealing with consumer products. When using probability sampling there are different techniques to choose from: simple random, cluster, systematic and stratified sampling.

Non-probability sampling can be applied when the relationship to customer is closer. However, we must be aware of the danger that the desired population is not reached. Non-probability sampling techniques are also available in a wide range e.g. convenience, purposive, quota and snowball sampling (Gustaffson, 1999).

In this study non-probability, purposive sampling method was used. Students of the College of Kecskemet helped to find those respondents who met the above mentioned criteria.

C. The way of communication

Among the communication forms personal interview is the most commonly used. One reason for this is that the collected data will be of higher quality since it is possible to control the situation. This is inevitably important since conjoint analysis can be strenuous and complex. Also, this way of communication generate higher response rates. Another advantage of personal interview is that it reduces the risk of misunderstandings since respondents can be guided through the survey. The down side of personal interview is cost.

The second most frequent means of collecting data is by mail surveys. First, it is cheaper and second, more respondents can be approached. In this case however, scaling method should be as simple as possible. The down side here is the low response rate (Gustaffson, 1999).

In our case students communicated with respondents through questionnaires that reduced the cost of interview to zero.

D. The basic concepts

The attributes and the levels of each attribute should be chosen to be realistic and related to the problem. There are three basic rules that should be take into account (Gustaffson, 1999):

- Attributes chosen might be important to the respondent (sometimes seemingly no meaningful attributes can be important).
- Attributes are possible to alter, that is the product is in the earlier stage of design.
- Attributes included should cover the core competence of the producer.

The first problem is to find the adequate number of levels. Too many levels can confuse respondents. In our case the following attributes and levels were included (Table 1):

Table 1. Wine attributes and their levels

Attribute	Site	Taste	Quality	Variety	Price
Levels	Kunság	Sweet	Table	Chardonnay	269 HUF
	Eger	Semi-sweet	Quality	Lindeblättrige	389 HUF
	Szekszárd	Semi dry		Portugiser	529 HUF
	Villány	Dry		Blaufränkish	799 HUF
				Merlot	

The selection of the above attributes was based on our prior research and the experiences of GfK Hungary Ltd. in market research.

E. Design matrix

A fundamental procedural decision in conjoint analysis is whether to use full profile or pair-wise procedure for data collection. The pair-wise procedure presents the respondents with a set of matrixes representing all possible attribute pairs, with the levels of one attribute appearing on the X axis and the levels of the other attribute appearing on the Y axis. Respondents are asked to rank-order each combination (cell) in each table to reflect their preference or purchase likelihood. The number of possible combination is N(N-1)/2, where N indicate an attribute. Although it was initially widely used, the pair-wise approach is rapidly losing favor in applied research studies.

Full profile conjoint, what was applied in our study, involves presenting the respondents with a set of product descriptions such that each description contains information on the level of each attribute. The number of descriptions increases geometrically with the number of attributes. In our case it means 2^{17} = 131 072 combinations. Fortunately, a fractional orthogonal array can be used to simplify the situation. SPSS 9.0 for Windows ORTHOPLAN command selected 25 so called profile cards, five of it were dropped. The 20 cards were marked by letters A, B, C... up to T. Even number of cards makes splitting possible to two groups: preferred and not preferred. Orthogonality was distorted but this did not deteriorate the results. Table 2 contains the descriptions (or cards) included in the survey questionnaire.

Table 2. List of cards used in the full profile conjoint analysis

MARK	SITE	VARIETY	TASTE	QUALITY	PRICE (HUF)
A	Szekszárd	Chardonnay	Sweet	Quality	529
B	Szekszárd	Portugiser	Dry	Quality	269
C	Villány	Chardonnay	Dry	Table	269
D	Kunság	Lindeblättrige	Dry	Quality	389
E	Kunság	Merlot	Sweet	Table	269
F	Eger	Lindeblättrige	Semi-dry	Quality	529
G	Villány	Lindeblättrige	Sweet	Quality	799
H	Villány	Blaufränkish	Semi-dry	Quality	269
I	Kunság	Portugiser	Semi-dry	Quality	269
J	Eger	Portugiser	Sweet	Table	389
K	Eger	Merlot	Dry	Quality	529
L	Eger	Chardonnay	Semi-sweet	Quality	269
M	Kunság	Chardonnay	Dry	Quality	799
N	Eger	Chardonnay	Semi-dry	Table	389
O	Szekszárd	Blaufränkish	Dry	Quality	389
P	Villány	Merlot	Semi-sweet	Quality	389
Q	Szekszárd	Lindeblättrige	Semi-sweet	Table	269
R	Eger	Lindeblättrige	Dry	Table	269
S	Villány	Portugiser	Dry	Quality	529
T	Eger	Portugiser	Semi-sweet	Quality	799

F. The questionnaire

The next step was to design the questionnaire. Our first two questions regarded the frequency of wine consumption and purchase of bottled wine. Only those questionnaires were evaluated that met the criteria. In order to make the selection of cards easier we used pictorial illustration. One card represented one wine description, just like the label of wine bottle does. Respondents were instructed to split the 20 cards into two groups: more favored and less favored. Out of the two 10-piece pack of cards respondents were asked to take the more favored pack and split them in the same way again. Thus, they could easily rank the most preferred five cards. This iteration was going on until the last card was positioned. Separately, the preference of different attributes was measured on a Likert scale. This helped us evaluate the consistency of answers. Finally, basic social-demographic questions followed.

G. Data analysis

There are different ways of analyzing conjoint data: MONANOVA and ordinary least square regression (OLS). Between the two the later is more frequently used.

From a strict statistical point of view OLS is not feasible for analyzing rank ordered data, since rank order scale does not include any measure of distance. This deficiency, however can be mitigated by introducing gaps (“do definitely believe in” etc.). Instead of introducing gaps we checked the consistency of answers as described above.

For each individual respondent the part-worth (also known as “utilities”) or relative preferences among the attributes were estimated. In addition, the part-worths of the sample mean were calculated.

3. RESULTS AND VALIDATION

The sample means part-worths give some indication of the relative importance of the different attributes. The actual magnitude of the part-worths is of little importance. Rather, their relative size is of interest (Figure 1-4).

Calculating part-worths for the sample mean is somewhat dangerous. If, for example, there are distinct segments in the sample with opposite preference regarding one attribute, the effect from each of the segments will be cancelled, giving a false result that the attribute is not considered important. To avoid this danger ANOVA was applied for the social-demographic segments for all part-worths of each attribute levels calculated. Results are shown in Table 3.

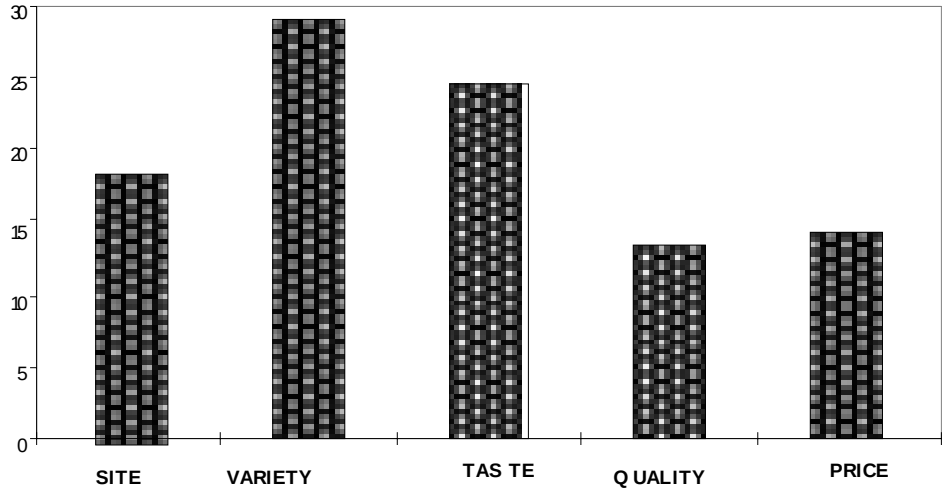

Figure 1. Averaged importance of attributes

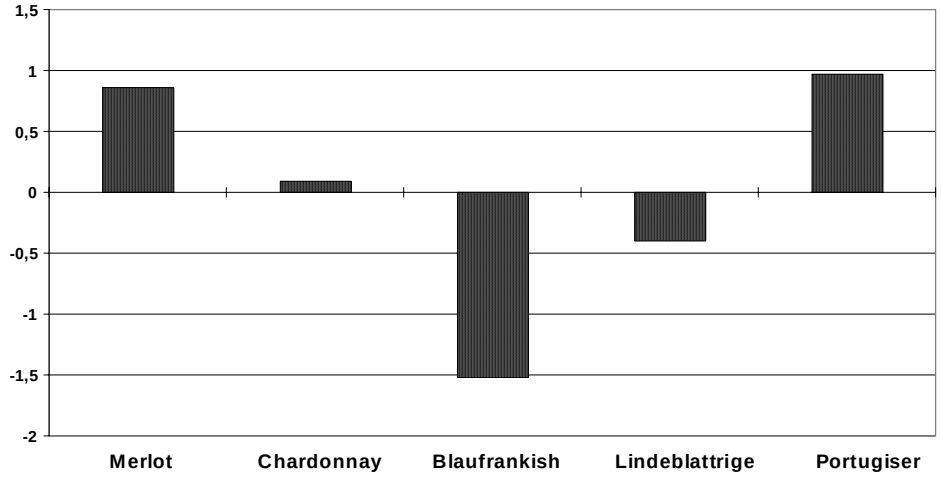

Figure 2. Utility of "variety" in the sample

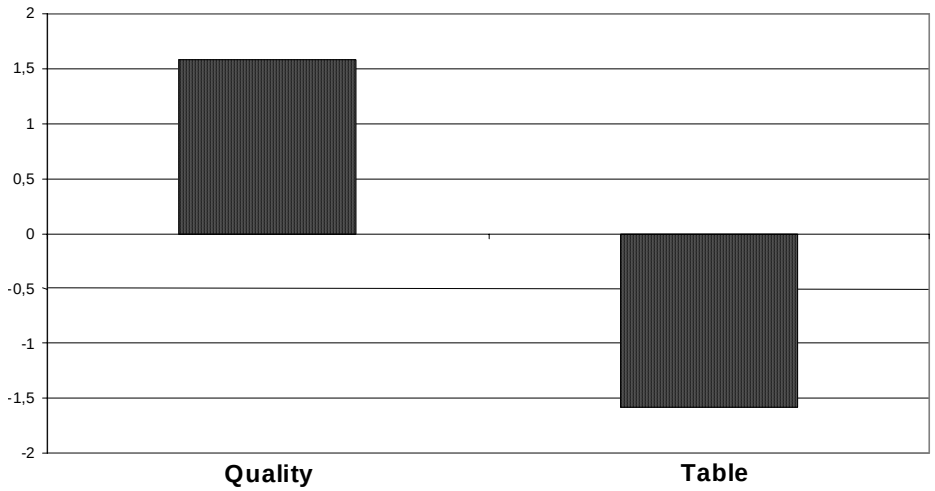

Figure 3. Utility of "quality" in the sample

Apart from semi-dry taste category there are significant differences between sexes. It means, that, as it is seen in the output report, men prefer dry wines to sweeter ones. Women's preference is just the reverse.

As far as varieties are concerned only Portugiser's preference differs significantly between sexes. As it is seen from also the part-worth values, men like this variety better than women.

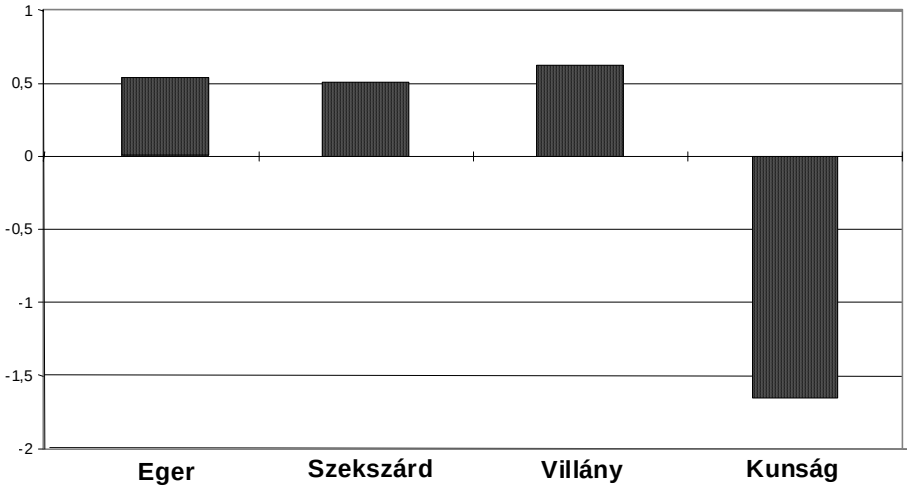

Figure 4. Utility of "growing site" in the sample

As for growing site no significant difference was found in any segments.

Almost unanimously respondents preferred quality wine to table wine regardless of sex, place of living or any other differentiating category.

Table 3. ANOVA Table of wine taste and variety in relation to sexes

Dry*SEX	Sum of Squares	df	Mean Squares	F	Sig.
Between groups	109,69	1	109,69	10,56	0,002
Within groups	1215,21	117	10,39		
Total	1324,90	118			
Semi-dry*SEX					
Between groups	11,77	1	11,77	1,83	0,179
Within groups	753,60	117	6,44		
Total	765,37	118			
Semi-sweet*SEX					
Between groups	50,19	1	50,19	8,18	0,005
Within groups	717,83	117	6,14		
Total	768,02	118			
Sweet*SEX					
Between groups	46,52	1	46,52	4,32	0,04
Within groups	1258,70	117	10,76		
Total	1305,22	118			
Merlot*SEX					
Between groups	2,39	1	2,39	0,321	0,572
Within groups	869,769	117	7,434		
Total	872,159	118			
Chardonnay*SEX					
Between groups	8,387	1	8,387	0,972	0,326
Within groups	1009,66	117	8,63		
Total	1018,048	118			
Blue Frankish*SEX					
Between groups	0,005	1	0,005	0,00	0,983
Within groups	1411,166	117	12,061		
Total	1411,171	118			
Lindeblättrige*SEX					
Between groups	3,886	1	3,886	0,332	0,565
Within groups	1368,597	117	11,697		
Total	137,483	118			
Portugiser*SEX					
Between groups	40,212	1	40,212	6,287	0,014
Within groups	748,358	117	6,396		
Total	788,570	118			

Price was not considered as a differentiating factor.

If we were to design a new wine for both sexes than it would probably be a red, semi-dry, quality wine at the price of 529 HUF a bottle from the Villány region.

REFERENCE

[1.] Gustaffson, A. - Ekdahl, F. - Bergmann, B. (1999): Conjoint analysis: a useful tool in the design process, *Total Quality Management*, Vol. 16. No. 3. 327-343 p.
[2.] Ferencz Á. – Berde Cs. - Nótári M. (2010): The Role of Quality Management of Traditional Horticultural Products in Rural Development in Hungary International Society for Horticultural Science 28th International Horticultural Congress Portugal, Lisboa 218. p.
[3.] Ferencz Á. – Berde Cs. - Nótári M. (2010): The Role of Sales Management of Traditional Horticultural Products in Rural Development in Hungary International Society for Horticultural Science 28th International Horticultural Congress Portugal, Lisboa 219.p.
[4.] Nótári M. – Ferencz Á. (2009): A hungarikum termékeket fogyasztók életstílusának elemzése. Jelenkori Társadalmi és Gazdasági Folyamatok. Vol. IV. No. 3-4. 69-73. p.
[5.] Nótári M. – Ferencz Á. (2010): Marketing Possibilities of Functional Food on the Hungarian Market Functional Food Scientific Conference University College Cork, Ireland p. 48

INTERNATIONAL SYMPOSIUM on
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FACTORS INFLUENCING COST OVERRUNS ON CONSTRUCTION PROJECTS IN LIBYA

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ABSTRACT:
Construction industry is considered as one of the most important industries in Libya. It is well known that most construction projects in Benghazi city exposed to cost overrun. These phenomena may affect the progress of construction industry in Libya as well as may expose many institutions of construction to be destroyed. Therefore, the aim of this paper was to identify factors influencing cost overruns on construction projects in Libya. The objective of the study was achieved through a valid questionnaire that was obtained from contracting companies, consultants, and owners in Benghazi city (Libya). As results, it was indicated that "lack of cost planning" occupied the first rank in importance, where "design changes" and "delay in materials delivery to the site" were among the most important affected factors. The study recommended owners, contractors, and consultants to hold their responsibilities to avoid cost overrun which could be achieved by good management of the project and finding new methods for storing the needed materials from the beginning of the project.
KEYWORDS:

1. INTRODUCTION

One of the most important problems in the construction industry is time and cost overruns. Time and cost overruns occur in every construction project and the magnitude of these delays and cost overruns varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project. This chapter reviews literature concerning the major issues of time and cost overruns in order to recognize the related information regard those issues. Cost overrun is defined as excess of actual cost over budget. Cost overrun is also sometimes called “cost escalation”, “cost increase” or “budget overrun” (Zhu *et al.*, 2004). Cost overrun is defined as the change in contract amount divided by the original contract award amount. Choudhry (2004) defined the cost overruns as the difference between the original cost estimate of project and actual construction cost on completion of works of a commercial sector construction project.

2. SHORT OVERVIEW ON FACTORS THAT INFLUENCE COST OVERRUNS

Previous research has attempted discover reasons for the disparity between the tender sum the final account. This section identifies the factors that influence cost overruns. Four factors were identified from the existing research findings (Morris et al., 1990; Kaming *et al.*, 1997; Chimwaso, 2001). These are; design changes, inadequate planning, unpredictable weather conditions; and fluctuations in the cost of building materials. To broaden the investigation it was decided to complement the above list of factors with other factors gleaned from the final account reports. These were compared with the factors from the existing research findings, and a final list of 18 factors was prepared. Those were than divided into two groups of seven critical factors and nine other factors, which are usually ignored, but perceived to be of equal significance (Chimwaso, 2001).

2.1 List of critical factors

1. Incomplete design at the time of tender
2. Additional work at owner's request
3. Changes in owner's brief
4. Lack of cost planning/monitoring during pre-and-post contract stages
5. Site/poor soil conditions
6. Adjustment of prime cost and provisional sums.
7. Re measurement of provisional works.
8. Logistics due to site location
9. Lack of cost reports during construction stage.

2.2 List of other factors, which are usually ignored

1. Delays in issuing information to the contractor during construction in delays
2. Technical omissions at design stage
3. Contractual claims, such as, extension of time with cost claims
4. Improvements to standard drawings during construction stage
5. Indecision by the supervising team in dealing with the contractor's queries in delays
6. Delays in costing variations and additional works
7. Omissions and errors in the bills of quantities
8. Ignoring items with abnormal rates during tender evaluation, especially items with provisional quantities.
9. Some tendering maneuvers by contractors, such as front-loading of rates.

The prime variables of cost overruns have been commonly identified as: unpredictable weather, inflationary material cost, inaccurate materials estimates, complexity of project, contractor's lack of geographical experience, contractor's lack of project type experience, and non-familiarity with local regulations (Kaming et al., 1997). Morris (1990) studied the factors influencing cost overruns in public sector projects, he found that Escalation in costs is attributable party to the fact that the original estimates were prepared at the then current prices, and partly to delays which enhance the effect of inflation and to direct escalation in costs arising out of change in scope, errors etc.

Based on certain assumptions with regard to the pace of expenditure on projects Morris have roughly computed that for the 133 projects which were studied only about 25 to 30% of the cost increase can be attributed to inflation. The remaining 70 to 75% has to be explained in terms of delays, inefficiencies, scope changes, changes in statutory levies, variations in exchange rates and to the combined effect of these factors with inflation. Morris (1990) was mentioned ten factors that influencing cost overruns of construction projects. These factors are: inadequate project preparation, planning and implementation, delay in construction as the first cause of cost overruns. The second factor was supply of raw materials and equipment by contractors. The third one was change in the scope of the project. The fourth factor of cost overruns was resources constraint: funds, foreign exchange, power, associated auxiliaries not ready. The delays in decisions making by government, failure of specific coordinating bodies was the fifth factor. The sixth cause was wrong/inappropriate choice of site. The seventh one was technical incompetence and poor overruns was natural calamities, Indo-Pakistan war and last one was the lack of experience of technical consultants, inadequacy of foreign collaboration agreements, monopoly of technology. Kaming *et al.,* (1997) examined the factors influencing construction cost overruns on high-rise projects in Indonesia. They found that cost overruns occur more frequently and are thus a more severe problem than time overruns on high-rise construction in Indonesia. The predominant factors influencing cost overruns are material cost increases due to inflation, inaccurate materials estimating and degree of project complexity. Chimwaso (2001) evaluated ten projects to assess their cost performance. The results have shown that seven out of ten projects had reported cost overruns. The factors that influence cost overruns have been identified and ranked in order of significance. These factors have further been classified under categories according to the formal of final account reports. By classifying them into categories, helps to deal with them effectively. The four categories arrived at are: variations, measurement of provisional works, contractual claims and fluctuations in the cost of labour and materials, with variations being the most significant. Frimpongs *et al.*, (2002) studied 26 factors that cause cost overruns in construction of ground water projects in Ghana, they sent to 55 questionnaire to owners, 40 to contractors and 30 to consultant. According to the contractors and consultants, monthly payments difficulties from agencies was the most important cost overruns factor, while owners ranked poor contractor management as the most important factor. Despite some difference in viewpoint held by the three groups surveyed, there is a high degree of agreement among them with respect to their ranking of the factors. The overall ranking results indicates that the three groups felt that the major factors

that can cause excessive groundwater project overruns in developing countries are poor contractor management, monthly payment difficulties from agencies, material procurement, poor technical performance, escalation of material prices according to their degree of influence. The amount of cost-increase (overruns), increased with an increase in the total cost of a residential project. However, private residence owners who spent more time on the pre-planning phase spent more money on the design phase; issued less change orders; selected more experienced contracting companies; and hired a supervising engineer to independently supervise the progress of work and ensure the delivery of materials – experienced less and cost – increases during the implementation phase of their residential projects. A major factor contributing to the sample projects and cost-increase was the insufficiency of money and time allocated to its design phase (Koushki *et al.*, 2005).

3. RESEARCH METHODOLOGY

This research consists of seven phases, the first one is the proposal for identifying and defining the problems and establishment of the objectives of the study and development of research plan. The second phase of the research includes literature review. Literatures of cost overruns were reviewed. The third phase of the research included a field survey which included the construction firms located within Benghazi city in Libya. The fourth phase of the research includes the questionnaires design, through distributing the questionnaire to a sample of contractors' firms. The fifth phase of the research was questionnaire distributors. The questionnaire was used to collect the required data in order to achieve the research objective. The sixth phase of the research focused data analysis and discussion. Statistical package for the Social Sciences, (SPSS) was used to perform the required analysis. The last phase of the research includes the conclusions and recommendations.

4. RESULTS AND DISCUSSION

Table 1 shows the ranking of factors that influencing cost overruns amongst fifteen factors which were used in the questionnaire. RII test was used to provide the ranking of these factors according to their importance. The respondents of contractors were ranked the "Lack of experience of project type" in the first position at this table. "Inadequate project preparation, planning and implementation" was ranked as the second important factor of cost overruns. The results as shown in Table 1 illustrate the other ranking of the factors by the contractors.

Table1. Ranking the factors influencing cost overruns

Factors	RII	Rank
Lack of experience of project type	.931	1
Inadequate project preparation, planning and implementation	.902	2
Low commitment of donor to compensate any bad result that may come from	0.898	3
the bad economic and political situation	0.881	4
Omissions and errors in the bills of quantities	0.879	5
Lack of coordination at design phase	0.874	6
Delays in costing variations and additional works	0.854	7
Delays in issuing information to the contractor during construction stage	0.851	8
Change in the scope of the project, in Government policies	0.846	9
Absence of managerial programs that help in saving materials inside the site	0.838	10
Re-measurement of provisional works	0.836	11
Delay in project's handing over	0.827	12
Incomplete design at the time of tender	0.794	13
Lack of experience of local regulation	0.787	14
Delays in decisions making by Government, failure of specific coordinating	0.785	15

5. CONCLUSION

From the results obtained from questionnaire when the researchers carried out the study, it was found that there are a real similarity of the important factors that influencing cost overruns (Table 1) when comparing them to those were found in the previous published studies. The only difference is that the ranking level was differed whereas it noticed that these ranking varied from one city or country to another. In addition, this study was ended by recommending some important strategies or policies to avoid such matter. These strategies are as following:

1. Contractors are recommended to have a time schedule that clarifies their needs for equipments in the site, so it would be ready where needed without delay.
2. Contractors are recommended to set up a computerized system to perform documentation process for all the activities in the site, so they would be able to detect performance in the work and to follow the time schedule continuously within the estimated costs.

REFERENCES

[1.] Chimwaso, K.D., (2001). An Evaluation of cost performance of public projects; case of Botswana. Department of Architecture and Building Services, Private Bag 0025, Gaborone, Botswana.
[2.] Choudhury I., and Phatak O., (2004). Correlates of time overrun in commercial construction, ASC proceeding of 4th Annual Conference, Brigham Young University- provo-Utah, April 8-10.
[3.] Frimpongs Yaw, Oluwoye Jacob, and Crawford Lynn., (2003). Causes of delay and cost overruns in construction of groundwater projects in a developing Countries; Ghana as a case study. International Journal of Project Management, Vol. 21, No.5, pp. 321-326.
[4.] Kaming Peter, Olomolaiye Paul, Holt gary, and Harris Frank C., (1997). Factors influencing construction time and cost overruns on high-rise projects in Indonesia, Journal of Construction Management and Economic. Vol. 15, No.1, pp. 83-94.
[5.] Koushki, P.A, AL-Rashid, Khalid and Kartam, Nabil., (2005). Delays and cost increases in the construction of private residential projects in Kuwait, Journal of Construction Management and Economics. Vol. 23, No.3, pp. 285-294.
[6.] Morris S., (1990). Cost and time overruns in public sector projects. Economic and Political weekly, Nov.24,1990, Vol. xxv, No.47, PP. M 154 to M 168.
[7.] Zhu. K. and Lin.L., (2004). A stage – by – stage factor control frame work for cost estimation of construction projects, Owners Driving Innovation International Conference. http:/ flybjerg. Plan.aau.dk / JAPAASPUBLISH ED.pelf.

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IDENTIFYING WAYS TO IMPROVE PRODUCTIVITY AT THE CONSTRUCTION INDUSTRY

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ABSTRACT:
In the current environment, contractors are had pressed to find ways to gain a competitive advantage and improve slim profit margins. In any given geographical area, construction labour, material and equipment costs are essentially the same. One of the few opportunities to improve the bottom line is to increase productivity. This paper is attempted to identify some ways to improve productivity at the construction site in Libya. Interviews were carried with contractors, owners and consultants. The paper has concluded that the consultants understand both best industry practice and the current construction technologies that can improve productivity. Perhaps most important, the consultants can provide the supervisor and crew with the training that will yield the greatest productivity improvements.

KEYWORDS:
Productivity, Improvement, Construction industry, Interviews, Libya

1. INTRODUCTION

Productivity is one of the key components of every company's success and competitiveness in the market. Productivity translates directly into cost savings and profitability (Proverbs et al., 1998). A construction contractor stands to gain or lose, depending on how well his company's productivity responds to competition. Construction companies may gain advantage over their competitors by improving upon productivity to build projects at lower costs; yet, most contractors do not systematically and properly address this strategic issue or evaluate its impact on the project's profit. It is no longer sufficient to outbid a singular, neighboring contractor because many companies compete nationally and/or internationally for construction contracts. Contractors must strive to improve productivity continuously or risk losing important contracts. A company has the ability to increase its competitiveness through enhanced productivity by raising the level of value-added content in products and/or services more rapidly than competitors. The concept of productivity is importantly linked to the quality of input, output, and process. Productivity is also a key to long-term growth (Helander, 1981).

A sustainable improvement in productivity, when associated with economic growth and development, is that productivity generates noninflationary increases in wages and salaries (Banik, 1999; Rojas & Aramvareekul, 2003b). A productive industry also may be profitable, allowing for growth and innovation while having a positive effect on society. For example, productivity improvement in the housing construction market may contribute to the supply of more affordable housing (Haas et al., 1999); however, sometimes the very nature of construction industry makes the productivity concept a complex one, due to such variables as small firm sizes, low profit margins, industry fragmentation, environmental issues, limitations on the supply of skilled labor, and other resources (Bernstein, 2003). Despite the importance of the productivity concept, productivity enhancement in construction has been overlooked for decades. While the manufacturing industry drew benefits from proven production management techniques (Neumann *et al.*, 2003), the construction industry lagged due to insufficient research in the area of productivity.

Methods for improving construction productivity to assist managers in identifying productivity barriers and offer solutions were limited. In contrast, there are few studies of enhanced productivity in the construction industry. In reality, increasing productivity benefits the stakeholders' in several ways:

- Projects are completed more quickly;
- Project cost is lowered;
- The contractor can submit more competitive bids; and
- The project can be more profitable

Most of the previous studies indicated that workers on a construction project are unproductive for 50 percent of their time on site. Waiting eats up more than half of an employees' unproductive time and about one-third of total project time. It can wreck a schedule and reduce the contractor's profits. Some studies indicated that a third of waiting periods result from factors under managements control. By improving management practices, a construction company can therefore reduce waiting time significantly. Besides long periods of waiting, there are many other drains on productivity at the construction site, including:

- Poorly planned materials management;
- Cleaning up the job site;
- Materials waste and theft;
- Accidents;
- Substance abuse;
- Redoing substandard work and completing client punch lists

Improving site productivity is easy to pose as a strategic objective, but not so easy to achieve given the complexity of the construction process. The study is carried out to identify some effective ways to increase the productivity in a construction company. A quantitative approach has been conducted with 25 project managers, contractors, consultants who are working with in the city of Benghazi in Libya. Based on their opinions and suggestion, the useful effective ways has been discussed briefly in the next section.

2. RESULT FINDINGS

From the interviews, it can said that these are the most effective ways that recommended by the interviewers who are working the construction filed within the city of Benghazi in Libya. They are as following:

2.1 Analyze the entire construction process in detail

A construction company should analyze each phase of its process to determine what the barriers are to improving productivity. It should begin by measuring key factors and setting benchmarks and goals for improvement. For example, the company can carefully observe the percentage of productive and nonproductive time at a site. By comparing project, the company can determine why one project was more productive that the other. For instance, perhaps productivity always slides when a certain piece of equipment is used. The construction company or firm can set a goal for using the equipment more efficiently, and then provide the training the crew needs to reach the goal.

2.2. Providing better planning

There will never be a magic solution that eliminates all work changes, but better planning will mitigate the impact of work changes and also eliminate the unnecessary waits that result from imprecise planning. For example, if contractor do not order material to arrive at the date it is needed, the crew will be forced to wait until the material arrives. Therefore, better planning is essential. There is also need to develop a measurement for determining how accurate the current planning process is, plus develop a realistic benchmark for improvement.

2.3. Train supervisors and the crew

Interviews confirmed that an important key to improving productivity is to train the crew. This is especially for construction supervisors, whose knowledge and skills can make or break a project in sound management principles and techniques. Construction companies rarely hesitate to train employees in specific skills such as how to operate a new piece of equipment. The benefit of training is measurable almost immediately: the employee is more productive as soon as he or she has mastered the new skill. Supervisor training should be specifically related to how to improve productivity at the job site. Supervisors must be trained to look at the job non on a day-to–day basis, but a work process with many discrete steps that must be completed over an extended, if limited period of time.

2.4. Regular meetings

In order to resolve the productivity problems associated with the management, a weekly informational staff meeting is recommended among the project manager, the project superintendent and their assistants. The weekly meeting would benefit productivity and profitability of project through prompt exchange of information. Weekly issues facing the project, information received from the engineer and owner, the project schedule, safety, critical materials and the machinery were among the topics to be discussed in the weekly meetings between the project's key personnel.

2.5. Safety planning

From the interviews, it can be indicated that some of the new workers seemed not to have a clear understanding of safety culture on the project. Some of the new workers did not utilize fall protection (despite the availability of this equipment on site), when standing at the edge of an excavation deeper than six feet. There were some workers who wore no hearing protection when working at different areas of the site that had a high level of noise. There was no orientation program for new hires and no training was performed for hazard identification and elimination. There were no safety incentives in place for recognition of goal directed behavior. Therefore, safety planning is an important element for increasing the productivity at construction sites.

3. CONCLUSION

Productivity is a serious issue for the construction industry, which because of it large size has a dramatic impact on the economy. This research was carried out in the developing economy of Libya. It may be that the issues of the key factors, the model developed and the alternative solutions here can provide guidance to the other economies in transition. Concepts such as practicing productivity in construction sites are not well understood by construction personnel. They often do not realise that there are many alternative ways that can lead the productivity and improve its achievements and values. The 5 identified ways can actually contribute to an increase in the value of construction productivity and could increase the performance level as well.

REFERENCES

[1.] Banik, G. C. (1999). Construction productivity improvement. ASC Proceedings of the 35th Annual Conference. San Luis Obispo, CA, 165-178.

[2.] Bernstein, H. M. (2003). Measuring productivity: An industry challenge. Civil Engineering,73 (12), 46-53.

[3.] Everett, J. G. & Kelly, D. L. (1998). Drywall joint finishing: Productivity and ergonomics. Journal of Construction Engineering and Management, 124(5), 347-353.

[4.] Haas, C.T., Borcherding, J. D., Allmon, E., & Goodrum, P. M. (1999), U.S. Construction Labor Productivity Trends 1970-1998. (Rep. No. 7). Center for Construction Industry Studies, University of Texas at Austin.

[5.] Helander, M. (1981). Human factors/Ergonomics for building and construction. Construction Management and Engineering. New York, Wiley.

[6.] Neumann, W.P., Winkel, J., Magneberg, R., Mathiassen, S.E., Forsman, M., Chaikumarn, M., et al. (2003). Ergonomics and productivity consequences in adopting a line-based production system. Proceedings of the 15th Triennial Congress of the International Ergonomics Association. Seol, Korea.

[7.] Proverbs, D.G., Holt, G.D. & Olomolaiye, P.O. (1998). A comparative evaluation of planning engineers' formwork productivity rates in European construction. Building and Environment, 33(4), 180-188.

[8.] Rojas, E. M. & Aramvareekul, P. (2003). Is construction labor productivity really declining? Journal of Construction Engineering and Management, 129(1), 41-46.

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CONSUMER ATTITUDES TO GLOBAL GRAPE VARIETIES VERSUS HUNGARICUM VARIETIES IN THE SOUTH-ALFÖLD REGION

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ABSTRACT:
In our days markets are segmented and the competition between the producers/suppliers is fierce. The main challenge for the marketing experts is to develop differentiated products that can develop a good market share and are able to keep their marketing share. The number of new products that are introduced to the market developed enormously
Multidimensional scaling is a useful tool in creating perceptual maps that is for positioning. Histograms are useful to "see behind the curtain".
KEYWORDS:
Consumer, grape varieties, markets

1. INTRODUCTION

Marketing experts are faced with enormous difficulties when they try to estimate income, sale, market share of a new product, or the effect of a marketing strategy (Nótári et. al., 2010/a).

In our days markets are segmented and the competition between the producers/suppliers is fierce. The main challenge for the marketing experts is to develop differentiated products that can develop a good market share and are able to keep their marketing share. The number of new products that are introduced to the market developed enormously (Nótári et. al., 2010/b).

Success of strategic decisions depends on a well-operating marketing information system. Marketing research uses multivariate statistical methods to better understand consumer behavior (Ferencz et.al., 2009/a).

The abundance of measured data supposes statistical methods. As there is a continuous change (evolution) of living orgasms the trends can be calculated statistically by computers especially if the available time for decision making is short (Ferencz et.al., 2009/b).

2. MATERIAL AND METHODS

The present study shows the results of a survey done among college students. In order to measure the attitude to wine regions and varieties a 1000 sample size survey was carried out. The data was processed by SPSS 10.0 for Windows statistical program package. The two methods used were multidimensional scaling and histogram of frequencies.

3. RESULTS

Figure 1. shows that, as for the wine producing region, Tokaj-Hegyalja is located in the corner of the map and Kunság Wine Growing district is the farthest from it. Frequencies show that consumers attribute high price for wines from Eger and Tokaj Hegyalja and low price to the wines originated from Kunság Wine Growing Region.

Figure 2. shows that as for the fame of the wine producing consumers regard Tokaj-Hegyalja, Eger and Badacsony the most renowned while Kunság the least one. Not surprisingly Pannonhalma-Sokoróalja is not positioned well which is attributed to its relatively new age.

Figure 3. shows that as for the quality of wine produced, Tokaj, Eger, Badacsony are well positioned while Kunság is again the least positioned. This shows that respondents attribute higher price to a more prestigious wine producing region.

Figure 4. shows the positioning of white varieties. As histograms indicate (*Figure 5-6*) Furmint, Hárslevelű varieties are favored while Kövidinka was not. Perhaps respondents were orientated by the fame of the region. Kövidinka, a local variety, or hungaricum is well adapted to the Alföld (Kunság) region which gives a light table wine. This variety is takes an important part in the wine strategy of the Alföld (Kunság) region. It is going to be difficult for the marketing experts to reposition this variety.

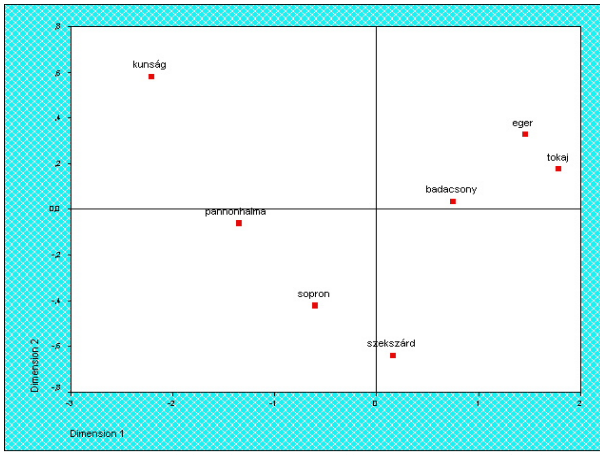

Figure 1.: Positioning according to price of wine

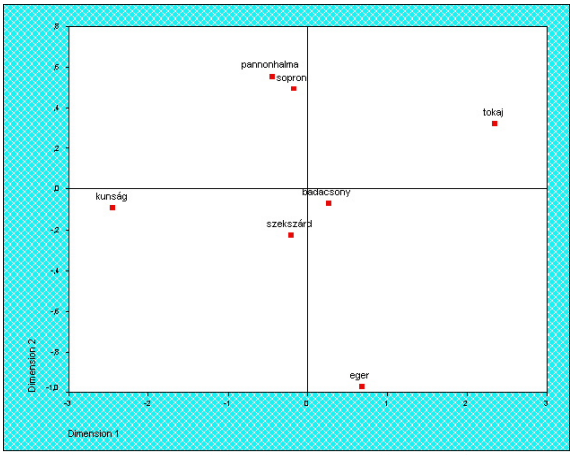

Figure 2: Positioning according to fame

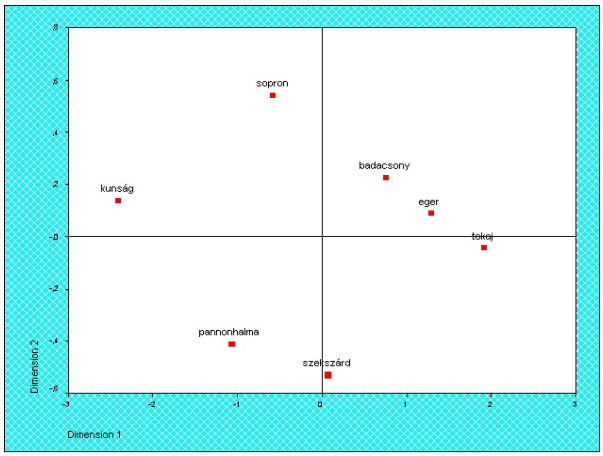

Figure 3.: Positioning according to quality of wine

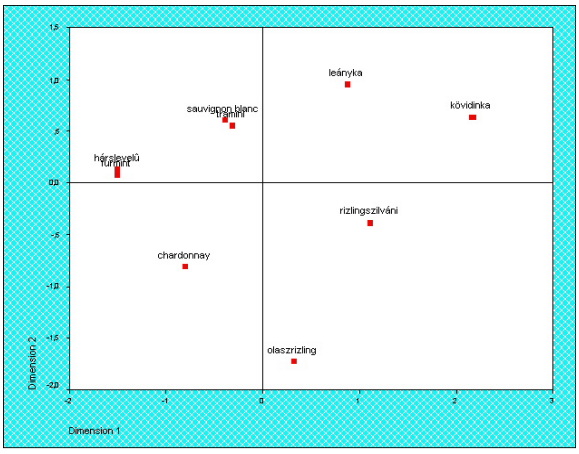

Figure 4.: Positioning of white varieties

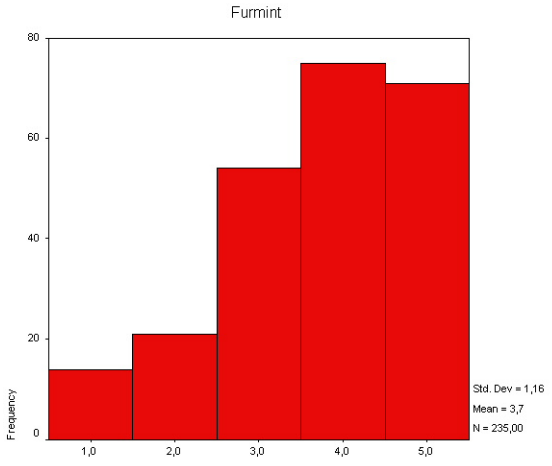

Figure 5.: Histogram of Furmint variety

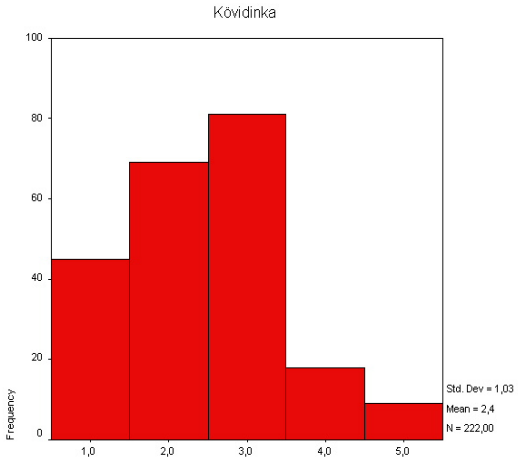

Figure 6.: Histogram of Kövidinka

Among red varieties so called "global" varieties (Merlot, Cabernet sauvignon) are preferred to local wines. Kadarka is the least favored hungaricum variety. Zweigelt is in an intermediate position (*Figure 7.*). Histograms help to reveal the inner structure of the relations (*Figure 8-9.*)

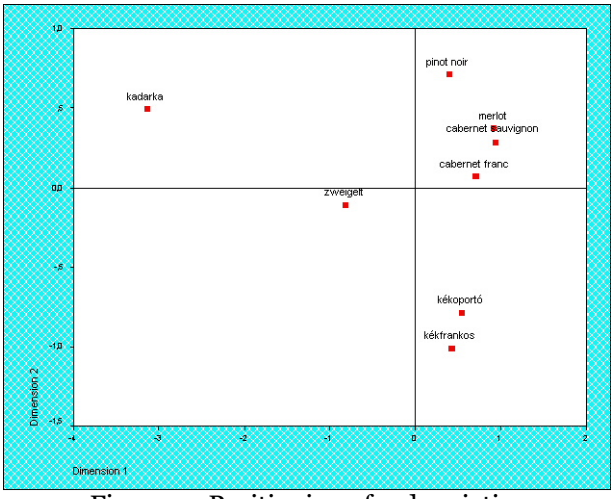

Figure 7.: Positioning of red varieties

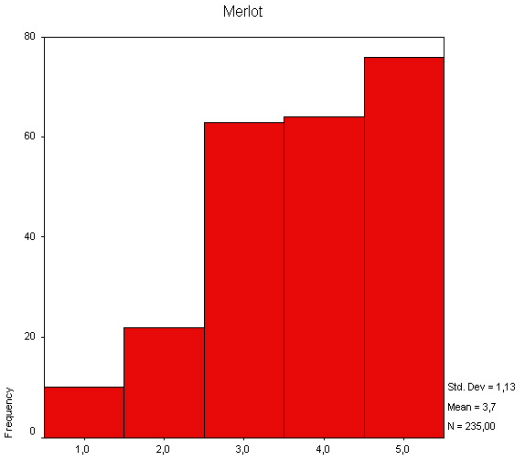

Figure 8.: Histogram of Merlot variety

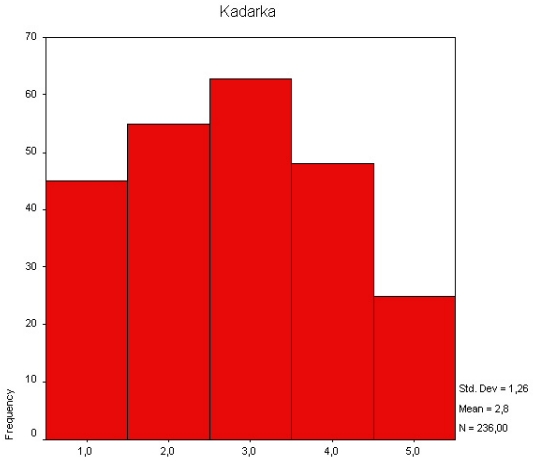

Figure 9.: Histogram of Kadarka variety

4. CONCLUSION

Multidimensional scaling is a useful tool in creating perceptual maps, that is for positioning. Histograms are useful to "see behind the curtain".

It is seen that the wine producing regions with high reputation is reflected in the positioning, whereas Kunság and Pannonhalma-Sokoróalja are less positioned. This later is a new region therefor it is intermediately positioned. Fame and quality positively price is negatively correlated. Respondents attribute higher price of the wine to more renowned regions.

As far as varieties are concerned, among white varieties Furmint, Hárslevelű varieties are positioned best, because their "Tokaj" image. Kövidinka, a local variety, mostly grown in the Kunság region has a negative reputation even though this is a valuable variety, that has its place on the market. Among the reds, Merlot and Cabernet sauvignon are favored, while Kadarka is not. Kadarka is also associated to Kunság region and produce a light colored table or quality wine. It has a renaissance in the Szekszárd Wine Producing region.

BIBLIOGRAPHY

[1.] Ferencz, Á - Notari M. (2009/a): Economic and marketing examination of traditional horticultural products among the costumers in Hungary. Annals of the Faculty of Engineering Hunedora. Vol.4. No.VII.145-150.p.

[2.] Ferencz Á.-Nótári M. (2009/b): Piaci kihívások és lehetőségek a régiós, tradicionális kertészeti termékeknél a dél-alföldi régióban. Gazdálkodás. Vol. 53. No. 5. 440-446.p.
[3.] Nótári M. – Ferencz Á. (2010/a): Examination of the market opportunities of the regional horticultural and food idustry products in Hungary International Scientific Symposium Management of Sustainable Rural Development Timisoara Seria I. Vol 2 p. 136-142.
[4.] Nótári M. – Ferencz Á. (2010/b): Communication Management of Functional Food in Hungary Functional Food Scientific Conference University College Cork, Ireland p. 49

INTERNATIONAL SYMPOSIUM on
ADVANCED ENGINEERING & APPLIED MANAGEMENT
– 40th ANNIVERSARY in HIGHER EDUCATION (1970-2010)
4 – 5 November, 2010, Hunedoara, ROMANIA

[1.]M. KATA, [2.]Z. AIGNER, [3.]P. SZABÓ-RÉVÉSZ, [4.]Z. SZABADAI, [5.]Á. GYÉRESI

RESEARCH COOPERATION BETWEEN THE UNIVERSITY OF TIMISOARA AND THE UNIVERSITY OF SZEGED

[1-3] DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY, UNIVERSITY OF SZEGED, HUNGARY;
[4.] UNIVERSITY OF MEDICINE AND PHARMACY, TIMISOARA, ROMANIA;
[5.] UNIVERSITY OF MEDICINE AND PHARMACY, TARGU-MURES, ROMANIA

ABSTRACT:
In the framework of a friendly scientific cooperation, three talented, young researchers obtained their PhD degree in the Department of Pharmaceutical Technology of the University of Szeged. The first steps and the major results of this cooperation are summarized.
KEYWORDS: Scientific cooperation, mineral complexes with montmorillonite and inclusion complexes of cyclo-dextrins

1. INTRODUCTION

It is evident that excellent possibilities of cooperation are inherent in things which have belonged together naturally – geographically, economically – for centuries. The same is also true for scientific cooperation and for the trilaterial relationships among Timisoara (Romania), Novi Sad (Serbia) and Szeged (Hungary) extending over the borders.

In our case, the first steps were taken about ten years ago when *Professor dr. Z. Szabadai* (University of Medicine and Pharmacy, Timisoara, Romania) proposed scientific PhD work carried out by two young researchers (*Codruta Soica* and *Cristina Trandafirescu*) from Timisoara UMF in the Department of Pharmaceutical Technology of the University of Szeged. In Targu-Mures (Romania), *Professor dr. Á. Gyéresi*, Head of the Department of Pharmaceutical Chemistry, UMF, was the scientific coordinator for them. Parallel with this, a third young researcher from Timisoara (*Ildikó Fejér*), also obtained a scholarship and a possibility to do her scientific research at the University of Szeged.

2. INVESTIGATED DRUGS

Investigated drugs in two main fields were the following: a) *inclusion complexes* containing acetazolamide, albendazole, betulinic acid, bifonazole, chlorthalidone, flufenamic acid, furosemide, hydrochlorothiazide, indapamide, mefenaminic acid, meloxicam, simvastatin and cyclodextrins, and 2) *mineral complexes* containing benzalkonium chloride, buformin hydrochloride, glibenclamide, promethazine hydrochloride and montmorillonite.

3. STATISTICAL DATA OF COOPERATION

3.1 Publications in edited journals

Languages:

English	13
Hungarian	3
Romanian	9
Total	25.

Character:

Experimental publications	23
Refresher publications	2
Total	25.

Journals in which publications were edited:
Acta Medica Marisiensis, Targu-Mures/Marosvásárhely, Ro
Bulletin of Medical Sciences/Orvostudományi Értesítő, Cluj-Napoca/Kolozsvár, Ro
Colloid and Polymer Science, Springer-Verlag
Farmacia, Bucuresti, Ro
Gyógyszerészet/Pharmacy, Budapest, H
Revista de Chimie, Bucuresti, Ro
Revista de Medicina si Farmacie/Orvosi és Gyógyszerészi Szemle, Targu-Mures, Ro
Timisoara Medical Journal, Timisoara/Temesvár, Ro.

3.2 Presentations

Languages:

English	20
Hungarian	10
Romanian	2
Total	32.

Character: all are experimental presentations.

It must be pointed out that we also held an extra presentation at the 7th International Symposium Interdisciplinary Regional Research (ISIRR 2003), on 25-26 September, 2003, in Hunedoara/ Vajdahunyad, Romania. *M. Kata* and *Á. Gyéresi* were the authors and the title of their presentation was „Trilateral Cooperation in the Fields of University Activities".

Cities where presentations were held:
Basel, Switzerland
Bristol, UK
Budapest, H
Cluj-Napoca/Kolozsvár, Ro
Dijon, France
Gdansk, Poland
Hunedoara/Vajdahunyad, Ro
Miercurea Ciuc/Csíkszereda, Ro
Oradea/Nagyvárad, Ro
Szeged, H
Targu-Mures/Marosvásárhely, Ro
Targu-Secuiesc/Kézdivásárhely, Ro
Timisoara/Temesvár, Ro
Versailles, France
Würzburg, Germany
Zalau/Zilah, Ro.

3.3 PhD theses

3.3.1 Title of PhD thesis of *Ildikó Fejér*: „Study of Drug-Montmorillonite Organocomplexes as Drug Carrier", Szeged/Hungary, 2001.

3.3.2 Title of PhD thesis of *Codruta Soica*: „Preparation and Analysis of Inclusion Complexes of Some Diuretics with Cyclodextrins", Targu-Mures/Marosvásárhely, Romania, 2007.

3.3.3 Title of PhD thesis of *Cristina Trandafirescu*: „Study of Interaction of Cyclodextrins with Azole Derivatives of Therapeutical Use", Targu-Mures/Marosvásárhely, Romania, 2008.

4. OTHER CO-WORKERS

Rita Ambrus, *Cristina Dehelean*, *Ibolya Fülöp* and *Emőke Rédai*.

5. SUMMARY

The geographical proximity, the European approach and the interdependence of the Universities in Timisoara and in Szeged render cooperation possible: in the Department of Pharmaceutical Technology of the University of Szeged, three talented, young researchers prepared their PhD theses and obtained their PhD degree. At present, *Ibolya Fülöp* is conducting her PhD research. The first steps of this cooperation and its results to date are summarized by the authors.

As a result of collaboration for about 10 years, the authors investigated 16 drugs by inclu-sion and mineral complexations with up-to-date methods, they had 25 publications in quality journals (having *impact factors*), 32 presentations in different cities of Europe and 3 successfully defended PhD theses.

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[1.]Eva BATEŠKOVÁ, [2.]Martina NOVÁKOVÁ, [3.]Tibor KRENICKÝ

TRANSFORMATION OF STN STANDARDS TO EN ISO STANDARDS IN THE FIELD OF ENGINEERING

[1-3.] TECHNICAL UNIVERSITY OF KOSICE, FACULTY OF MANUFACTURING TECHNOLOGIES WITH A SEAT IN PRESOV, PRESOV, SLOVAKIA

ABSTRACT:
The paper deals with the ISO standards processing. Standardization, being the basic method of documents formatting, is usually utilized to order and define rules which govern editing of the forms and documents. Moreover, ISO standards are widely applied not just for the purposes of the document editing, playing an important role in achieving the goals targeted by the manufacturing process and modelling the role of particular company segments.
KEYWORDS:
standard, ISO standard, STN standard

1. INTRODUCTION

The market of particular countries becomes competitive on international scale following the extent of ISO standards introduction that acts as a factor that affects the fundamental characteristics of manufactured product. This competitiveness is of great benefit to all suppliers. Recently, standardization has become a fundamental cornerstone in the whole industry, introducing innovative approaches to preventing imperfections of production, taking into account the economic advantage. The need for efficiency of production, the production process transparency is a way of the approaching the success for the companies engaged in the production. Nowadays, this issue addresses the introduction of ISO standards in order to define precisely the conditions under which the product is manufactured. But it is not only the production where ISO standards found its application, playing an irreplaceable role in editing of documents and modelling activities and organizational structure of the company.

2. THE STUDY

2.1 Characteristics of a standard

Standard is a document created on the base of agreement and is approved by a recognized institution that provides rules and guidelines for common and repeated use, for activities or their results so as to achieve an optimum degree of organization in a given context [1]. Standards vary according to the nature, scope and method of dissemination. Standards:

- cover several disciplines; dealing with all technical, economic and social aspects of human activities and cover all the basic disciplines such as language, mathematics, physics, etc..;
- are coherent and consistent; standards are prepared by technical committees that are coordinated by specialized institutions that guarantee that barriers between different fields of activities and business are overcome;
- are the result of cooperation; standards reflect the results of the joint work of all interested parts and are confirmed by the agreement by the relevant representatives: manufacturers, users, laboratories, public administration, consumers, etc.;
- are a living process; standards based on experience and lead to actual results in practice (products and services, test procedures, etc.); standards represent a compromise between current level and economic restrictions at the time;
- are currently; standards are regularly revised, or if circumstances dictate, standards evolve along with technological and social processes;

- have the status of reference documents; in commercial contracts and disputes in lawsuits;
- are recognized nationally and internationally; the standard is a document that is valid - nationally, regionally or internationally;
- are accessible to everyone; standards can be bought or studied without restrictions.

As a general rule, the standards are not mandatory, but are used voluntarily. In particular, implementation of standard may be required (e.g. safety, electrical installations, etc.) [1] Standard represents a level of know-how and technology, which makes the presence of industry in the process of its preparation inevitable. Standard is never neutral, this is reference document that is used specifically in connection with public contracts or contracts in international trade or for concluding commercial contracts. Moreover, standard is used by industrialists as unquestionable reference, which simplifies and clarifies the contractual relationship between economic partners. Finally, it is a document that is increasingly used in law suits.

2.2 Usage of a standard

Preparation of a standard usually consists of seven main stages depicted in Fig. 1. Then, standards can be used as:

- the basic standards introducing terminology, metrological concepts, conventions, marks and symbols;
- methods of testing and standards for analysis, the characteristics are measured;
- tools for defining the parameters of the product (product standard) or standards with specifications of services and defining the lowest parameters that must be adhered;
- organizational standards, dealing with the description of the company objective and its relationships, and modelling the activities (management and quality assurance, maintenance, logistics, project management and systems management of production (organization of production), etc. [2].

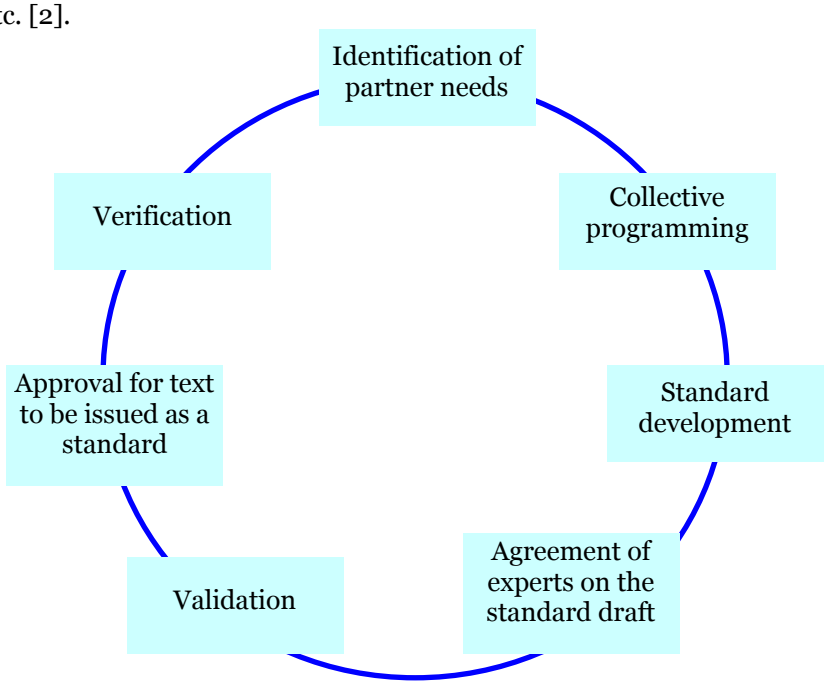

Fig. 1 Main stages of development of a standard [3]

2.3 European standardization institutions

Fig. 2 shows the European institutions for standardization.

SUTN - Slovak Standards Institute - the main activities of SUTN are:

- development, approval, issuance, distribution and sale of STN standards;
- development and maintenance of the national fund of STN; fund of European, international and foreign standards;
- providing searches in databases;
- organization of international cooperation from the post of official National standardization institution (i.e., participation in the development of international and European standards);
- providing activities of the National Information Centre (NIS);

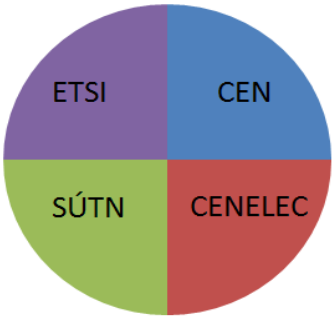

Fig. 2 European institutions for standardization [3]

- notification of national standards in CEN;
- issuing of standardization publications and periodicals;
- providing education for the technical community through seminars and trainings. [1, 4]

ETSI - European organization working in the field of telecommunications

ETSI is the largest developer and publisher of European standards on electronic communications, which prepares and issues with the approval of the European Commission to promote European Union policies. ETSI participates in the decisions on the further development of telecommunications, radio communications, mobile and other data networks, radio and television digital broadcasting, the Internet and other related areas. Moreover, ETSI cooperates mainly with the European organizations for standardization - the European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC) and International Telecommunication Union (ITU). ETSI is a non-profit and non-governmental European organization which associates hundreds of members from various areas.

CENELEC - European Committee for Electrotechnical Standardization.

Its mission is to develop electrotechnical standards that facilitate to develop the European Single Market - European Economic Area for electrical and electronic goods and services, removing barriers to trade; creating new markets and reduce compliance costs.

CEN - European Multi-sectoral Standardisation Organisation acting in all areas except the electrical and telecommunication fields.

The role of CEN is to promote the European economy, social well-being of European citizens and the environment. The main principles of CEN activities can be summarized as following:

- openness
- transparency
- consensus
- relationship / identity
- national commitment.

3. ANALYSE OF TYPES OF STANDARDS

3.1 ISO standard

International Standard Organization (ISO) is as the world's largest developer and publisher of international standards. It is a network of national institutes for standardization of 159 countries as displayed in Fig. 3, founded in 1947 with headquarters located in Geneva. ISO covers standardization in all areas except the electrical. [1] ISO acts as the world leader in the development of international standards. ISO standards are dealing with the requirements that products must comply to be introduced to the global market as well as provide a mechanism for evaluating compliance ensuring that these products meet parameters that are specified in the standards. The result is that suppliers from both developed and developing countries can compete in any market under the same conditions. [6]

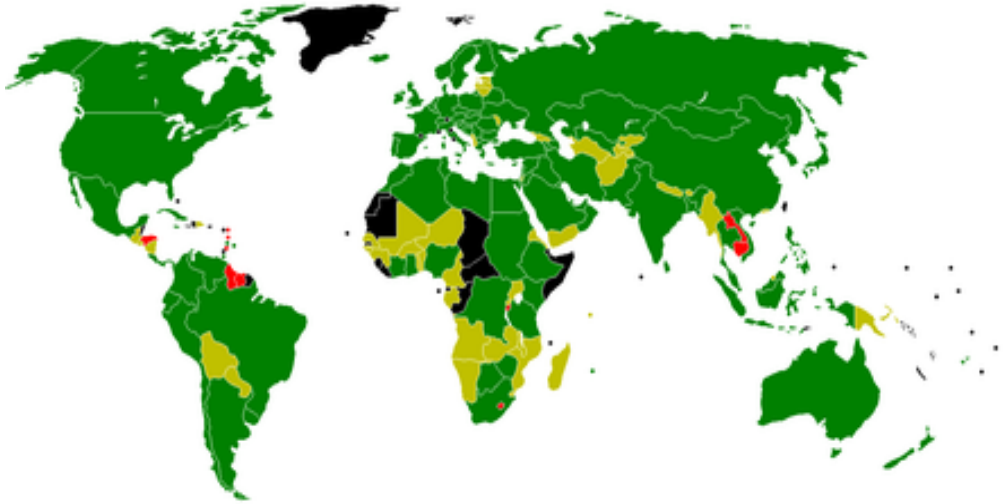

Fig. 3 Map of ISO members: green – members, yellow – correspondent members, red – supporting countries, black – non-members

These standards can be obtained although are rather expensive as they are protected by copyright and are generally prohibited to copy and distribute them. However, they may be implemented through national standards as follows:

- translated - maintains everything, including a code of international standard;
- translated with modifications - text and parameters are modified as compared to the source, the structure of international standard is retained;
- incorporated - text, structure and parameters of international standards are modified;
- taken original - very rarely (issued without translation for limited use in a defined group of experts).

ISO standard is published in a paper form, in A4 format – it is one of the ISO standard paper size. It may be up to several hundred pages long. ISO standards are also available for download in electronic form and some are available as part of a collection on CD or in manuals. [5]

3.2 STN standards

These standards are valid in the territory of Slovak Republic. Their position in the legal system is defined by the act on technical requirements for products and on conformity assessment and on change and amendment of some Acts in the wording of Act No. 436/2001 Coll. and Act No.254/2003 Coll. (Act No.264/1999 Coll.). [6]

The Act is mainly determining:

- codification of the method for setting the technical requirements for products;
- ways of assessment the conformity of product characteristics with these requirements; testing, certification, conformity standardization of products etc.;
- the rights and obligations for economic subjects (manufacturers, importers, distributors, etc.) in the introducing of products;
- the rights and obligations of legal subjects and organizations responsible for activities associated with the development, approval and issuance of technical standards.

3.3 EN standards

EN standard is the basic document of CEN and:

- it is required to be taken at the national level along with cancellation the standards that are inconsistent with it;
- its use is optional;
- its validity is unlimited and reviewed every five years.

The European standard is a document which that was adopted by one of the three recognized European organizations for standards: CEN, CENELEC and ETSI. EN is available in the three official CEN languages (English, French and German). European standards are a key part of the European Single Market. These technical documents are essential to facilitate European trade and therefore have high importance among producers from all around the world.

4. TRANSFORMATION OF STN STANDARDS TO EN ISO STANDARDS FOR SELECTED MATERIALS

A standard represents a model for specifications or technical solutions which can be traded in the market. Along with our country implementation into the European Union and with the adoption of technical standards there arose some questions of implementation related to the new standardization of materials.

In Table 1 - Table 3 are given examples providing the comparison of steel standardization under the corresponding original STN standard and current standard EN, respectively EN ISO standard.

Tab. 1 Steel Class 11

STN steel nomenclature	EN or EN ISO steel nomenclature	Material number W. Nr.
11 109	11SMn30	1.0715
11 110	10S20	1.0721
11 120	15SMn13	1.0725
11 140	35S20	1.0726
11 321	DC01	1.0330
11 343	S195T	1.0026
11 373	S235JRG1	1.0036
11 375	S235JR(G2)	1.0038

Tab. 2 Steel Class 12

STN steel nomenclature	EN or EN ISO steel nomenclature	Material number W. Nr.
12 010	C10E	1.1121
12 020	C16E	1.1148
12 024	C22E	1.1151
12 030	C25E	1.1158
12 031	C30E	1.1178
12 040	C35E	1.1181
12 041	C40E	1.1186
12 042	35B2	1.5511
12 050	C45E	1.1191
12 051	C50E	1.1206

Tab. 3 Steel Class 13

STN steel nomenclature	EN or EN ISO steel nomenclature	Material number W. Nr.
13 030	20Mn5	1.1133
13 141	28Mn6	1.1170
13 180	70Mn4	1.1244

5. CONCLUSIONS

In the study, structure of national and international systems of standards and process of transition between them is given. Standards are in frequent use in manufacturing in order to increase efficiency and productivity and are regularly updated. Using of a standard creates conditions for the regular audit of its relevance by the supervising organization and allows determining the time when it is necessary to adapt the standard for new needs. Finally, it should be noted that this analyse of the transition of materials labelling standardization is necessary part of such processes as the EU enlargement, since it facilitates the nonverbal communication within the unified market.

REFERENCES

[1] <http://www.sutn.sk/default.aspx?page=81f79981-12c5-491e-87e3-491c73710141>; [cited 2010-06-12]
[2] <http://www.tf.uniag.sk/e_sources/katmech/TN/Pr_TN5.pdf>; [cited 2010-06-12]
[3] Šimočko, M.: Prehľadová štúdia spracovania ISO noriem v oblasti navrhovania technologických konštrukcií. Thesis, FMT TU of Košice, 2010, 47 p. (in Slovak)
[4] <http://www.cen.eu/cen/AboutUs/WhatisCEN/Pages/default.aspx>; [cited 2010-06-12]
[5] Medvecký, Š. and al.: Konštruovanie 1. Žilina, EDIS – ŽU, 626 p., 2006, ISBN 978-80-8070-640-1 (in Slovak)
[6] Leinveber, J., Vávra, P.: Strojnícke tabulky. Prague, 914 p., 2008, ISBN 978-80-7361-051-7 (in Czech)

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[1.] Abdul Aziz HUSSIN, [2.] Abdelnaser OMRAN

IMPLICATION OF NON-COMPLETION PROJECTS IN MALAYSIA

[1-2.] SCHOOL OF HOUSING, BUILDING AND PLANNING,
UNIVERSITI SAINS MALAYSIA, MINDEN, PULAU PINANG, MALAYSIA

ABSTRACT:
The construction industry continues to occupy an important position in the nation's economy even though it contributes less than the manufacturing or other service industries. The contribution of the construction industry to national economic growth necessitates improved efficiency in the industry by means of cost-effectiveness and timelines and would certainly contribute to cost savings for the country as a whole. A major criticism facing the construction industry is the growing rate of delays in project delivery. Delay is a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period. Thus, this paper is investigated the implication of non-completion in construction projects in Malaysia.

KEYWORDS:
Projects, Implications, Non-completion, Delay, Malaysia

1. INTRODUCTION

The construction industry continues to occupy an important position in the nation's economy even though it contributes less than the manufacturing or other service industries. The contribution of the construction industry to national economic growth necessitates improved efficiency in the industry by means of cost-effectiveness and timelines and would certainly contribute to cost savings for the country as a whole. A major criticism facing the construction industry is the growing rate of delays in project delivery. Delay is a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period. In countries such as United State of America (USA), United Kingdom (UK) and Western Germany, Mobbs (1982) found that 'construction time' is better. The Construction Sector is one of the important sectors that contribute to Malaysia's economic growth. The sector accounted for nearly 3.3% of GDP in the year 2005 and employed about 600,000 workers including 109,000 foreign workers (MALBEX, 2005). The huge volume and complexity of projects in Malaysia's construction sector pose a great challenge and provide a wealth of opportunities to various companies in the construction industry. In Nigeria, Ajanlekoko (1987) observed that the performance of the construction industry time wise is poor. An investigation by Odeyinka and Yusif (1997) shows that seven out of ten projects surveyed suffered delays in their execution. According to Chan and Kumaraswamy (1993) timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. These are not without some cost consequences. The conventional approach to managing the extra cost is to include a percentage of the project cost as contingency in the pre-contract budget. According to Akinsola (1996) conventional allocation of contingency is based on judgment. However construction projects are unique; as they may have a distinctive set of objectives, require the application of new technology or technical approaches to achieve the required result. This uniqueness makes the contingency allowance allocation based on assumption

and intuition inadequate and unrealistic. An investigation by the authors revealed that in Nigeria 5–10% of pre-contract estimate is in most cases allowed as contingency. This allowance was found to be inadequate. Inadequate contingency implies extra financial commitments, which in some cases are beyond the capacity of the owner. Clients are in some cases not prepared for such extra cost and so fund inform of loan are sought to offset the unexpected costs.

2. PROJECT NON-COMPLETION/ABANDONMENT AND DELAY

Construction projects have been managed since time immemorial. Traditionally this was the responsibility of the "master of the works" – a concept retained in the modern French. It emerged as industrial societies started to build complex systems such as rail and power networks. Projects are classically defined by the need to complete a task on time, to budget, and with appropriate technical performance/quality. In recent decades, projects have tended to become more time-constrained, and the ability to deliver a project quickly is becoming an increasingly important element in winning a bid. There is an increasing emphasis on tight contracts, using prime contractor ship to pass time-risk onto the contractor.

i. Project Delay

Failure to complete a complete a project either by the original planned time or budget, or both, ultimately results in project delay. The social and economic costs of delay can be staggeringly high and to a certain extent cannot be absorbed by the industry. When a delay can no longer be absorbed by the client, it will result in the project being abandoned. Thus, it is important to predict and identify problems in the early stages of construction and diagnose the main causes and implement the most appropriate and economical solutions to prevent further negative impacts of delay. In construction, delay could be defined as the time over run either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the owner, delay means loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases. Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it is rarely happen that a project is completed within the specified time. Stumpf (2000) defined delay as an act or event that extends the time required to perform the tasks under a contract. It usually shows up as additional days of work or as a delayed start of an activity. He showed, in his article, that delay does matter, and that different methods for analyzing schedule delay lead to different results for the owner and contractor. Construction delays became an integral part of the project's construction life. Even with today's advanced technology, and management understanding of project management techniques, construction projects continue to suffer delays and project completion dates still get pushed back (Stumpf, 2000).

ii. Project non-completion/Abandonment

There are several stages, as defined by the ministry, before a project is declared abandoned. If it has passed its promised delivery date by 10%, it is considered late; if the delay stretches beyond 10%-30%, then it is considered 'sick'; and finally, if no work has been carried out or no workers are on the project site for up to six months, then it is deemed abandoned (The star, 2009). Abandoned housing development means where a licensed housing developer had refused to carry-out or delayed or suspended or stopped or ceased works continuously for a period of six months or more or beyond the stipulated period of completion as agreed under a sales and purchase agreement (Sabah, 2005). A housing project is classified as "abandoned" by the Ministry of Housing and Local Government (MHLG) when there is no activity at the project site, continuously, for more than six months after the expected date of delivery of vacant possession. This is based on the date of the first Sale and Purchase Agreement (SPA) signed between the developer and a purchaser. A project is also classified as abandoned if, within this six month period, the developer has been wound-up and the company taken over by an official receiver or private liquidator recognised or affirmed by the Housing Controller, who is the Secretary-General of MHLG.

3. MALAYSIAN ABANDONED PROJECT

Project delays are known to affect project cost, workers morale, quality of completed works and the industry's reputation. Modern construction techniques and the use of sophisticated ICT tools on their own do no ensure that a project can be delivered on time. The right level of

knowledge, experience, methods and management skills are needed to ensure a greater chance for projects to be completed on or before the deadlines. Delay is a serious problem in the construction industry. It is costly for both owner and contractor. The owner loses by missing out on the potential revenues from the use of the project and by increased overhead cost for contract administration and supervision. The contractor also loses due to increased costs in over-head and tied-up capital. His losses may include lost opportunities for new projects because of diminished financial capabilities. In public projects, the public may also be affected by the delay in the utilization of the facilities and by the extended inconveniences such as traffic disturbances. Delay, therefore, is an important issue to the construction industry. Investigation into this problem area is needed in order to better manage delay situations and to mitigate their consequences. Assessing the frequency of delay, the extent to which delay may occur, and the responsibility for delay can provide insights for early planning to control these factors and improve project performance. Every step prescribed under the Housing Development (Control and Licensing) Act (the Act) is being taken by the Ministry of Housing and Local Government (MHLG) to minimise the number of abandoned housing projects in the country. However, there are unforeseen circumstances beyond the control of the ministry, such as the Asian financial crisis of 1997-98 and increases in the cost of building materials that have hurt many small housing developers and caused project abandonment. The public relies on this legislation and the enforcers to protect them in their quest for homeownership and many are fed-up with the lack or lax enforcement when problems surfaced. In the past, weak enforcement and monitoring had allowed errant developers to flourish. The previous Prime Minister, Abdullah Badawi was on 22.11.2005 quoted as saying: “If the projects have been monitored on a regular basis from the start, any sign of them being abandoned could have been detected and the projects salvaged” (Please see Table 1).

Table 1. Statistic of Abandoned Housing Project

STATISTIK PROJEK-PROJEK PERUMAHAN BERMASALAH (LEWAT, SAKIT & TERBENGKALAI)
SEHINGGA FEBRUARI 2009

BIL.	NEGERI	PROJEK LEWAT			PROJEK SAKIT			PROJEK TERBENGKALAI			JUMLAH		
		BIL. PROJEK	BIL. UNIT RUMAH	BIL. PEMBELI	BIL. PROJEK	BIL. UNIT RUMAH	BIL. PEMBELI	BIL. PROJEK	BIL. UNIT RUMAH	BIL. PEMBELI	BIL. PROJEK	BIL. UNIT RUMAH	BIL. PEMBELI
1	PERLIS	3	67	52	2	30	27	0	0	0	5	97	79
2	KEDAH	14	1,301	847	14	2,473	1,502	9	1,445	709	37	5,219	3,058
3	PULAU PINANG	32	4,162	2,415	18	4,123	3,607	10	6,517	4,784	60	14,802	10,806
4	PERAK	52	3,182	1,713	43	3,622	1,925	6	822	597	101	7,626	4,235
5	SELANGOR	39	6,130	3,221	68	21,972	17,998	39	21,733	14,642	146	49,835	35,861
6	WP KUALA LUMPUR	10	2,471	896	9	895	564	6	2,408	1,365	25	5,774	2,825
7	NEGERI SEMBILAN	17	2,276	936	10	1,135	948	20	4,743	2,383	47	8,154	4,267
8	MELAKA	9	510	350	6	1,448	1,033	7	1,109	570	22	3,067	1,953
9	JOHOR	15	1,142	508	30	6,958	5,053	32	9,280	5,419	77	17,380	10,980
10	PAHANG	9	779	181	7	1,000	750	11	3,866	1,972	27	5,645	2,903
11	TERENGGANU	3	261	213	3	52	48	1	21	20	7	334	281
12	KELANTAN	5	193	109	6	286	228	3	519	367	14	998	704
13	SABAH	0	0	0	1	455	45	4	326	260	5	781	305
14	SARAWAK	0	0	0	0	0	0	8	406	288	8	406	288
JUMLAH KESELURUHAN		208	22,474	11,441	217	44,449	33,728	156	53,195	33,376	581	120,118	78,545
PERATUS		36	19	15	37	37	43	27	44	42	100	100	100

Source: Ministry of Housing & Local Government
NOTE: These figures do not include unlicensed and ‘commercial’ project developers.

Between 1990 and December 2005, a total of 261 housing projects were identified as abandoned by MHLG. These projects totaled 88,410 units, involving 58,685 house buyers for properties valued at a total of RM8.04 billion. Of these, 87 projects were revived and completed by white knights and another six by Syarikat Perumahan Negara Bhd (SPNB). Of the 168 remaining, 149 projects were classified as having the potential to be revived. These contained 63,894 units involving 42,706 buyers and a total sales value of RM5.4 billion. Another 10 projects housing 4,191 units, 2,074 buyers and RM426.2 million in sales value have been taken over by new developers, while nine others involving 2,866 units, 1,364 buyers and RM 335.29 million in sales value were classified as "not viable for revival". Of the total 70,960 units abandoned in the 168 projects, 31,276 are high-cost houses, 18,731 medium-cost and 20,953 low-cost units. The total number of abandoned projects makes up only 1.3 per cent of the 13,286 projects implemented between 1990 and December last year. It must be noted that the developers that abandoned the 261 projects

between 1990 and December 2005 had their licenses issued before the housing law was amended on Dec 1, 2002.

4. CAUSES OF NON-COMPLETION PROJECT

There are a number of factors behind the abandonment of a housing project:

i. Finance
ii. Poor marketing and sales strategies
iii. Technical problems faced during construction
iv. Problems caused by compensation demanded by squatters for resettlement.

The MHLG's findings have shown that 118 or 70 per cent of the 168 projects abandoned were due to the financial problems of developers. Another 23 (14 per cent) arose from poor marketing and sales strategies while 27 (16 per cent) failed over problems arising from squatter resettlement, poor company management and disputes between developers and contractors or with landowners (News Tarikh, 2006). There are financial problems of a developer caused by incidences such as the 1997-98 economic crisis. Crisis within the development company, including disputes between shareholders or embezzlement of progress payment collections, problems involving contractors and even disagreements with landowners are more reasons for abandoned housing projects. There are many reasons why delays occur. They may be due to:

i. strikes,
ii. rework,
iii. poor organization,
iv. material shortage,
v. equipment failure,
vi. change orders,
vii. Act of God and so on.

In addition, delays are often interconnected, making the situation even more complex (Alkass, 1996). The factors which may give rise to non completion or late completion of projects cannot be exhaustively discussed due to space constraints, so only some are dealt with below. It is the responsibility of the parties to take account of any risk which might distort the completion of the plant, its operation and revenue stream (Dow and Andrews-Speed, 1998). Lenders as well as sponsors need be aware of the events which may endanger the completion of the project and the implication of leaving such factors unabated.

i. Insolvency Of Contractor

The insolvency of a contractor engaged in the construction of housing might mean distortion for the completion schedule. This is particularly an instance where a turn-key contract proves inadequate to mitigate completion risk, unless the contractor's obligation had been guaranteed under a bond by a credit-worthy third party. Although it might not be possible to predict the contractor's state of affairs such as to determine impending insolvency, engaging an experienced, financially responsible and strongly capitalized contractor is a way to mitigate this risk.

ii. Cost Overrun

Cost overrun can arise from so many events which include: an increase in the cost of energy supply for the construction, transportation cost, labour cost and material cost. Cost overrun may also arise from delay which can give room for inflation. Sometimes, design changes initiated by the owners or the government after the commencement of construction could so gravely invite cost overrun. Recently for instance, Multiplex Construction, the contractor in charge of the Wembley National Stadium in the UK has threatened to sue the clients for £150 Million allegedly being overrun cost it has suffered for the over 560 design changes made by the clients (Rogers, 2006). A power project experiencing cost overrun faces the risk of delay in completion pending the determination of the party committed or obliged to make provision for the overrun cost, unless adequate provisions had been made to salvage such eventuality. Sometimes, this determination emerges after a long and heated litigation process. Also, it could lead to outright non completion by frustrating the furtherance of construction work on the project where the party under obligation for the overrun cost is incapable of providing for it. This is especially so because power project sponsors, are often not as hugely capitalized as their oil counterparts, and in oil there is often resort to a great deal of joint ventures which helps to easily absorb such overrun risk.

iii. Currency Fluctuation

Whenever there is mismatch between one currency against another in a single project for loan disbursement and construction cost, there could arise the issue of currency fluctuation. The construction phase for a conventional plant has an average lead time of at least three years (Beck, 1994); thus within this time; cost overrun could set in arising from an unfavourable fluctuation of exchange rate. An example could be a loan denominated in British Pounds Sterling for which

construction contract and machinery accessories are in American Dollars. A devaluation of the Pounds Sterling against the Dollar would mean that more Pounds would be needed to fulfill the completion of the original plan. This was the case in Indelpro polypropylene plant in Mexico, where cost overrun was experienced partly as a result of fluctuation of the Mexican Pesos rate against the American Dollars (IFC, 1999). Thus currency fluctuation is an issue for consideration in mitigating completion risk. Lenders can explore a host of methods, including but not limited to denominating the loan currency in the currency of the technology to be adopted, however where this is not practicable.

iv. Regulatory Changes

There could be delays due to changes in policies, standards and regulations; these could also result in extreme cases of non-completion/cancellation. In the United States (US), majority of the unjustifiable cancellations of nuclear plants were blamed on constraints set in by ever evolving regulatory requirements (Joskow and Schmalensee, 1983). Often, some conditions like requirements to use modern and costly technology, are subsequently imposed which have the effect of eroding the bankability of the project, and for which the lenders would never have advanced capital had they been put in place from the very beginning. The difficulty has always been borne by parties who had no fault, drawn from the change in government regulation of the enterprise. With ever increasing environmental standards, it becomes even worse to predict what environmental compliance would be required of a power plant by the government. This is a potent risk in view of the long lead times of a conventional power plant. Environmental regulation contributed to the California electricity debacle - it was more cumbersome to get sitting and permitting approvals for new plants than in other US states and also the legal system gave the inhabitants and environmental groups the right to substantially delay the construction of new plants leading to inability to complete plants as scheduled.

v. Contractual Disputes

Disputes may be inevitable whenever parties to a contract have duties and obligations. With the several contracts needed to put a housing project into operation (concession, construction, loan, shareholders, interlenders, power purchase agreement and so on), the non existence of well established institutions and processes for dispute resolution, could lead to delay in completion of a housing project. Court proceedings are often presided over by judges who have no special training in the kind of contracts involved; and could also evidence very extensive delays. This is an area that a lender should not ignore in its objective to see the project completed according to schedule. Arbitration is the easy alternative since it gives the parties the flexibility to frame the process to suit their own peculiar circumstance, but even that is not a final solution in itself since arbitration awards will have to be enforced by a regular court. In India for example, a dispute concerning transfer of technology cannot be a subject of arbitration and the courts will not enforce any such award.

5. IMPLICATION OF NON-COMPLETION PROJECT

Abandoned housing projects have certain implications on the affected parties. Losses and difficulties faced by house buyers in servicing the interest on housing loans they have taken while paying house rental as well is one. The revival of an abandoned project involves:

- High capital injection, either by the developer or by other parties interested in reviving the project. This is due to vandalism at the project site, price increases of raw materials and changes in building requirements.
- Developers also face non- performing loans and land-owners risk their land being foreclosed.
- There is also, the possibility that a project may no longer be viable for revival or that no company is interested in reviving it. All these mean a loss to the economy.

Non-completion projects have certain implication on the affected parties. Managing and reviving a non-completion project is a complicated affair involving the developer, purchaser, financer, landowner and other parties. It will take time for all parties to reach a consensus since each parties want to protect their interest. When a single building is faced case of non completion, there is usually a confrontation between these parties. What to do with the project and who has to pay are usually sensitive issues that end up in costly and slow lawsuits. Abandoned buildings also have a significant impact towards socio economics nature and environment. Some closed ended implications are as follows:

i. **End user/ house buyers**

The consequences of abandoned housing projects are many. Some of them are, first, on part of the purchasers, they surely are unable to occupy the houses on time as promised by the developers in the Sale and Purchase agreement. The construction of the houses are terminated and partly completed which results to the fact that they are useless for occupation for a long duration of

time (mostly), unless they could, expeditiously be revived. Apart from the inability to occupy the houses, the purchasers too have to pay monthly installments to their banks. This is pathetic as the purchasers have to part with their monies but they could not get the houses. There are many side effects to home buyers especially those who still do not have their own homes and are forced to rent a house while waiting for the house is completed. They had to bear interest bank loans in addition pay the cost of rental houses while. This is their burden of middle income and low cost of living due to the increasing. There are not uncommon cases, where banks had made the purchasers bankrupt on the ground that they failed to pay monthly installments.

ii. **Developers/ clients**

Developer or client who is interested in reviving the project was burdened by the high capital injection. This is due to vandalism at the project site, price increases of raw materials and changes in building requirements. They also face non-performing loans and yet the land being foreclosed. Consequently, there is the possibility that the project may no longer viable for revival or there is no company interested to invest in the project. All these mean a loss to the economy. Private sector failures are sometimes solved by the public administration so the transfer of cost happened between private and public sector.

iii. **Illegal activities are conducted**

Studies showed that abandoned buildings are magnets for crime. First, they provide centres for the pursuit of a range of criminal activities, including prostitution, the consumption and trafficking of drugs, and crimes against property. Evidence of this is found in Spelman's (1993) study of 59 abandoned residential buildings in a low-income Austin, Texas neighborhood. Of these buildings, 34% were being used for illegal activities. Of the 41% of buildings that were unsecured, some 83% were being used for illegal activities (Spelman, 1993). Greenberg and other's (1990) study of TOADS in the 15 largest American cities finds that vacant buildings are frequently used as crack houses, and cites the use of TOADS as locales for drug dealing as one of the most prominent social ills associated with abandonment. According to Spelman (1993), abandoned buildings are ideal places to trade, conceal, and consume drugs. Activity within them is rarely visible from the street, while police officers are reluctant to enter abandoned buildings for legal reasons, because of general uncertainty and the possibility of danger and because of the low probability of a worthwhile payoff (i.e. slight chance of making an arrest). Evidence of drug use was found in 19% of the abandoned buildings in Spelman's study. Spelman (1993) also finds evidence of sexual activity and prostitution in 20% of the buildings in his study, and evidence of two different types of crimes against property. First, almost all of the unsecured buildings in Spelman's study are found to have been plundered by trespassers. Copper piping and wire, appliances, carpets and furniture are favorite targets. Second, 8% of the buildings in the study are found to be housing goods ranging from wallets to lawn furniture to bicycles stolen elsewhere. Abandoned buildings are not just centres where illegal activities are conducted. They also provide meeting places where offenders who perpetrate crimes elsewhere can gather, meet and plan their activities. Spelman (1993) suggested that abandoned buildings are well suited for this purpose because they physically shield criminals from the attention of outsiders. He even argues that, used as meeting places, abandoned buildings might actually foster and exacerbate criminal tendencies. This occurs as the lack of the usual social surveillance mechanisms erodes the self -control of those who meet there, while promoting group cohesion and the illusion of invulnerability. A clear association between abandoned buildings and neighborhood crime rates emerges from Spelman's (1993) study. City blocks blighted by unsecured abandoned buildings were found to suffer crime rates (including cases of drug, theft, and violent crimes) that were twice as high as those found in "control blocks" characterized by the absence of abandoned residences. Of course, this is not definitive proof that abandonment fosters criminal activity — perhaps the crime pre-dated and actually caused the abandonment, rather than the other way around. This possibility must be taken seriously because of the evidence that crime causes abandonment in Newman (1980). Spelman (1993) argues, however, that the "crime causes abandonment" thesis is not consistent with the qualitative features of the pattern of abandonment observed in Austin, Texas during the later 1980s. For example, abandoning owners were largely absentee landlords not local residents, who were responding to plummeting real estate prices throughout the region, not block specific characteristics such as crime rates. This provides some indication that the association between abandonment and neighborhood crime rates in Spelman's study is, indeed, explained by the notion that abandonment causes crime.

i. Cost overrun and time overrun

Cost overrun and time overrun (elongation of project duration) were the two most frequent effects of delay in the construction industry. Delay had significant effects on actual project duration. The model relating delay and actual project duration provide a benchmark for future

research work in the study of project management in Nigeria and also facilitate comparison with other countries. Loss and expense claims arising from delay and fluctuation claims during the delay period had significant effect on cost overrun. The models provide a benchmark for future research work in the study of project management in Nigeria and also facilitate comparison with other countries. Loss and expense claims arise from ascertained and approved delay caused by the client or his agent. The significant effect of loss and expenses claims on project cost overrun suggests that clients are a significant cause of delay in Nigerian building projects. This corroborates the result of a previous study where client-related delay was found to be significant. Delays in project completion seem to be a perennial problem and the lack of oversight by various ministries and departments in the procurement of goods and services continue to cost the Government hundreds of millions of ringgit. Delays in project completion, work not done in accordance with the original scope of works will increased project costs due to the inclusion of procurement of equipment and assets in the scope of works, unutilised facilities upon completion, improper payments made for works not done and shortage of officers in project supervision. These range from multi-billion ringgit infrastructure projects to the procurement of laptops and maintenance of government assets. For example, Kolej Kemahiran Tinggi Mara Balik Pulau in Penang paid RM84,640 for two laptops or RM42,320 per laptop and spent RM2.08mil on computer software that was not used, among other things. Then, there is the over RM15mil the Perak government spent on new purchases of cars and maintenance over the past four years and still not being able to manage its vehicles properly.

ii. Dispute and Arbitration

Furthermore, associated delay problems can also result in dispute, arbitration, total abandonment and protracted litigation by the parties. To some extent the contract parties through claims usually agree upon the extra cost and time elongation associated with delay. Nevertheless, this has in many cases given rise to heated arguments between the owner and contractor. The question of whether a particular delay to progress of work warrants an extra cost and or extension of project duration is usually the cause of disagreement. Such situations, usually involve questioning the facts, causal factors and contract interpretation, which have been addressed by (Alkass *et al.*, 1995). In specific terms, Odeyinka and Yusuf (1997) have addressed the causes of delays in Nigeria building projects. Another problem that has been identified is the disagreement prevailing among the purchasers, bankers, local authorities and the contractors concerned when it comes to revive the abandoned housing projects. This problem is complex as is evident in many cases. Consequently, the projects could or may not be rehabilitated as there is no common consensus among them.

iii. Rehabilitation Problem

Further to aggravate and worsen the situation, in the event there are plans for rehabilitation, the plans and attempts to rehabilitate are not easy. Many impending problems and difficulties, neither subtle nor obvious, would be awaiting the purchasers and the developers. Among the traumatic problems are the impossibility to revive the projects as the projects have been too long overdue without any prospect of reviving and to rehabilitate them, needing additional and substantial costs and expenditure. Cases show that most of the purchasers are reluctant to take additional money out from their own pockets on the ground, 'that it was not their fault', as the 'fault was squarely due to the developers'. 'Thus, the developers concerned should advance their own money to revive the projects'. Matters would not be settled that easy since most of the developers involved do not have enough money, which may be due to poor management or they had calculatedly siphoning off the company's assets and monies through unreasonable directors' allowances and high overhead operating costs. Worst still and of all, most of them have been wound up and the directors have absconded, unable to be traced and contacted.

iv. Delay on completion Time and Delay on Payment

Delays defer income, while interest keeps accumulating. Long delays may result in projects ending up in the so-called 'interest trap' (Flyberg *et al.*, 2004), where a combination of escalating construction costs, delays and increasing interest payments result in cost overrun.. According to Arditti *et al.*, (1985), lengthy delays in inflationary environments increase cost overruns tremendously. The overall lack of finance to complete a project, or delays in the payments for services by the project owners or clients can lead to significant problems. If the costs of a project have increased significantly beyond the original estimate, then work on the project may have to be stopped or be delayed until additional funds can be found. Delays on payment may some times provoke the contractor to claim for interest rates. If the payment by a project owner is slow, the contractor may begin to commit fewer resources to a project, and may even cease work if cash flow becomes a problem.

v. Late Site Hand Over or Change of Location of Construction site

Late hand over of construction sites, some times may happen and substantially increase the cost of construction projects. In most international projects in Ethiopia late site hand over is a common form of claim source for compensation for contractors (Girmay, 2003). For example, the Addis Ababa Bolle International Airport Project has suffered an additional cost of about $1,000,000.00 USD due to late site hand over (Girmay, 2003). Fortunately, domestic contractors do not ask for compensation due to late site hand over. Sometimes the owner may decide to change the location of the project after the award to the winning contractor. This is a rare phenomenon butt it does happen due to sudden and unavoidable circumstances. The change of location of a project might extensively change the entire character of the work that was initially required under the (awarded) contract or the new location of the construction site may have different sub surface condition that may necessitate the structure to be redesigned. In such cases it is rightly alleged that the changes do alter the "general scope of work" and therefore, the final cost of the project might exceed the original contract amount.

vi. Acceleration Costs

Acceleration occurs when a project has been delayed, yet the owner demands that the contractor completes the contracted work before the contract completion date, or agreed upon changed completion date, or when the contractor wants to complete early. When acceleration occur the contractor typically will incur additional direct and indirect costs. While direct costs are relatively easy to quantify, indirect costs are difficult to identify and quantify (William, 2002). If the contractor establishes a valid acceleration claim, it is entitled to recover the costs incurred. These costs may include increased mobilization and demobilization costs due to the need to commit additional resources in terms of labor, equipment and supervision at the project than originally contemplated by the original schedule; specifically, direct labor costs include such items as increased wage costs for additional workers, overtime pay and rental costs for additional equipment. Further, the contractor may incur additional costs for inefficiencies in labor. These inefficiencies may include congestion or fatigue from extensive overtime work. Labor inefficiencies are a hidden butt very expensive cost of acceleration. Nevertheless, while labor inefficiencies are a very real part of an acceleration cost, they are extremely difficult to quantify.

vii. Environmental impacts:

Visual impact: View quality is partially dependent on relatively unchanging landscape elements like mountains or valleys; views are also affected by more readily altered landscape features, particularly built structures such as buildings (Miller, 2001). In case of abandoned buildings view quality can be seriously deteriorated, especially if towering over flat coastal areas where the visual field is wide and open. Puntillo Del Sol building (Tenerife) is composed of two enormous unfinished and badly preserved fifteen-storey buildings. Its dilapidated appearance and its location at the top of a cliff generate a huge negative visual impact (CIEM, 2003). Similar visual impact has Azaña Hotel, also in Tenerife, a twenty-storey building seriously deteriorated. In these and other cases, and in accordance with Kearny *et al.*, (2008), the existing regulations do not meaningfully reflect general public attitudes regarding visual impacts.

viii. Landscape modification.

The original topography is significantly changed once urbanisation process starts. Waste soils, gravels and residues, temporary soil piles on construction sites, vegetation elimination and asphalt cover are common actions during urbanisation. These processes change progressively the especially sensitive coastal landscapes. Once the coastal stretch has become superficially indistinguishable from the rest of the hinterland's landscape in terms of vegetation and apparent sedimentary inactivity, development pressures and the absence of strict planning controls leads to encroached urbanisation in a number of prime locations. For instance Costa Esury housing development, in Huelva, consists of 2,184 houses (half of them under construction), two shopping malls, hotels and two golf courses. All of the latter elements are also under construction. The current bankrupt situation of the building company has paralysed the works. Up to date the landscape has changed drastically, and what before was riverside land nowadays is half-built housing development.

ix. Erosion.

At most locations, the occupation of the back-beach by infrastructural work has affected the littoral dynamics in a predictable way. The back-beach, which had previously been effective as a coastal defense feature through the provision of protection in rare severe wave conditions, became fixed by vegetation during relatively long periods of inactivity. In the most highly urbanised sections of the coastal fringe, the complete elimination of the back-beach as a morphological feature has occurred. Also digging and moving of soil and rocks leave abandoned loose earth and residues. Experimental studies and field investigations show that loose silt and earth piles formed

by urban construction can be eroded seriously (Hu *et al.*, 2001). In Lanzarote, the tracks generated thirty years ago during the construction phase of Atlante Del Sol site still remain. These tracks cause severe erosion problems in the area. The vegetation is unable to remain in these conditions as the little forest cover of the soil disappears and the area become more vulnerable to erosion. The deterioration of Puntillo Del Sol Building in Tenerife and its possible collapse are considered serious environmental hazards. It can produce erosive phenomena and affect to the Cabrera precipice and to the inter-tidal space located down the precipice (CIEM, 2003).

x. Biodiversity decrease

As coastal habitat conservation is directly related to species conservation, degradation of coastal areas would end in a decrease of biodiversity. Club Mediterranee de Cadaqués, in Catalonia, is located in the high ecological value area of Cap the Creus, part of the Natura 2000 network and Especial Protected Area. It is the damage to biodiversity and ecological values resulting from the abandoned of the resort what has driven Public Administration to order its demolition (BOE, 2008). Atlante Del Sol is located in an arid area of Lanzarote Island, but despite extreme conditions this area is rich in species of plants (CIEM, 2008). However, due to the fragility of this ecosystem, plants population has decreased in the surroundings areas of the abandoned building due to the erosion process described above.

xi. Pollution

Abandoned buildings usually trigger the creation of uncontrolled and unsupervised garbage disposal. As the case of Arenales Del Sol Hotel, in Alicante, this is dirty, full of garbage, an attraction to rats and a focus for illnesses. Besides garbage, half-built housing development may bring other kind of pollution. In Costa Esuri, Huelva, some people are currently living without sewage treatment plant. The pollution generated is being noticed downstream the Guadiana´s river, where organic pollution is increasing. Pollution effects can be summarise as a decrease of water quality for aquatic life and recreational activities, eutrophication, alteration of ecological conditions and increase of illnesses related to water (DHG, 2009).

6. MEASURES TO PREVENT NON-COMPLETION /ABANDONED PROJECT

These are some of the measures MHLG has taken to prevent housing projects from becoming abandoned:

- Tightening procedures for issuance of housing development licenses and focusing on a developer's financial capacity;
- Continuous project monitoring through Form 7f;
- Regular visits to the project site and developer's premises to counter-check information provided in Form 7f;
- Exercising greater control over the Housing Development Account to ensure compliance with the Housing Development Regulations;
- Counter-checking all claims made on the Housing Development Account;
- Ensuring developers submit their annual audited financial reports;
- Taking legal action against developers for offences; under the Act and its Regulations; and
- Allowing licensed developers to apply for the minister's permission to revoke SPAs should they be unable to fulfill their obligations to purchasers.

7. EFFORT TO REVIVE ABANDONED PROJECT

Since housing projects are abandoned at various stages of construction for a variety of reasons, MHLG has adopted several approaches in the revival process. However, its main role is to:

- Act as mediator/facilitator to house buyer committees, financiers and developers to determine the direction of the revival scheme;
- Act as adviser to project revivers (white knights) and other affected parties to ensure their full co-operation and commitment to revive the scheme;
- Request SPNB to conduct viability studies to revive and complete a project should no other party want to;
- Allow for winding up of a developer and placing of a project under an official receiver or applying for a court order to appoint receivers and managers, or a white knight to revive it with the consent of the majority of the buyers;
- Allow a project financier, as debenture holder, to use its powers to appoint receivers to take control, revive and complete a project;
- Direct a company to assume, control and carry on the business of a developer vide the minister's powers under Section 11 (1) (c) or to use Section 11 (1) (d) to direct a developer to petition the High Court to wind up its business.

8. STAGES IN REVIVING AN ABANDONED PROJECT

Basically, all abandoned housing projects are first classified as having the "potential for revival". Subsequently, this classification is further stream- lined into four categories.

The first category is for abandoned projects newly identified in a particular year. At this stage, MHLG will focus on information gathering and allow for the appointment of a receiver or private liquidator for the developer, with the winding-up petition being served. ***Thereafter*** a feasibility study will be conducted on the project. This is normally done one year or more after the project is declared abandoned. It is at this stage that white knights may surface with project revival proposals. The MHLG will act as facilitator, giving advice and guidance to all affected parties.

The third stage in project revival is the selection of a white knight and ensuring all affected parties have reached a consensus on the project revival proposals. At this point, MHLG will act as a coordinator between the white knight and other technical agencies in order to speed up the approval of plans for the project to take off.

The fourth stage is when the contractor is appointed and construction is under way.

9. PROBLEMS REVIVING ABANDONED PROJECTS

Managing and reviving an abandoned project is a complicated affair involving the developer, purchasers, bridging financier, landowner and other parties. It will take time for all parties to reach a consensus, since each wants to protect its interest. Some of the hurdles MHLG faces in reviving abandoned projects include:

1. The involvement of the developer in other business activities or in a company with a diversified business portfolio. Though a Housing Development Account has been opened for the project, the receivers will take stock of all the developer's financial accounts when it goes into receivership. While project revival and debt settlement remain a priority, at times there would be very little left in the account to complete the project and settle liabilities.
2. When a developer is wound-up, the master charge is to get the first priority for debt repayment - and it usually wants the project foreclosed.
3. Developers also impose conditions in their consent for project revival in order to get returns for the effort they have put in from the parties reviving the projects.
4. Some developers don't own the land they are developing, so the rights of the landowners cannot be denied, especially if they have imposed conditions to protect their rights.
5. Consultants of developers who are in possession of detailed or amended building plans often refuse to cooperate with receivers or liquidators until their dues are paid.
6. Purchasers often insist that the late delivery clause in a SPA be honoured, or that no additional payment be imposed on them to revive the scheme.
7. Drawn-out court battles against developers by squatters, landowners, bridging financiers or contractors over contractual matters may further delay the revival of a project.

10. CONCLUSION

The issue of non completion of construction projects is one that has tremendous effects on the industry and economy of the country. From this research, we have identified the implications of non completion of projects from high capital injection, inability to occupy houses on time by the end users, building being subject to crime, cost and time over run, disputes, arbitration and protracted litigation by parties, difficulty in rehabilitation, project delay, increased cost of construction, environmental implications such as altered landscape view, unsightly scenery due to wastes, residues, soils etc, erosion, pollution, biodiversity decrease; socio-economic implications such as unemployment increase, conflicts between the public administration and the private sector, loss of economic value of the project and the area at large, consequential marginalization of the population to unwarranted transfer of cost between private and public sector; and numerous causes of non completion of projects which includes inadequacy of finance, poor marketing and sales strategies, technical problems faced during construction, problems caused by compensations demanded by squatters for resettlement, insolvency of contractor, cost overrun and currency fluctuation amongst others. We have also identified some possible measures towards cropping this problem both from the public and private sector namely: tightening procedures for issuance of housing development licenses and focusing on a developer's financial capacity; continuous project monitoring through Form 7f; regular visits to the project site and developer's premises to counter-check information provided in Form 7f; exercising greater control over the Housing Development Account to ensure compliance with the Housing Development Regulations; counter-checking all

claims made on the Housing Development Account; Ensuring developers submit their annual audited financial reports; taking legal action against developers for offences; under the Act and its Regulations; and allowing licensed developers to apply for the minister's permission to revoke SPAs should they be unable to fulfill their obligations to purchasers.

We observed that there have been efforts made by the government towards reviving abandoned and non completed projects and some problems faced in this course. However, it is important to note that abandoned projects do not benefit the construction industry and has negative effects on the economy of the country and most effectual on the end users. It is therefore, expedient that efforts are made jointly by the public and private sector to crop this problem.

REFERENCES

[1.] Ajanlekoko JO. (1987). Controlling cost in the construction industry. Lagos QS Digest, Lagos. 1(1):8–12.
[2.] Akinsola, A.O. (1996). A Neutral network model for predicting Building projects' Contingency. Conference: Proceedings of Association of Researchers in Construction Management, ARCOM 96, Sheffield Hallam University, England, 11–13 September 1996, pp. 507–516.
[3.] Alkass, S., Mazerolle, M., Tribaldos, E., and Harris, F. (1995). "Computer Aided Construction Delay Analysis and Claims preparation", Construction Management & Economics. 13, 335-352.
[4.] Ardity, D., Akan, G.T., and Gurdamar, S. (1985). Cost overruns in public projects. International Journal of Project Management, 3, 218–225.
[5.] Bagué, G. (2004). El Club Mediterranee de Cadaqués cierra y pretender vender su paraíso natural al estado. El País Online, 1 June 2004.
[6.] Beck, P. (1994). Prospects and Strategies for Nuclear Power, Global Boon or Dangerous Diversion? 53 (London, UK: Earthscan Publications Ltd, 1994).
[7.] Chan, D.W.M., & Kumaraswamy, M.M. (1993). A survey of time-cost relationships in Hong Kong construction projects. Building Technology and Management Journal. 20 (2), 54–72.
[8.] CIEM (Canary Islands Environmental and Territorial Policy Ministry), (2003). Plan Especial Paisaje Protegido Costa de Acentejo.
[9.] Czamanski, D. (1999). Privatization and Restructuring of Electricity Provision 32 (West Port, US: Praeger Publishers.
[10.] Bordoli, D.W., and Baldwin, A.N. (1998). A methodology for assessing construction project delays. Construction Management and Economics. 16, 327–337.
[11.] DHG (Demarcación Hidrográfica del Guadiana), (2009). Contaminación localizada en aguas de transición. Plan Hidrológico 2009, Tema Importante nº 13. Confederación Hidrográfica Guadiana.
[12.] Dow, R., & Andrews-Speed, P., (1998). China's Electricity Industry under Reform 1996-1998 (Dundee, UK: CEPMLP).
[13.] Flyvbjerg, B., Holm, M.K.S., and Buhl, S.L. (2003). How common and how large are cost overruns in transport infrastructure projects? Transport Reviews, 23, 71–88.
[14.] IFC, (1999). Lessons of Experience: Project Finance in Developing Countries 43 (Washington, US).
[15.] Joskow, L., & Schmalensee, R. (1983). Markets for Power: an Analysis of Electric Utility Deregulation (Massachusetts, US: The MIT Press.
[16.] Kearny, A.R; Bradley, G.A.; Petrich, C.H; Kaplan, R.; Kaplan, S., and Simpsom-coleman, D., (2008). Public perception as support for scenic quality regulation in a nationally treasured landscape. Landscape and Urban Planning. 87.
[17.] MALBEX, (2005). Market watch – construction industry, Kuala Lumpur Exhibition Center Report. Pp.1–8.
[18.] Miller, D. (2001). A method for estimating changes in the visibility of land cover. Landscape and Urban Planning. 54, 91–104.
[19.] Mobbs, G.N. (1982). Speeding up construction. The Quantity Surveyor. 38(1):2–3.
[20.] Newman, O. (1980). Community of Interest. New York: Anchor Press/Doubleday.
[21.] Odeyinka, H.A., & Yusif, A. (1997). The causes and effects of construction delays on completion cost of housing projects in Nigeria. Journal of Financial Management of Property and Construction; 2(3):31–44.

[22.] Rogers, D. (2006). Multiplex sues Football Chiefs & Wembley Designer next in line for Legal Action, Construction News, April 6, 1–3.
[23.] Sabah, (2005). Housing Development (Control and Licensing) Enactment 1978 (Amended 2005).
[24.] Sander, H.A., and Manson, S.M. (2007). Heights and locations of artificial structures in viewshed calculation: How close is close enough?. Landscape and Urban Planning, 82.
[25.] Spelman, W. (1993) "Abandoned Buildings: Magnets for Crime" Journal of Criminal Justice. 21: 481-95.
[26.] Stumpf, G. (2000). Schedule delay analysis. Construction Engineering Journal. 42(7):32–43.

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APPLICATION OF PROJECT MANAGEMENT METHODOLOGY IN PREPARING OF THESIS

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ABSTRACT:
The final phase of the high school education, is to write a thesis. The student has to do it alone, and use his acquired knowledge, that he studied in the school. He must demonstrate, that he is able to work in this area of speciality. Preparing this work lasts up months, because it includes a lot of work such as going to the library and find a good theme, formulate a task, consulting with the teacher, using simulations, ... Inadequate timing, and inadequate understandig the work schedule can cause the delay of efficient work. The network planning, which is constructed by the project method, helps us to optimize the steps in the work, the length of each phase and relationship to each other.
During the construction of our work, we used successfully the computer and other multimedia tools such as film, projector and interactive whiteboard. We made a network plan under several hours, which shows the process of preparing a thesis. Students worked in a group. We made photos, and videos of the atmosphere of the education in the class, and the result of our work was valuated through questionnaires.
KEYWORDS: Project Management Methodology, network plan

1. THE MEANING OF TEAMWORK

To construct a project, it is necessary to work in a team. The activities of such a group will follow-up during the class. A group of students, who work in the classroom, simulates a real environment and want to create a conceptual product. Working in group will develop the division of labor, cooperation, adaption, communication. [2] Meanwhile, students discuss what to do, they use technical terms. They are able to apply knowledge, ideas in experimental situations, so they improve their understanding of knowledge.

2. THE MEANING OF PROJECT

The meaning of a project is defined in 1994, by the standard ISO 8402 with the following terms:

Project: a project is a temporary endeavor undertaken to create a unique product or service. Every project has a definite beginning and a definite end. It has a clear aim. To achieved this aim, the activities of team is co-ordinated and controlled. All this proces is indicated by specific requirements such as constraints of time, cost and resource constraints. [10]

Project can take various forms, where each has its own specific requirements. Each requires a separate project management. Despite the differences, each project has the following properties:

- the timeframe for the implementation of the project;
- the product of a project, so the aim, that is intended to be implemented;
- there is a description of the plan of project implementation;
- the cost for realization is given:
- there is a financial plan that is broken on parts of the project time;
- there are formulated the quality expectations and requirements against the project;
- the uncertainty project sites and inhibitor facts are signed, and
- valuation of potential risks and reactions. [10]

In every project we must specify – it`s size (the activities which represents the individual tasks)
– resources that includes: - labor (so called "work")
- materials
- money
– and its deadline.

After this first phase follows the tracking of implementation.

a) One of the requirement of tracking systems is to collect continuously (in real time) data about the
- implementation and
- costs.

b) Another requirement is that the results of an analysis of the data must be submitted as soon as it is possible. For this process it is necessary to have
- appropriate techniques and
- tools. [10]

In order to answer the above requirements, the planned phases are realized by deploying a variety of methods. Finally, the preparation process of the thesis and the steps were drawn up in the network. There are several well-known network planning methods, they are taught in graph theory in operational research.

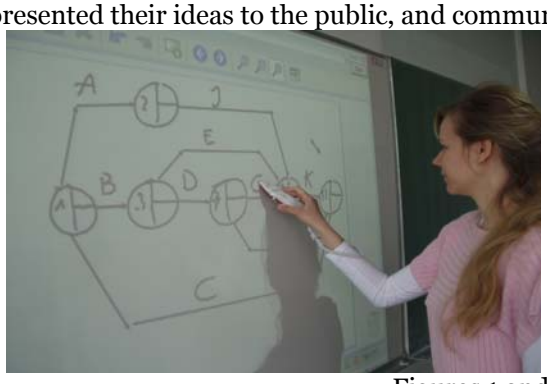
The network planning is a plan of work. That plan contains the optimal project scheduling and analysis, contains the coordination of the timing of certain activities, contains the timing of those activities which can do one after the other or can do in parallel schedule. This helps us to follow through the actual implementation of the workflow, to recognize in time the significant backwardness and delay the plan. If it is necessary, the corrective action can take. The processes of tasks are presented in a network plan. [9]

3. METHODS OF WORKS

Our knowledge - we have – is thanked to older generations. We take their expertise and empirical knowledge, or they teach us. This process is realized mostly through books, magazines, courses, school education. [1]

At the beginning of the work, the team must be educated about thesis requirements, it`s phases and about method how to prepare our work. The knowledge that we use in project management, is partly from studies in the universities, and partly from skills of professionals. [7] Their skills help us to determine the amount of resources and their schedule on tasks. To ask for skills, we prepared some questions, and collected them into interview. The subject of our interview, we choose such persons who have recently graduated, or who are now preparing his thesis. The questions are constructed by students by using the method Brainstorming. These ideas were grouped according to the phases of thesis. The interactive whiteboard was a useful tool for our notes, that was good visible for everybody. We opened new pages for a group of questions, so the ideas we entered on the correct page. Saved the file, and this is our document in our project. Some of the main questions are to be found in the appendix. (A)

During the work in classroom, the atmosphere in a group was friendly. The members easy presented their ideas to the public, and communicated well.



Figures 1 and 2. The teamwork

At the next time a member of the group, reported the results of the interview. Our topic was processed based on these data. We made videos of students work, and we played them back. These play backs are always interesting for students, because it is a time when they can watch themselves as an outsider. Each step has discussed together. The comments were written on the interactive whiteboard. They were saved, and if it was necessary, easily could turn a page back. These notes are also the part of the documentation.

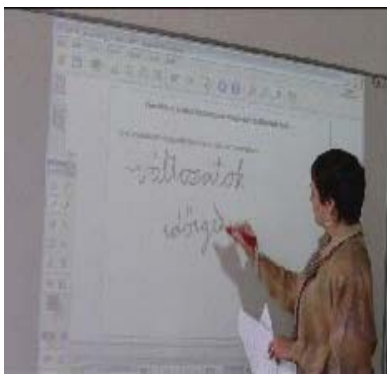
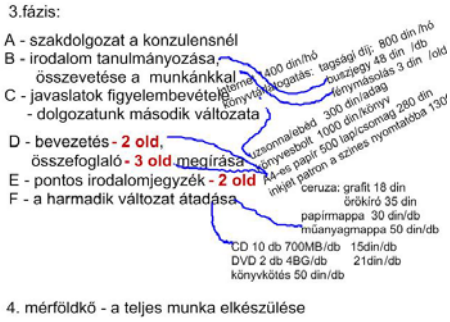
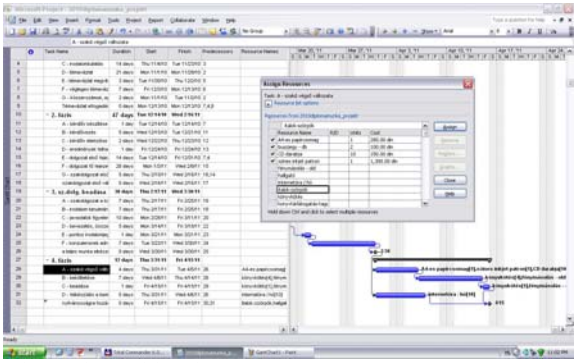



Figure 3, 4, 5 and 6. During our work, the interactive whiteboard was a favorite tool

As a result of our work is a product, that is a network plan, which our students can realize. The tasks from network plan, were entered into the computer. Information of the duration of tasks, and costs of the activities, were collected from questionnaires.





Figures 7 and 8. Data on the board, and in the computer

The phase of the follow-up is created during student's actual thesis writing, when he follows up the phases of work, quickly notices any deviations so he can change and modify the additional activities. To construct the working plan, the student can avoid to late of term or not to finish his work on time.

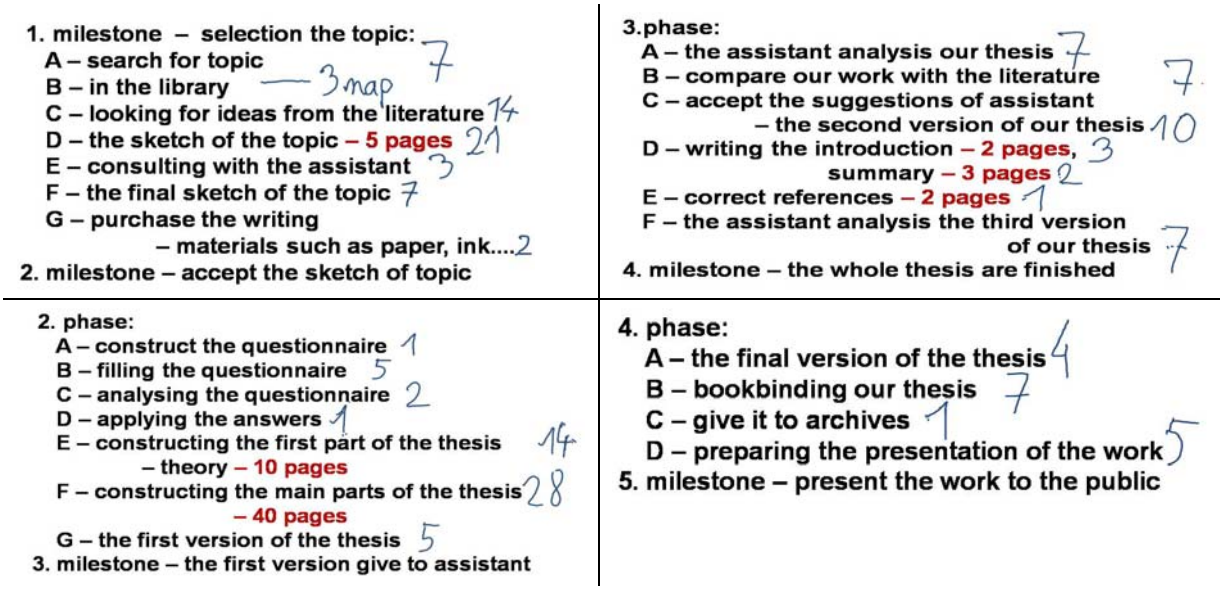


Figure 9. Lists of signs of activities and durations

We evaluated our project well. It was succeeded to construct an acceptable timetable. It shows that it is necessary a half year to prepare a thesis, of which about 20% of the study of literature, 10% of the time the work is at assistant, and 60% of the work is it's writing.

In pedagogical education are known the impacts of project method. [2] I presented them to students in the form of a questionnaire. While they filled and formulated the questions, they were thinking about facts by which they became richer.

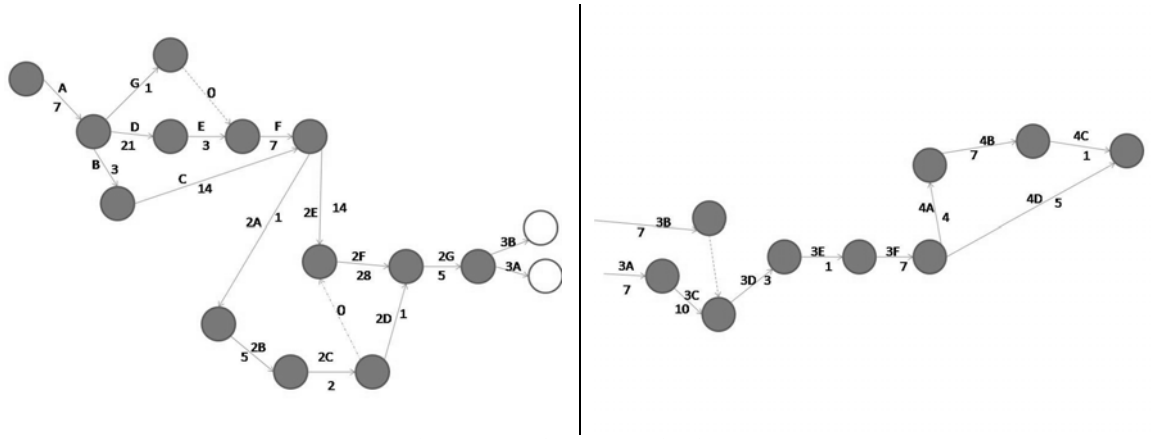


Figure 10. The network plan

The results were discussed by us all together. We made a stand that students in our work became richer in knowledge, in skills and also in experience.

As the final step in our project activities, we summarized our skills, and positively evaluated our work.

4. SUMMARY

The construction of the project must do by the team. The student, through their studies, took part in this kind of work, and applied his knowledge, ideas, and thoughts. Improved the curriculum, and learned the reactions of the group. In this work, a chosen theme is solved by team using the method of project management. The result is a product, which serves the interests of students, i.e. a network plan of tasks for thesis. During solve our task, we used multimedia tools. We analyzed the phases of the project, and wrote our noticed.

APPENDIX (A)

(A) Questionnaire to the students who graduated:

a) questions related to choice the topic
– how long did finalize the topic
b) questions related to planning (how to define aims and tasks):
– how long did construct the sketch of topic, and what period of time was necessary to work with the assistant
c) questions about finding literature:
– how many time did he spend on searching the literature, looking for adequate topic in the books, magazines, and how many time did he spend browsing on websites
– how much did he spend in the library (by paying membership, photocopying …)
d) questions about elaborating the topic:
– how long did it elaborate each chapters, and how long did it elaborate the chapter which described the main topic
e) preparing the presentation about production
– which time was it necessary to construct the versions of the work
f) questions related to the presentation of the production:
– what time was it necessary to duplicate, and bookbinding the thesis
– how much did it cost and how did they be satisfied with it

REFERENCES

[1.] Orosz Sándor 1987. Korszerű tanítási módszerek. Budapest: Tankönyvkiadó.
[2.] Radnóti Katalin. Milyen oktatási és értékelési módszereket alkalmaznak a pedagógusok? http://www.oki.hu/oldal.php?tipus=cikk&kod=Hidak-Milyen
[3.] Falus 1998. http://www.oki.hu/oldal.php?tipus=cikk&kod=Hidak-Milyen
[4.] Eva Matijevics, A hálótervezés oktatásának megszervezése korszerű módszertani eszközökkel, Proceedings of the IV. International Scientific Conference of „Modern Methodological Aspects". September 23-25, 2010. Subotica 1/10 old. ISBN 978-86-87095-08-3, COBISS.SR-ID 255685127
[5.] piku.freeblog.hu/files/kerdoivkesziteshez3w_0316.doc
[6.] Project Management Institute 2006. Projekt-menedzsment útmutató PMBOK Guide Budapest: Akadémiai Kiadó.
[7.] http://www.oki.hu/oldal.php?tipus=cikk&kod=Erettsegi_maskent-Projekt-Kiskate
[8.] www.georgikon.hu/tanszekek/matek/.../Operációkutatás09-10.doc
[9.] K.Lockyer, J.Gordon 2000. Projektmenedzsment a hálós tervezési technikák. Budapest: Kossuth kiadó

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DIRECTIONS TO APPROACH ERGONOMICS ISSUES IN WELDING

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ABSTRACT:
Principles of ergonomics in welding are treated as a whole into the scope and interdisciplinarity of existing connections. The whole approach is oriented to minimizing risk in welding and prevents occupational diseases of the musculoskeletal kind, indicating the possible remedies, as stipulated in international standards.
The applicability in WELDING of these principles, both in manufacturing processes and products, is leading to performance, but also to efficiency.
Insisting on the fundamental directions of approach, but also on specific cases completes the application domain perspective.
KEYWORDS:
Risk, welding, ergonomics

1. INTRODUCTION

Ergonomics relates to the human body behaviour in the working activity, with a view to optimize it considering the corresponding performances. More interdisciplinary sciences and disciplines are involved (figure 1),[12].

The object of ergonomics, which involves man - machine system, , imposes the approach and analyses considering the biomechanical conditions during the work activity and implicitly physical and intellectual repercussions on the human body [3,4].

Occupational medicine, is involved in watching people adapting to their jobs, depending on demands of work, in early detection of morpho - multifunctional changes to appear in the body under the influence of environmental factors, in the analysis of factors to adapt, in causes of morbidity, in diagnosis of deficiencies occurring due to the conditions offered by certain jobs, in psychology. Especially work psychology is concerned with the human in relation to all objective conditions of work [1-14].

Figure 1. Interdisciplinary sciences and disciplines involved in ergonomics

Studying the mental mechanisms work and the impact of various factors on these mechanisms, psychology provides items such as: rational and balanced involvement of human psychological function in work tasks. Psychological mechanisms determine the degree of mental application, study and psychological limits of human determination.

Sociology gives information on factors to consider in the way human adapt at work, the way work adapts to the man, respectively.

Technical sciences involves, too when the relation ergonomics - technical sciences appears in two-way. Data and knowledge are used to conceive ergonomic machinery and technology, considering technical issues to be solved, establishing new trends of research in the field [12].

Economics is in a two-way relation with ergonomics. So, ergonomic research provides an optimum organization of work, under the modern production, and economic studies to answer to the efficiency of the concept.

2. PRINCIPLES OF ERGONOMICS IN WELDING

Ergonomics generally describes the possibility of reaction and the limits of the operating personnel in its activity. The adaptability of the personnel working at operating conditions during the service is also one of the objectives.

Welding is a demanding profession it requires safe operation, concentration, routine work, and a lot of skill. Ergonomic principles, lead to performance, economic efficiency and productivity, when applied in the welding activity, under quality assurance conditions.

WELDING also has a strong impact on many sciences, technologies and disciplines (metallurgy physics, heat treatment, physics of welding processes and allied ones, electro technique and electronics, automation, robots, elements of artificial intelligence, design and manufacturing of welded structures, certification, reliability, destructive and non-destructive examination, quality assurance etc [1,2,5,11].

Its preoccupations are on welding technology and on auxiliary devices, too, manipulators with cranes and specialized carriages to support welding, welders clothing, footwear welders, environmental management, environmental protection for vibration and noise etc. related to their adaptability to the ergonomics principles in welding. Research developed in welding ergonomics has a remarkable dynamic having as priority the minimization of risks and occupational illnesses, through secure products and processes, the adaptation to the operator's skill, but also his limits. Two concepts specific to the ergonomics environment: the ergonomics of the process and that of the products, related to activities in the field of welding and allied techniques are widely used. The target is the implementation of measures to avoid physical constraints of welding operators (position - effort) and cognitive constraints (complexity-regularity) [7, 8, and 9].

Within welding processes the aim is to place correctly the equipment in the fabrication flux, corresponding lightning, correct working position, correct ventilation, colour of the ambient etc. For products everything is different.

Nowadays firms offer equipment, welding guns, clothing, and accessories etc, which present ergonomic aspects, too.

In this sense SR EN 13291:2007 "Individual protection equipment. Ergonomic principles" is a guide related to the ergonomic characteristics of such products. This standard as the other standards has to be applied both by certification bodies and by users when identifying the necessary characteristics for individual protection equipment.

Among the factors to be considered when establishing the ergonomic requirements are: integration of ergonomic performances and requirements, factors to determine the optimal provided level of protection, practical use understanding the instructions, to measure the impact of physiological factors of the protection equipment (oxygen consumption, respiratory flow, body temperature changes, sweating, fatigue or muscle contraction) anthropometric factors, biomechanical characteristics (mass distribution, the dynamics of the human body inertial forces, hindering movement, abrasion or compression of the skin and muscles, increased vibration) thermal characteristics of protective equipment (thermal insulation, water vapor permeability, air permeability, water absorption and desorption) effect on the senses (sight, hearing, taste, smell, touch) [5,6,7].

SR EN ISO 10819:2002:" Mechanical vibrations and shocks. Hand arm vibrations." The method of measurement and evaluation of vibration transmission from glove to hand contains requirements that are necessary for anti-vibration gloves. These gloves do not have to amplify the vibrations of the medium frequency range (i.e. between 31.5 Hz and 200 Hz) and must reduce vibration up to 60% of the measured without gloves in high frequency range (between 200 Hz and 1000 Hz).

Checking the characteristics of protective equipment with soft ergonomic includes: technical performance tests conducted at the laboratory level, specific ergonomic tests, but tests on subjects and carriers. These tests should be done before placing on the market, the certification model, in order to apply the CE mark. Simple design accompanying the reliability of welding equipment (light welding guns, allowing access to adjustments in welding for any configuration of the joints, easy to access to a corresponding adjustment), adapted furniture, besides turntables or scissor, furniture, shelves, racks, flexible seating options suitable for operators etc.

Helmet - masks with lens that automatically darkens when arc ignition, its advantage being that it reduces repetitive impact in advancing the neck, gives comfort and protection in place safe. Lumbo-abdominal belts protects back against overload by supporting the spine during lifting operations, muscles of the lower back and abdominal muscles [13,14].

Comfortable clothing [SR EN 340:2004], which ensures freedom of movement, made of safe materials, heat and fire resistant, comfortable footwear [SR EN ISO 20344:2004], pliable gloves, comfortable elastic supports for the wrist and palm [SR EN 420:2004].

Corps of the welding operators must be protected for activities involving great efforts. So they must use: wrist cuffs protection for heavy work, removable instep, lombo-abdominal belts. On the other hand positions sometimes require access to the welding work in the knees. The risk of chronic diseases, including cartilage damage, due to continued pressure on the knees [2, 3, 4, 5, 6, 13 and 14].

International legislation imposes to wear knee having the role of spreading forces on a regular basis and to prevent small hard object to cause injury. Knee can be made of materials highly resistant to abrasion and mechanical shock, eg ABS, rubber compounds, with or without adjustment system / closing. When such activities are long lasting, it is proposed to alternate the position of the knee walking, risks and lancing, compression of objects with sharp edges are important, the design must take into consideration all these factors, exercise equipment including the possible stress on muscles or blood vessels. It is subject to SR EN 14404: 2005 “Knee protection. PPE protection for working in the knees".

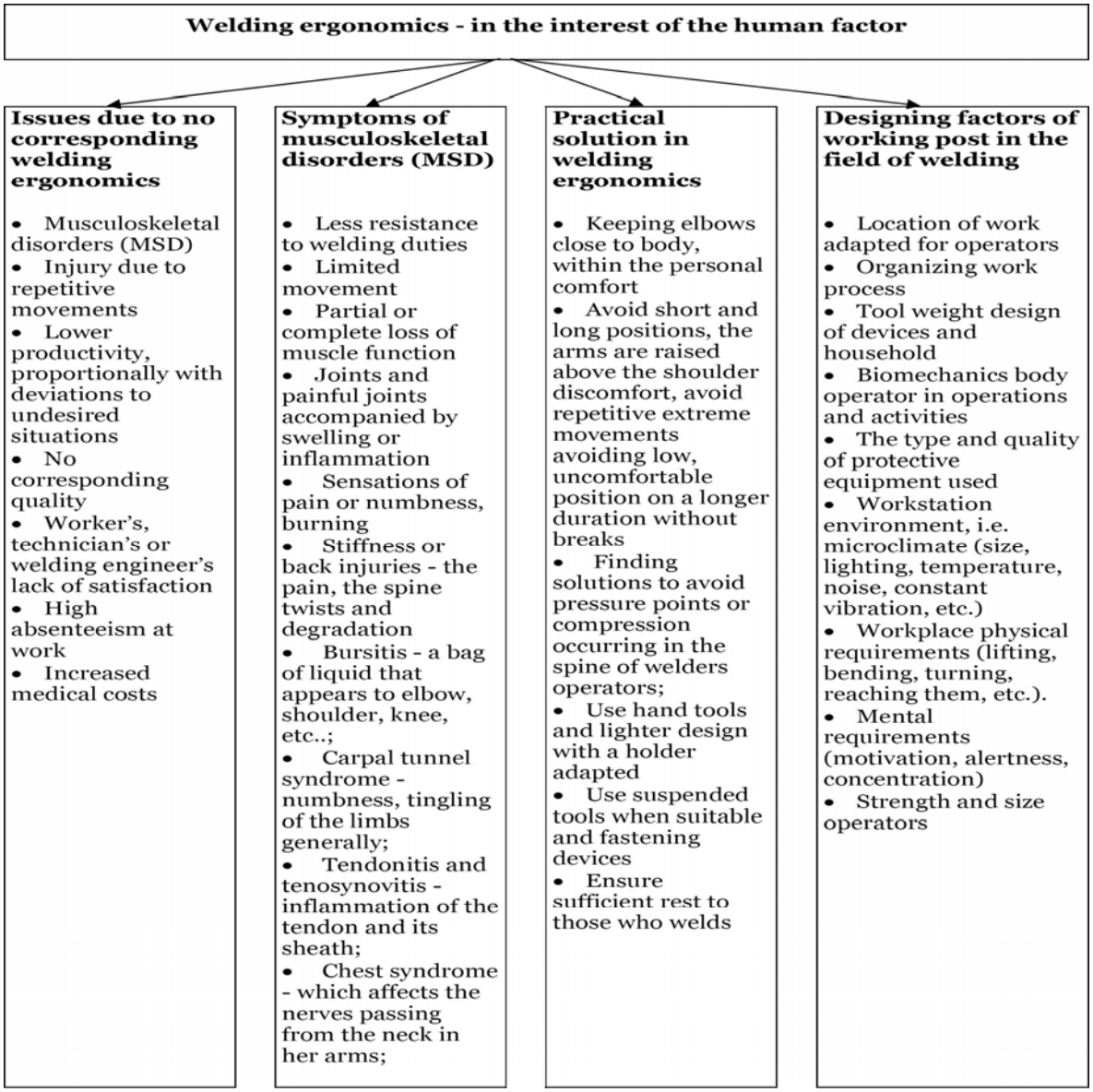

Figure 2. Elements of welding ergonomics - Systematization

Ergonomics is focussing on changing things (instruments, tools, devices, equipment, facilities etc., Figure 2). Healthy welding personnel assure the highest operational training level, and without other professional categories contribute, statistically to a lot of reported accidents.

Many injuries can be developed if the capabilities of the working force and the requirements of welding operator's tasks do not match. These differences are, generally called musculoskeletal disorders, or WMSDs (Work Related Musculoskeletal Disorders).

All these occur due to overstressing the body. Vertebral disc is composed of flexible cartilage and semi-liquid containing gel. Cartilage is ring shaped. When a person performs duties higher than capable, these rings may degrade. If the person continues these activities a long time, everything gets worse and can break down, with many nerve complications.

3. RISK FACTORS DURING THE WELDING OPERATION

Risk assessment in welding represents the way to working places with a healthy and secure climate [12].

Being a dynamic process it gives employers and occupational organizations the possibility to implement a proactive risk management policy at work. Risk assessment approach to welding, is done in stages (Figure 3), established on the bases of a n attentive appreciation.

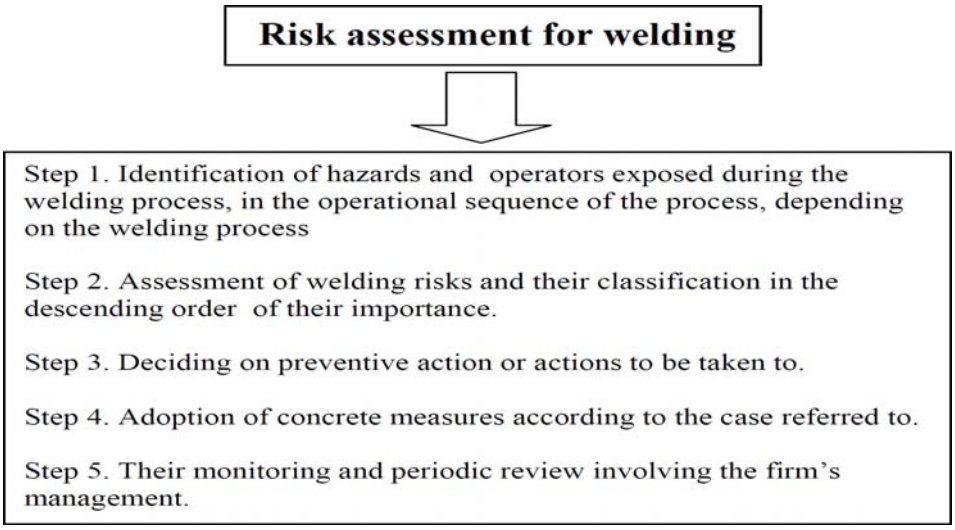

Figure 3. Steps in the assessment of welding risks

4. ANALISES, DISCUSIONS, APPROACHES AND INTERPRETATIONS

4.1. Welding ergonomics criteria approach

Relevant requirements according to several criteria (Figure 4) addressed to as ergonomics.

"To watching" criterion refers to adapting work to human ergonomics, human adaptation to the work. "Stage" and "implementation phase" refers to the concept and "the purpose of concerns" refers either to production or to the product.

As regards the "content" it is made to ergonomics survey information cognitively involved, based on perception and reasoning and decision topoergonomics, dealing with research and dimensional design of machines, control bodies of working places according to human anthropometric data, and bio ergonomics related to the phenomenon of human body fatigue in relation to elements of work organization.

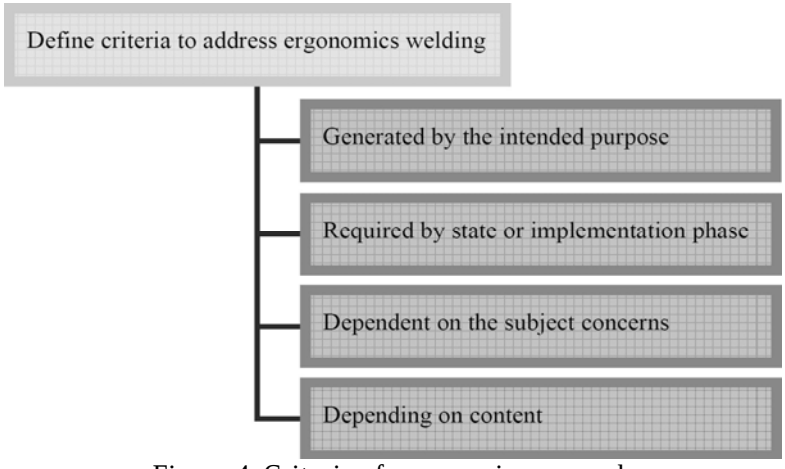

Figure 4. Criteria of ergonomic approach

4.2. Approach specialized bodies

Welding ergonomics is approached by specialized bodies such as the International Institute of Welding (IIS/IIW), which through its Commissions and Working Groups has directed preoccupations (it is the concrete case of Commission VIII), international standardizations forums and the European Welding Federation (EWF), (Figure 5). It is worth mentioning that among the study objectives and preoccupations of Commission VIII of the IIS/IIW, alongside ergonomics there are the effects of fume and welding gas components on the operators, the effect of fire, electro shocking due to noises in the field a.s.o.

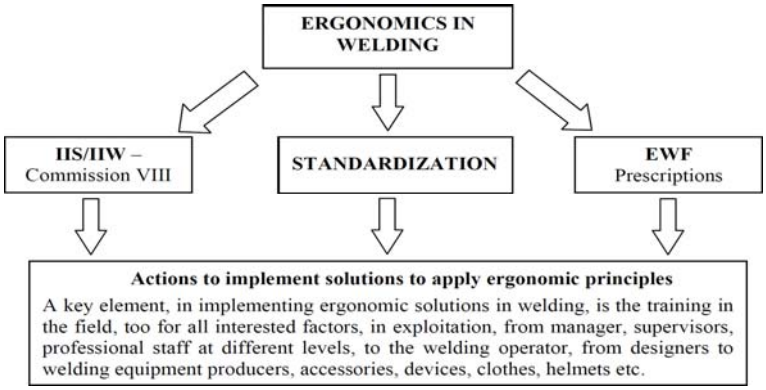

Figure 5. Implications of international organizations IIS/IIW,EWF,ISO

On the other hand the international standardization too is in step with technological developments and related areas of concern and expanding in this direction. The principle of harmonization and standardization of Romanian standards is so aligned in this way.
Actions for implementation come considering the results of concerns.

4.3. Professional training in ergonomics

The training in ergonomics represents a key element, in implementing ergonomic solutions in welding from manager, supervisors, professional staff at different levels, to the welding operator, from designers to welding equipment producers, accessories, devices, clothes, helmets etc. Training and continuous watching of changes in legislation and professional directives is compulsory.

New standards are imposed from the quality a point of view, through durable values. The target is to assure a high level of safety during the working activity, man being the most precious resource.

5. CONCLUSIONS

The paper insists on the importance of ergonomics and the interdisciplinary of its field in approaching welding processes and products.

The approaching criteria of welding ergonomics, risk factors and steps in their assessment , as well as the focalization on symptoms of musculoskeletal disorders (MSD), practical solutions and designing factors of working posts in the field of welding complete the data presented. The paper enumerates the possible ergonomic for solutions indicating the requirements according to the in law standards.

The adaptation of the human operator and his skill on the bases of his own limits, with the contribution made by applying the results of ergonomics studies in WELDING complete the data presented.

Preoccupations of the International Institute of Welding (IIS / IIW) are punctually presented, too [1-14].

REFERENCES

[1.] Colombo, F.(2006). Ergonomia e organizzazione del lavoro, Rivista Italiana de la Saldatura anno LIVII, no.6, pp. 817-822, ISSN 0035-6794
[2.] Danciu, I. M.; Popescu, M.; Margina, M. R.; Opris, C.: Studii de caz-Aplicatii ergonomice in sudura (Case studies – Ergonomic aplications in welding), Buletinul AGIR, 2010, a. XIV, nr.2-3, apr-sept, pp., 73-81, ISSN 1224-9728
[3.] Draghici, A.: Ergonomie vol.I Noi abordari teoretice si aplicative (New theoretical and applicative approaches), Editura Politehnica, Timisoara, 2006, ISBN 973-625-270-1
[4.] Draghici, A.:Ergonomie vol. II Aspecte novatoare ale cercetarii ergonomice
[5.] (Innovative aspects of ergonomic research), Editura Politehnica, Timisoara, 2007, ISBN 978-973-625-349-2
[6.] Holstein, P.:(2009) How to choose ergonomic land tools, Welding Journal, vol.88, no.3, pp. 90-91, ISSN 0043-2296

[7.] Iosif, G.; Marhan, A. M.: Ergonomie cognitiva si interactiune om-calculator
[8.] (Cognitive ergonomics and interaction man - computer), Editura Matrix Rom, Bucuresti, 2005, ISBN 973-685-923-1
[9.] Irimie, S.: Ergonomie Industriala (Industrial ergonomics), Editura AGIR, Bucuresti, 2008, ISBN 978-973-720-196-6
[10.] Kadefors, R. :(2006).Welding and ergonomics, Australasian Welding Journal, vol. 51, no.1, pp.22-23, ISSN 1093-0642
[11.] Popescu, M.; Marta, C; Radescu, D.; Danciu, I. M.:(2009), Welding and ergonomics. Case studies, RaDMI, 9-th International, Proceedings Conference „Research and Development in Mechanical Industry, 16-19 September, Vrnjacka Banja, Serbia, ISSBN 978-86-6075-007-7
[12.] Popescu, M; Danciu, I. M.; Codrean, C.; Utu, I.: (2009), General principles of ergonomics with direct application in welding engineering, Scientifical Bulletin of the POLITEHNICA University of Timisoara, Transaction on Mechanics tom 54(68), fasc.4, pp.70-74, ISSN 1224-6077
[13.] Popescu, M.; Danciu, I. M.; Opris,C.: Principii de ergonomie in tehnica sudarii
[14.] (Ergonomics principles in welding technique), Buletinul AGIR, 2010, an.XIV, nr.2-3, apr.-sept., pp. 69-72, ISSN 1224-9728
[15.] Popescu, M.: WELDING: ERGONOMICS-ELEMENTS, DAAAM International Conference, 2010, vol. 9, pp.351-352, ISSN 1726-9687, ISBN 978-3-901509-74-2
[16.] xxx: Ergonomics guide for welders
[17.] xxx: OSHA Guidelines for Shipyards, (2008), ergonomics for the prevention of Musculoskeletal Disorders

INTERNATIONAL SYMPOSIUM on
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4 – 5 November, 2010, Hunedoara, ROMANIA

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STUDY REGARDING COSTILL METHOD EFFICIENCY IN TRAINING OF SEMI-FUND RUNNERS

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ABSTRACT:
At the current of performance level, the crucial role in guiding and directing the training process it can not have any "intuition" or "stimulus" coach or athlete, but follow the strict methodological approach, previously established for the current year (Puică,I.,1994;Dragnea,A.,1996; Bompa,T.,2001). National results in long-distance race semi fund and fund athletes in the C.S.S. Hunedoara, we have determined, given the scarcity of training, to systematize and rationalize only those methods and means of preparation leading to relatively short time to obtain valuable results by increasing performance.

KEYWORDS:
performance, semi-run, annual planning, methods, means

1. INTRODUCTION

Streamlining and standardizing operations sports training is required by the need to exploit the best biological and psychological potential of the athlete and the coach available time to achieve a stable performance as a branch or sports sample (Cârstea, G.,2000; Bompa, T.,2001).

Methodological guiding sports training require systematic data recording and regular analysis after processing and interpretation (Dragnea,A.,1996; Gârleanu,D.,1996; Bompa,T.,2001).

This analysis reveals an inventory of methods and means most effective in training, recovery and especially in preparation for competition.

2. AIM

It is assumed that the streamlining and standardization of means and methods in sports training, after application of methodological procedures Costilla leading to higher levels in great performance advanced semi-fund of athletics department at CSS. Hunedoara.

3. ASSUMPTIONS

We made the following assumptions:

- Standardization means and methods of training involve their implementation in all training structures, while targeting training goes to the essence of competition;
- In training must be identified those means and methods that meet operational performance objectives as specific athletic events;
- Establishment of training model is achieved by the method of statistical correlation between two variables: the preparatory year (x) and performance competition (y) (Drăgan, I., 1994; Bompa,T.,2001).

Following objectives were separated:

- Making a summary of the methodological approach of training semi-fund;
- Highlighting the interdependence of the key parameters of the effort in training volume - duration - intensity;
- Identifying the most effective ways and means of streamlining and standardizing training from semi-fund group advanced athletes to the CSS. Hunedoara.

4. RESEARCH PLAN

Research has resulted in investigations conducted during the annual cycle of training, the group of advanced level - junior semi-fond of CSS. Hunedoara, following application Costilla method. Costilla method allows two things:

- Calculation of Indirect VO2 max;
- Calculation tempo runs (at 70% of maximum oxygen consumption per kg / body).

5. RESULTS AND DISCUSSIONS

Group of semi-advanced level junior fund being investigated, consists of a total of 6 athletes.

Costilla method, emphasizes the consumption of oxygen per kg / body.

Looking at the results summarized in tables which show us what was the average speed that traveled long distances in training and comparing them with average speeds required by coach to browse these distances can be observed:

Coach request:

- uniform tempo running: 3.40/km;
- varied terrain running: 3.45/km.

Table 1 The average speed per km from the calculations by the Costilla method

B.F.	- 3:43,8/km = 223,8 sec
A.C.	- 3:46,2/km = 226,2 sec
D.A.	- 3:55,2/km = 235,2 sec
C.A.	- 3:58,2/km = 238,2 sec
D.V.	- 4:15,6/km = 255,6 sec
M.N.	- 4:18,6/km = 258,6 sec

Graph representing, one may note that the first two runners who have close value have run in training duration with appropriate speed.

For other runners, for which we had baseline data to take them into account, the speed required for coach training was superior to their ability.

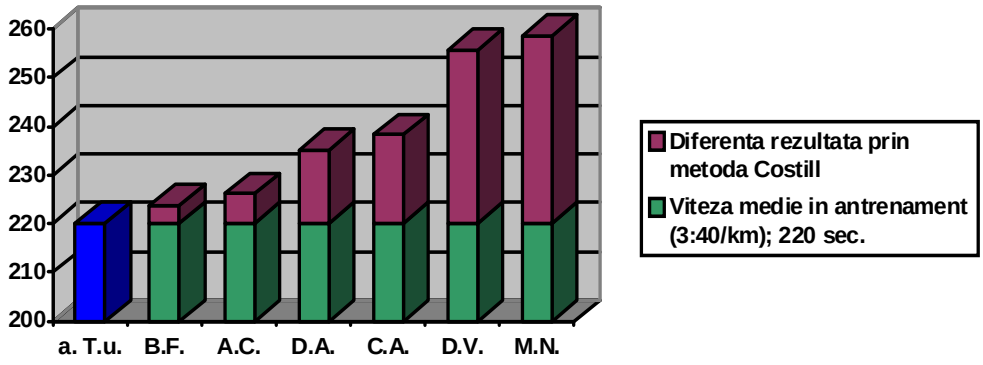

Figure 1 – Uniform tempo running

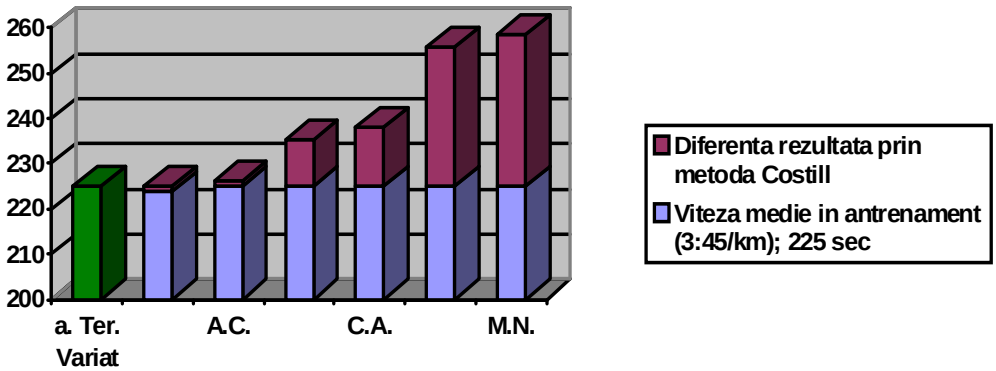

Figure 2 – Varied terrain running

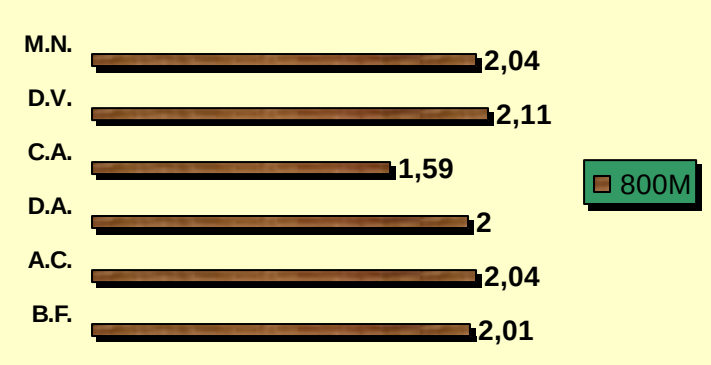

Figure 3. Dynamics of the sample of 800 level performances

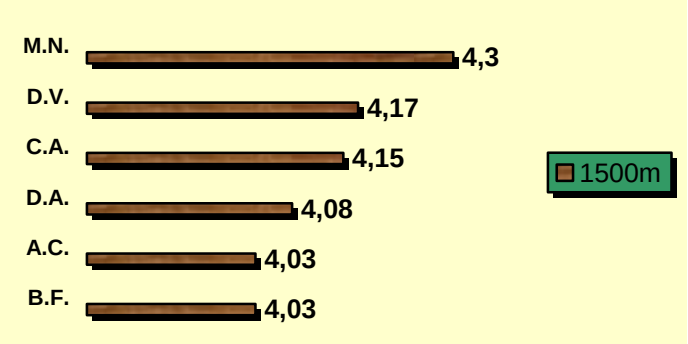

Figure 4. Dynamic of the sample of 1500m level performances

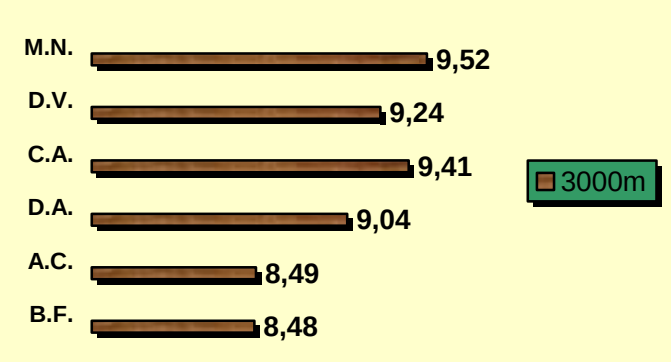

Figure 5. Dynamic of the sample of 3000m level performances

6. CONCLUSIONS

- The means and methods of training should be structured so that all components have constant values, except for one that will evolve over time. For that, initially, we must standardize the means and methods of training, in order to capture the statistical, mathematical correlation of each mode of training with another variable, which is just the purpose of practice increasing performance level (Gârleanu,D.,1983; Alexei, M.,Monea, G., Bogdan, V.,1996);
- Based on results from major competitions, we tried to find the correlation between the method chosen and the performance level and the impact of orientation and dynamic implications of the main parameters of effort;
- During the competition we will bring the following operational algorithms:
  - 12 days before the contest: 6 to 8 x 400m launched run; pause: 200m low run;
  - 9 days before the competition: control rules on intermediate distances:
    - 500m + 300m for 800m
    - 1200m + 300m for 1500m
    - 3000m + 1200m for 5000m
    - 4 days before the contest 6x200m; pause 200m low run.

- If we believe that training is only a systematic repetition of exercises, we can not achieve true understanding of its complexity and depth that involve physical, functional, biochemical and psychological of great complexity, due to processes determined of adaptation (Drăgan,I.,1994);
- In planning we have to take account, in addition to our experience, that addressing a situation of training can not ignore the social and human dimension of the training process, which determines the interpenetration of scientific thinking with intuitive perception of reality teaching (imagination and creativity)

BIBLIOGRAPHY

[1.] ALEXEI, M., 2005, Athletics - technical evidence, University Press Publishing House, Cluj-Napoca;
[2.] ALEXEI, M., MONEA, G., BOGDAN, V., 1996, Athletics course, engineering samples, Publisher UBB Cluj-Napoca;
[3.] BOMPA, T., 2001, Theory and methodology of sports preparation - Publishing Ex Ponto, Bucharest;
[4.] BOMPA, T., 2001, All about training young champions – Publishing Ex Ponto, Bucharest;
[5.] BOGDAN, V., 2005, Biomechanical evidence of Athletics Features, Faculty of Physical Education and Sport, Cluj-Napoca;
[6.] BOGDAN,V., POP, A., 2005, Initiation into athletics. Athletics School, Faculty of Physical Education and Sport, Cluj-Napoca;
[7.] CÎRSTEA, GH., 2000, Theory and methodology of physical education and sport, Publishing AN-DA, Bucharest;
[8.] DRAGNEA, A., 1996, Sports training, Didactic and Pedagogical Publishing House, Bucharest;
[9.] DRĂGAN, I., 1994, Applied sports medicine, Youth and Sports Publishing EDITIS, Bucharest;
[10.] GÂRLEANU, D., 1996, Course athletics, Ecological University, Bucharest;
[11.] GÂRLEANU, D.,1983, Athlete steps training, Bucharest Publishing, Bucharest;
[12.] PUICĂ, I., 1994, Training of semi fund and fund for girls, Youth and Sports Publishing EDITIS, Bucharest;

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ENGINEERING TRAINING SUPPORT THROUGH PRACTICE

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ABSTRACT:
Most engineering tasks require teamwork. For a good development in the engineering profession one should cultivate social skills to facilitate group interactions which are a work team or organization with the purpose of production which have to manage the future engineer.
Developing social competence is a necessity of having an impact on individual privacy, the relationships he has with those close to him and even on his professional results.
KEYWORDS:
Teamwork, professional learning and development

1. INTRODUCTION

Besides professional competence, which is imperative for progress and performance, now, requirements are that every young student of engineering profile of any specialization to be prepared so as to intervene promptly in addressing relevant problems of economic and social reality, having positive effects in terms of reaching professional and social performance.

Progress in life, both in school and in a profession largely depends on the power to manage and use our social skills.

These behaviours are founded on successful professional learning and development supported by the ability of social competence, capacity, fitness and personal abilities.

Capacity - conditional ability and degree of maturation of learning and exercise - is our ability to achieve success when performing a task or profession.

Fitness, representing a trait or traits of a young system, mediates its success in an activity and the possibility to act and get performance. The fitness appears as a defining factor of the person that facilitates knowledge, practice, technical development, arts and communication.

Ability differs from capacity by its specificity for a technique that involves and requires learning. Ability is also the trait synonymous with skill, dexterity, skill, dexterity, skill, highlighting the ease, speed, high quality and precision with which a person carries out certain activities, involving self-organization suitable to concrete task, smooth and effective adaptation. You should not confuse ability with skills or aptitudes. Together, they condition the substrate skills. Psychologically and subjectively competence is a result of knowledge, skills, abilities, skills, capacities, skills and temper- character traits that lead to performance in different areas.

Most engineering tasks require teamwork. For a good development in the engineering profession one should cultivate social skills to facilitate group interactions which are a work team or organization with the purpose of production which have to manage the future engineer.

A future engineer who is granted a major role by members of the group in which it manifests professionally and who by interpersonal relationships fulfils a clear role in human resource structure will be provided with a series of attributes as shown below:

- cognitive experience;
- communication skills;
- judgement power and understanding the transmitted message;
- resolute capacity, creativity in thinking and action;
- availability to knowledge;
- availability for cooperation and interpersonal communication within the group;

- self-confidence and to another;
- attitude to overcome the obstacles to attaining the proposed profit;
- flexible style of approach to the task and interaction with its partners to achieve the common goal of the group;
- honesty, responsibility and empathy in interpersonal relationships;
- need for cognition, affection and social valuation
- for relationships, development, acceptance and integration in the work group;
- satisfaction with participation and individual and group success
- skills and interpersonal skills.

This actually represents the sequence of factors whose interaction network and networking abilities outline of a sphere of social competence of a responsible individual.

Developing social competence is a necessity of having an impact on individual privacy, the relationships he has with those close to him and even on his professional results.

2. THE STUDY

European Youth Pact focuses on facilitating access of youth on the labour market, combating youth unemployment and increases the quality of education.

The PRACTICOR project co-financed by the European Social Fund through the Human Resources Development Operational Programme 2007-2013 aims establishment of transnational networks regarding the educational guidance, counselling career and practice, coupled with labour market in knowledge society.

We started this project the need for social skills training in the engineering profession.

Development of social skills and recovery in the workplace is a necessity due to multiple effects abilities clearly targeted toward productivity and success.

Of these empathy allows understanding and cooperation within an organizational structure, both vertically and horizontally.

For example, non-empathically managers produce discontent among employees who may become the cause for dissatisfaction, absenteeism and staff rotation.

Assertiveness also provides personal opinions and provides the ability to protect the rights that a person holds, which will lead to gaining authority and respect in front of other employees or supervisors.

Gratuity and conflict resolution skills improve steep lines that may arise at some point in their professional relations.

Along with taking advantage of these abilities, competence in communication is presented as a basic need to achieve professional success.

To prepare students as future engineers aims to train these skills through practical activities carried out in the middle of productive environmental of the economic reality.

The overall objective of the Practicor project was to organize practice to ensure their students a greater chance on graduation, in the labour market and strengthen their training level, in line with socio-economic reality.

In addition, through this project it is also aimed the guidance and advice in career to those who wish to choose a vocational route to embrace a successful career in priority areas of engineering and to improve through practice, correlating and aligning learning and labour market.

To provide initial training anchoring with the labour market demands preparation of engineering as a whole must take the following steps:

Step 1. "Saying" – didactic presentation for information and knowledge skills that are to be trained - activity that is done in classes and seminars;

Step 2. "Show" - creating opportunities and necessary platform demonstrating behaviour and possible responses - Work carried out under laboratory hours;

Step 3. "Doing" – putting students in a position to perform, to practice the skills - stage made within hours of practical training;

Step 4. "Transfer" – providing logistics and resources to implement the new abilities gained in solving specific production tasks - step resulted in practice in a job at the employer;

Step 5. "Feedback" - ensure awareness and reflective dimension of learning - is an ongoing process rather than a step and takes place through self-evaluation and evaluation of student activity and behavior from peers and the coach / guardian of the level achieved for gained skill;

Step 6. "peer learning" - the participants support each other in developing skills - by solving a common task - again a continuous process integrated in all other stages. To strengthen my skills is a co-drive with a "master" phase in which for example may have involved another student who graduated step four.

Another way to enhance skills through training is done under the supervision of "master." To maintain the skill level is achieved by building "personal training".

3. ANALYSES, DISCUSSIONS, APPROACHES AND INTERPRETATIONS

Bologna strategy is beginning to implement the national and European system of higher education and should be supported. Basically reducing the learning period in the first cycle degree (four years) than the old system of diplomats engineers (5 years) should be compensated through careful use of the time of preparation, particularly related to specific practical and necessary areas of society, especially productive and importance related to the company's energy security and environmental protection.

The Practicor project gives the opportunity to develop skills training and supported the acquisition of skills to help graduates.

The Practicor project helps students to find a job and begin a successful career after graduation.

The Practicor project is an initiative of the Polytechnic University of Timisoara, as coordinator and project partners: University from Piteşti, The Institute for Studies and Energetic Design ISPE Bucureşti and FRAUNHOFER – Gesellschaft zur Förderung der angewandten Forschung, Germany.

On completion of the project in 2013 students must be better prepared not only theoretically but also practically, and their prospects for employment upon graduation to increase significantly.

Our goal is that business people and companies to want to hire our graduates.

Companies agree to have a say in our students' practical training, and project facilities are part of the team with us. So companies conducting practice under the guidance of tutors trained specifically in the project, assisting students trained during practice for the acquisition of specific job skills. These skills will facilitate the integration to the working place of graduates trained in the Practicor project.

Other support activities relate to counselling and career guidance through visits to companies, presentations, panel discussions with representatives of the business world, workshops, simulations (job interviews, job fairs).

Practice partner companies have selected a group of employees to participate in a tutor-training practice to put in dialogue with the teachers of universities and practitioners together to prepare students. This course completes with a certification of the competence recognized by the Ministry of Labour and Ministry of Education;

4. CONCLUSIONS

The Practicor project is relevant because the younger generation has the main subjects of future engineers who will ensure the sustainable development in the context of the ecologic balance change, the need to intensify innovative actions environmental protection and saving energy resources, organization and implementation of sustainable transportation technologies.

The project duration is from October 2010 until October 2013. Trans-national network related to educational guidance, career counselling and practice, coupled with labour market, in the knowledge society formed under the project will work and after completion of the project.

Team of the project is a partnership and homogeneous unit based and complementary, formed community of interests and goals, which aims to provide greater access to opportunities in priority areas that support sustainable development of European society, in areas related to traditional and renewable energy resources, transportation and advanced technology to protect the environment and ensure evolution and harmony in the society's transnational space in the process of sustainable development.

Cohesion of interests, experience and awareness that there is room for improvement are the glue of the partnership.

For Politehnica University from Timisoara the purpose of the project is to ensure performance and financial conditions for the organization of the students' practice in the Department of Mechanical Machinery, Technology and Transportation for a chance to ensure increased and enhanced training, in agreement with the necessity of the labour market.

Related objectives is to develop sustainable partnerships with employers for students in first to four years of study and building a relationship with the business community, developing a guidance system and counselling for career integrated into the practice of students.

Besides establishing a network of tutors to coordinate and guide the students practice in line with the practical needs of society and skills development helps prepare students for future employment.

REFERENCES

[1.] Gilson Morales, Clarissa Unica Morales, Model for engineering education to development of competences and abilities, International Conference on Engineering Education – ICEE 2007-05-01, available: www.ineer.org/Events/ICEE2007/papers/74.pdf

[2.] Moti Frank, Knowledge, abilities, cognitive characteristics and behavioural competences of engineers with high capacity for engineering systems thinking (CEST), Systems Engineering, Volume 9 , Issue 2 (May 2006) pp. 91 – 103, Publisher John Wiley and Sons Ltd. Chichester, UK ISSN:1098-1241

[3.] Eileen P. Arnold, Global Systems Engineering Competencies: A Business Advantage, INCOSE 2008 Symposium, available: www.incose.org/.../May_IS2008_Arnold_Global%20SE%20Competency.pdf

[4.] Gonczi A. 1996, Reconceptualising Competency Based Education and Training, PhD thesis, at http://epress.lib.uts.edu.au/dspace/bitstream/handle/2100/303/01front.pdf?sequence=1

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RELIABILITY THEORETICAL APPROACHES FOR ORGANIZATION OF RESOURCE-LIMITED INFRASTRUCTURE LOADS

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ABSTRACT:
The management of mobile systems is essential for optimal management of transport systems to ensure even with the increasing complexity the transportation services in freight transport and passenger transport in terms mobility and safety of traffic flows.
Through the use of mobile devices as a source of traffic data today all the technical possibilities are available to control traffic chaos with the use of LBS and GIS technologies. Actually, it's all about avoiding the chaos from the start.
KEYWORDS:
reliability, transport systems, management, mathematical modelling

1. INTRODUCTION

The current level of traffic telematics solutions brings the following problems that are to be solved:

- Through the active and unconditional use of navigation systems - i.e. the driver uses the navigation system and adheres strictly to its recommended route - a growing number of road users may get the effect that they use together with other road users the same bypass, creating a new traffic jam on this bypass route, especially if the navigation systems use the same or similar routing algorithms and use the same current traffic condition data
- At the current time existing traffic restrictions will be considered even if these on the optimal route, but are at a great distance from the current location are, and thus it is not certain whether this limitation is still present upon arrival of the vehicle,
- Traffic forecasting models, that consider future transport density on the optimum route or at sub-optimal alternative routes are still lacking, its use however promise to optimize traffic flows especially in overload situations,
- The stationary traffic control systems can indeed take with its dynamic signposting the current traffic situation into account and to bypass the traffic around the obstacles encountered, but does not allow individual route to a better utilization of several diversion alternatives
- To monitor the traffic condition traditionally stationary detectors are used: induction loops, video based or infrared technology. These systems are supplemented particularly in city traffic with floating car data systems, the use of the results from this point measurements for prediction of traffic on the road network are possible only with restrictions.

The management of mobile systems is essential for optimal management of transport systems to ensure even with the increasing complexity the transportation services in freight transport and passenger transport in terms mobility and safety of traffic flows [1], [2].

A task of transport telematics is to optimize the path that traffic objects or subjects of traffic through a transport network under given conditions and by setting an objective function. Starting point for such considerations can be the dynamic routing strategies of conventional telecommunications networks. Through the use of mobile devices as a source of traffic data today

all the technical possibilities are available to control traffic chaos with the use of LBS and GIS technologies [1]. Actually, it's all about avoiding the chaos from the start.
To be able to solve the above problems the following theses will be set:

1. The target function for the optimization of traffic flow is to minimize the sum of the lives of travel time of all travel subjets rather than minimizing the travel time of an individual subject's movement, because it does not lead to a global minimum. The following relationship has to be used

$$\left(\sum_i T_{Tr_i\,i}\right) \to \min \neq \sum_i \left(T_{Tr_i} \to \min\right) \quad (1)$$

2. The routing decisions are made so that the travel time for traffic subject reached a local minimum and the network load is too large by the selected route. That means, that not already heavily loaded edges of the network traffic should be driven, even if this means that the travel time for a single subject will be longer.
3. The routing decisions for each transport subjects has to be taken with cooperation of a traffic control centre. An appropriate model for this was presented in [3].
4. For the organization of the transport process, the transportation network is divided in some intervals, the observed surface with a very large number of direct traffic sources (such as a household or a company with a number of vehicles) is divided in clusters, this is according to [4] based on postcode areas proposed and the streets are divided according to [3] in cells of the size of 100 meters. Furthermore, it is carried out according to the calculation of the rush hour for a time clock in 15-minute period.

2. MATHEMATICAL MODEL

2.1. Basic Approach

The starting point of mathematical modelling is the definition of process reliability $Z_\Pi(t)$ according to [1], which is split into the following reliabilities:

$Z_{Tr}(t)$ - Transport reliability
$Z_V(t)$ - Traffic reliability
$Z_{Sy_\eta}(t)$ - System reliability of the operator,
$Z_{Sy_v}(t)$ - System reliability of transport vehicles and
$Z_{Sy_t}(t)$ - System reliability of transport routes (infrastructure reliability).

The transport reliability $Z_{Tr}(t)$ defined as the probability that a transport entity travels in time t from i to j can be characterized by the undisturbed transport process, the transport reliability $Z_V(t) = f(X_q(\tau, w_q), Z_{Tr}(t))$ is considered with the temporal and quantitative stochastic of the arrival process of traffic entities X in the traffic sources w_q, while the other components of the process reliability are accessible of the failure and recovery processes. The process reliability is calculated as

$$Z_\Pi(t) = Z_V(t) \cdot Z_{Sy_\eta}(t) \cdot Z_{Sy_v}(t) \cdot Z_{Sy_t}(t) \quad (2)$$

The following sections describe some fundamental approaches of the individual part reliabilities.

2.2. Modeling of system reliability

The system reliability $Z_{Sy}(t)$ is according formula (2) will be distinguished as the **equipment reliability** - transport vehicle reliability - the **operator reliability** $Z_{Sy_\mu}(t)$ and **infrastructure reliability** $Z_{Sy_t}(t)$.

Infrastructure reliability is influenced by the following events:

- Accidents
- Breakdown of vehicles
- Construction sites,
- Blocking of traffic lanes for any reason

The operating areas for modelling the infrastructure reliability can be characterized as follows:

- **Nominal operation**: all lanes are available to the currently available speed limit, which refers to the current state and the state it will be like when the subject travelling through this area, i.e. construction sites that are present with probability $Z_{Sy_t}(t) = 1$ be regarded as nominal operation)

- **Downgraded operation**: there are either fewer lanes available and / or the currently permitted maximum speed is temporarily limited, the probabilities should be calculated with the probability of these speeds. Because of the given range of speeds only various speed limits are considered.
- **Collapse**: there is no lane by accident, breakdown, weather, etc. available

For accident-related restrictions stationary models can not be used because the probability is of interest to a restriction at the time when the subject's moving in that cluster. One issue is for example "How likely is in the cluster i at time t a traffic jam if at time t = 0 their was no traffic jam or if at time t = 0 there was a traffic jam."

The infrastructure reliability can be calculated analytically with transient reliability models. The procedure is demonstrated in the following simplified example. There is a lane with the following speed limit areas:

- Free traffic = State $Z_{\kappa=0} = Z_{Sy}^{[nenn]}$ = Nominal Operation
- Limited Traffic = State $Z_{\kappa=1} = Z_{Sy}^{[stör]}$ = Downgraded operation
- Stationary traffic (v = 0), i.e. blocking of lane = State $Z_{\kappa=2} = Z^{[koll]}$ = Collapse

The following figure represents the system reliability (Fig.1).

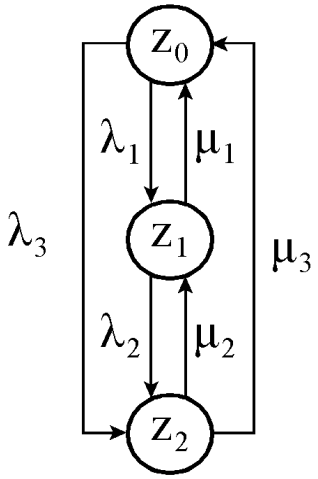

Figure1.: System reliability for a cell of a single track road

The mathematical model for a cell of a single-lane road has been described by [3] closer.

In the second approximation is the route, i.e. the first edge e_{ij}, regardless of the real net structure in $\hat{\xi}$ into equal-sized cells divided. In calculating the system reliability of a cell $Z_{Sy_{t_\xi}}^{[\kappa]}(\tilde{x},\tilde{t})$, the failure rate λ_ξ refers to this area. The parameter $\tilde{x}$ characterizes the (discrete) place and $\tilde{t}$ the discrete time when the vehicle is in (the center) of the cell. A vehicle must go through all the cells $\xi \in [1,\hat{\xi}]$ of the edge. In reliability-theoretic sense, this can be modeled by a series circuit. To calculate the non-stationary reliability $Z_{Sy_{t_\xi}}^{[\kappa]}(\tilde{x},\tilde{t})$ the system state of all cells $Z_{Sy_{t_\xi}}^{[\kappa]}(\tilde{x},0)$ at the time $\tilde{t}=0$ will be determined. The variation of time in the calculation is performed in discrete steps determined by the width of a cell Δx and the average velocity $v_m(\rho_m)$. Density-dependent fluctuations should not be considered first. For the nominal operation:

$$Z_{Sy_t}^{[nenn]}(\xi) = \prod_{\xi=1}^{\hat{\xi}} Z_{Sy_{t_\xi}}^{[nenn]}\left(\xi\cdot\Delta x, \frac{\xi\cdot\Delta x}{v_m(\rho_m)}\right)\Big|_{Z_{Sy_{t_\xi}}^{[\kappa]}(\xi\cdot\Delta x,0)} \quad \kappa \in [nenn \vee stör \vee koll] \tag{3}$$

This is the probability that all cells are passed in nominal operation, under the condition of the current operating range k, $k \in [1,\hat{\xi}]$ at time t = 0 (starting time) of each cell $\xi \in [1,\hat{\xi}]$.

For downgraded operation:

$$Z_{Sy_t}^{[stör]}(\xi) = \prod_{\xi=1}^{\hat{\xi}} Z_{Sy_{t_\xi}}^{[stör]}\left(\xi\cdot\Delta x, \frac{\xi\cdot\Delta x}{v_m(\rho_m)}\right)\Big|_{Z_{Sy_{t_\xi}}^{[\kappa]}(\xi\cdot\Delta x,0)} \quad \kappa \in [nenn \vee stör \vee koll]$$

This is the probability that all cells are passed in downgraded operation, under the condition of the current operating range k, $k \in [1,\hat{\xi}]$ at time t = 0 (starting time) of each cell $\xi \in [1,\hat{\xi}]$. For simplification a valid speed must be defined for all cells.

The calculation of the probability that all cells are passed in collapse state makes no sense and leads to no useful result. An example calculation indicates that (Fig.2).

For the red curve, all cells are in the initial state in the nominal operating range, the blue curves are two cells in the initial state not in nominal operation. This can be clearly seen at the two jumps, the impact on the overall reliability decreases with distance.

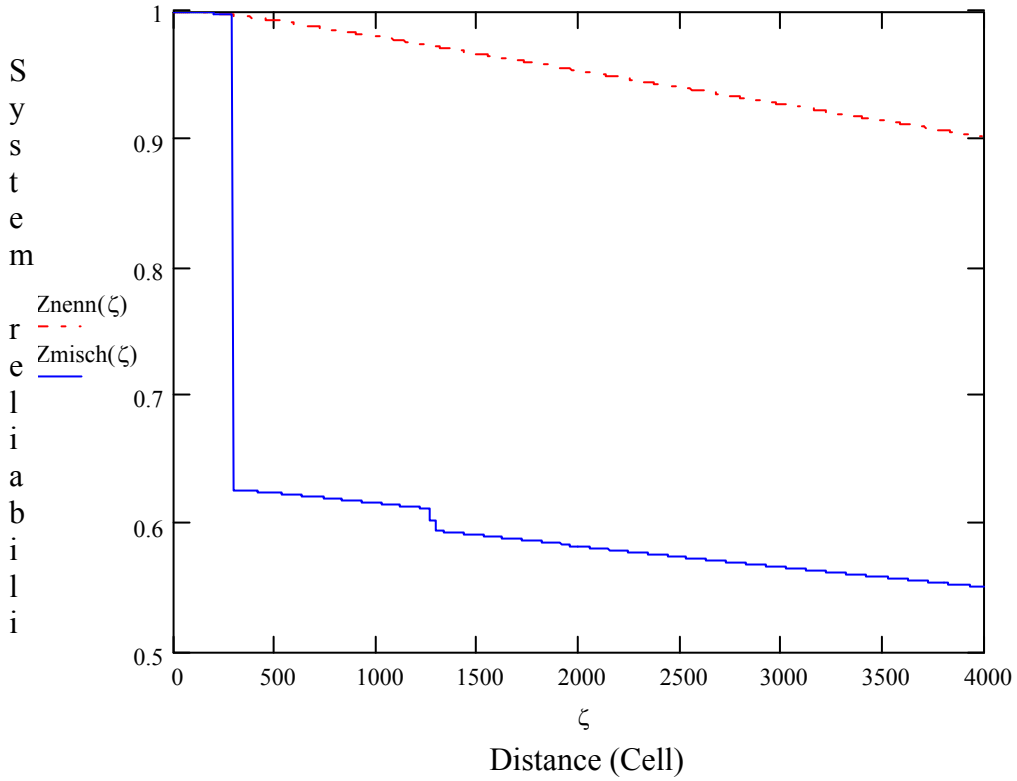

Figure 2.: System reliability - different initial states

The consideration of equipment reliability $Z_{Sy_v}(t)$ here the reliability of transport vehicle should be for example the charging the battery of an electric car. As a model, the maintenance theory of planned preventive maintenance to age-related cycle (period t_p) can be used to complete repairs by interference (time t_s) [5]. Preventive maintenance is the scheduled charging of the battery or the exchange of the battery. Disruption maintenance is regarded as the stopping of the vehicle when the battery is depleted. The maximum availability is

$$V_{Sy}^{[nenn]}(\tau_0) = \frac{1}{1+\lambda(\tau_0)\,(t_s - t_p)} \tag{5}$$

The operator reliability, i.e. the probability of the driver's failure during the time t is neglected.

2.3. Modeling of transport reliability

Due to the complexity of the transport process for its modeling a multi-stage calculation method is used to the abundance of the factors considered separately. First, the transport reliability is calculated independently of the arrival process.

The transport reliability is the distribution function of the transport time T_{Tr} without consideration of the influence of traffic density, ie it is considered the speed of free traffic v_f. This is dependent on many factors, e.g.

- Legally fixed limits,
- Road conditions
- Traffic conditions
- use of the utility weight,
- Specific drive performance,
- Behavior of drivers.

The transport reliability is calculated for each cell of the transport network in time interval. In [6] for modeling the transport time, normal distribution was used. Using a deterministic transport path by forming a function of stochastic variables according to Richter [7] to estimate the distribution function of the duration of transport can be achieved. It is

$$T_{Tr} \in N\left(\frac{s}{\mu_v}, \frac{\sigma_v^2\, s^2}{\mu_v^4}\right) \tag{6}$$

This distribution function corresponds to the transport reliability $Z_{Tr}(t)$.

For the assessment of reliability of traffic is $\rho(\Delta\xi, \Delta\tau)$ used. From the density of traffic, the transport speed is through an approach of Kuehne [8] calculated.

$$v(\rho) = v_f \left[1 - \left(\frac{\rho}{\hat{\rho}}\right)^a\right]^b \tag{7}$$

The transport rate is a function of

- Road-specific empirical parameters a and b,
- Assignment of the road (traffic density) ρ
- Maximum occupancy of the road $\hat{\rho}$ and
- The speed of free traffic v_f.

Reliability for the traffic is according to [3]:

$$Z_V(t) = \frac{v(\rho(\Delta\xi, \Delta\tau))}{v(0)} = \frac{v(\rho(\Delta\xi, \Delta\tau))}{v_f} = \left[1 - \left(\frac{\rho(\Delta\xi, \Delta\tau)}{\hat{\rho}(\Delta\xi)}\right)^a\right]^b \tag{8}$$

This shows that the speed of free traffic has no effect on the ability to reliability. It is calculated from the ratio of the current to maximum traffic density of the route part (cell). With the help of macroscopic traffic models [8] the variation of traffic density and traffic speed can be - for a limited time horizon - calculated and numerically the time of transport can also be determined. One approach was presented in [3].

In this calculation the composition of the traffic density from the individual relationships $\rho(w_q, w_s)$ between the traffic source and traffic destination does not matter, however these factors should be considered now. Here the following question emerges:

- How many traffic subjets will be on the individual sections of the route, if that section is passed? Or to put it mathematically, the traffic density $\rho\left(\Delta\tau, \Delta\xi[\psi(w_q, w_s)]\right)$ is sought.

To calculate this traffic, the following parameters could be used:

- Matrix of the traffic density from measured data of the past $\vec{P}(\Delta\tau)$
- Matrix of the objective factors from measured or estimated data of the past $\vec{F}(\Delta\tau)$
- Swelling of the subjects $X_{inp}(w_q(\Delta\tau))$ in the individual road traffic clusters, this data can be measured or estimated by different methods and data acquisition systems (Figure 3)

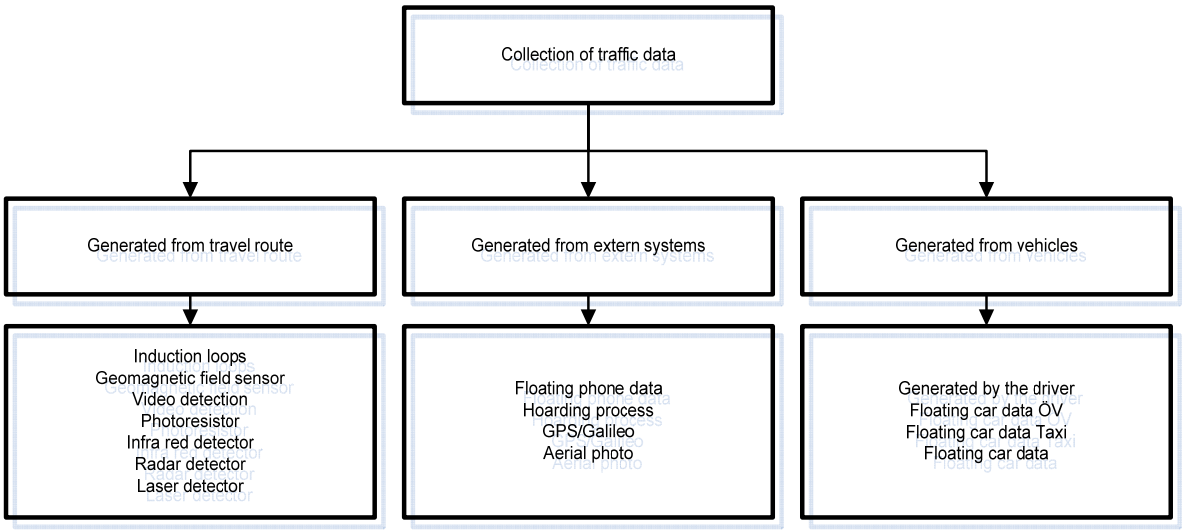

Figure 3.: Classification of traffic data collection

The data acquisition systems are usually suitable for recording the traffic density and speed. Traffic flows can be determined by a number of systems at the time of acquisition, but difficult is the detection of the target cluster w_s of all traffic entities at the time of acquisition. Suitable for this purpose are for example navigation systems with a communication session from the vehicle to a

control centre. To estimate the density of traffic in the future forecasting models of the transport planning can also be used.

3. CONCLUSIONS

If an edge or a node of the network is detected as a critical spot for trouble-free transaction processing in the whole network, so can this fit into a management model. Here, the inflow will be measured, directions of traffic selected, loads for a specific point forecasted, and constrained by the available capacity inflows to this point limited or amended by another traffic control. The detection of an overload condition of an associated site infrastructure at a future date allows an activation of defensive strategies by

- Inflow reduction,
- Alternative routing under time restrictions,
- Temporal effect as speed limits in the form of maximum or minimum speed etc.

REFERENCES

[1] Bärwald, W., Baumann, S., Keil, R.: Organisation ressourcenbegrenzter prognostizierbarer Infrastrukturbelastungen, Schriftenreihe des Sächsischen Telekommunikationszentrums e.V. Band 09/2010, Dresden 2010, ISSN 1863-1878

[2] Hrnćiar, M.: Analyse der Content-Management Bedingungen für LBS in der Slowakischen Republik, in Proceedings from workshop "LBS und RFID - Lösungsansätze in Logistik und Verkehr". Györ - Ungarn. 2006. ISSN 1611-8839

[3] Bärwald, W., Baumann, S., Keil, R.: Managing Infrastructures of Limited Resources, in Acta Technica Jaurinensis, Series Logistica Vol. 2. No. 3 (2009) Faculty of Enginieering Sciences, Széchenyi István University Györ, ISSN 1789-6932

[4] Bärwald, W.; Baumann, S.: LBS- und GIS-gestütztes Hoarding. In: Strobl/Blaschke/Griesebner (Hrsg.) Angewandte Geoinformatik 2008 – Beiträge zum 20. AGIT-Symposium S. 254 - 259, Wichmann Verlag Heidelberg

[5] Fischer, K.: Zuverlässigkeits- und Instandhaltungstheorie, transpess Verlag für Verkehrswesen Berlin 1990

[6] Keil, R.: Beschreibung des Zeitverhaltens informationslogistischer Prozesse in Schriftenreihe des Sächsischen Telekommunikationszentrums e.V. Band 02/2006, Dresden 2006, ISSN 1863-1878

[7] Richter, G.: Zum Verteilungsproblem bei zufälligen linearen Gleichungen, Dissertation B, Hochschule für Verkehrswesen „Friedrich List" Dresden 1989

[8] Helbing, D.: Verkehrsdynamik, Neue physikalische Modellierungskonzepte, Springer-Verlag Berlin Heidelberg New York 1997

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METHOD FOR CREATING AND MAINTAINING AN HIGHLY PERFORMING SPACE AT THE WORKPLACE

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ABSTRACT:
The philosophy of the "5S" focuses on the workplace and standard procedures at the workplace. The "5S" lead to an appropriate working environment, to decreasing the losses and useless activities, to improving quality, efficiency and safety. The workplace problems cannot be observed in due time if there is disorganization. Cleanliness and organization at the workplace help the worker team to discover and solve problems. By making problems visible we step closer to improvement. Maintaining the workplace clean, insuring an appropriate working environment and increasing productivity lead to time economies, time which we can dedicate to research, to cost reduction, to insure safety, loss decrease, and induce in workers the conscience of responsibilities and the pride of belonging to the team of enterprise employees.
The "5S" program helps us create an appropriate environment for the standard work, offers conditions for high quality, encourages visual control, helps identify loss and places great emphasis on safety. The individual implementation technique consists in complying with the "5S". We propose for your attention a short theoretically study in which we will present the five components of the method necessary for a correct implementation in every workplaces.
KEYWORDS:
workplace, performing space, humanized approach, productivity increase, "5S", method

1. INTRODUCTION

The "5S" method represents a method for creating and maintaining an organized, clean and highly performing space at the workplace, or better yet, a conditioned discipline for Kaizen.
Kaizen is a daily activity, whose purpose only exceeds productivity improvement. It is also a process which when performed correctly humanizes the workplace, eliminates excess work and teaches people how to perform experiments regarding their activity by using the scientific method and how to teach them to detect and eliminate waste produced during different processes. This process suggests a humanized approach of workers and of productivity increase: "Te idea is to fuel the company's human resources, as well as to praise and encourage their participation to kaizen activities". Its successful application needs "the participation of workers in the improvement activities".

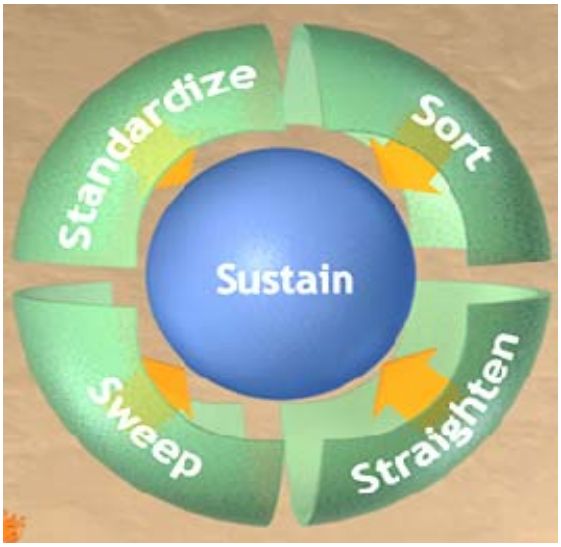


Fig. 1. The "5S" method

The philosophy of the "5S" focuses on the workplace and standard procedures at the workplace. The "5S" lead to an appropriate working environment, to decreasing the losses and useless activities, to improving quality,

efficiency and safety. The workplace problems cannot be observed in due time if there is disorganization. Cleanliness and organization at the workplace help the worker team to discover and solve problems. By making problems visible we step closer to improvement. Maintaining the workplace clean, insuring an appropriate working environment and increasing productivity lead to time economies, time which we can dedicate to research, to cost reduction, to insure safety, loss decrease, and induce in workers the conscience of responsibilities and the pride of belonging to the team of enterprise employees.

The "5S" program helps us create an appropriate environment for the standard work, offers conditions for high quality, encourages visual control, helps identify loss and places great emphasis on safety. The "5S" are (fig. 1):

- Seiri (sort) – selection;
- Seiton (stabilize / straighten) – engagement;
- Seiso (shine / sweep) – cleanliness;
- Seiketsu (standardize) – standardization;
- Shitsuke (sustain) – sustenance.

The individual implementation technique consists in complying with the "5S".

2. SEIRI – THE SELECTION PHASE

It represents the first "S" of the the "5S" and involves the focus on eliminating what is not necessary and keeping only what is necessary for a certain purpose. Seiri thus involves the separation the useful from the useless, the elimination of what is in excess at the workplace and in its environment. An ABC-type classification system allows the determination of the necessary compulsory stock for the job, but also the removal of what is in excess. In our case the signification of the 3 parameters afferent to the Pareto-type technique is the following:

- A – daily use;
- B – weekly or monthly use;
- C – rare use.

The objective is the saving and recovery of the work space. Table 1 presents the ABC classification.

Table 1.

Priority	Usage frequency	How it is used
High (type A articles)	Once a day	It is located at the workplace
Medium (type B articles)	At least twice in 6 months Once a month Once a week	It is stored together
Low (type C articles)	Less than once a year	It is disposed of or stored outside the workplace

An efficient visual method to discover all these unused objects is the "red marking". This marking is placed on all objects that are not used to complete the work. Marked in this manner these objects are moved in a so-called waiting area. Occasionally, the used objects are moved in a more organized area found outside the work area.

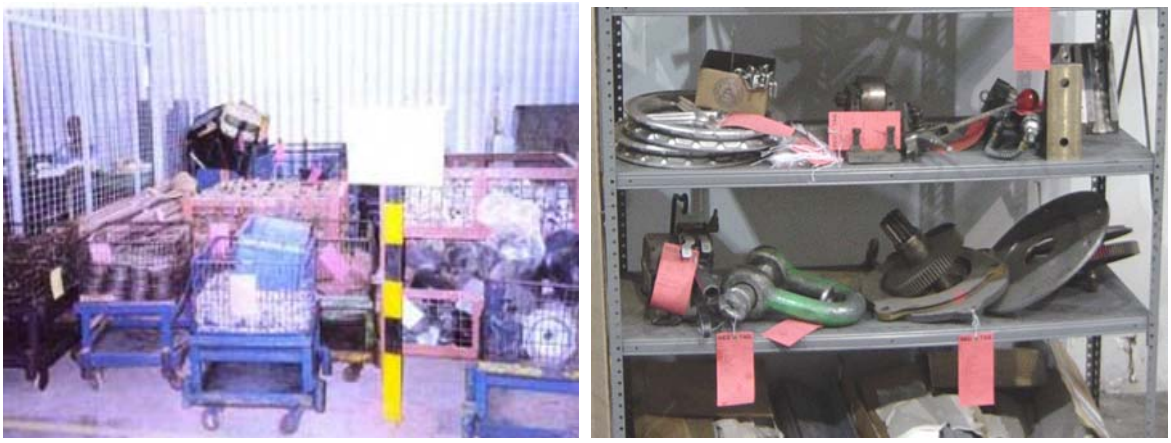


Fig. 2. Marked spaces in the workplaces – example

As far as the performed mold is concerned, it means the daily use of rubber as a basic material. That is why in the case of sorting materials, it belongs to the A type article group. In the same group is included the portable cone type device which must be available to the worker to perform the wiring.

The tools, apparatuses and devices used to tune the mold, the hydraulic operation of the slider and the preventive and predictive maintenance activities belong to the B type article group.

3. SEITON – THE ENGAGEMENT PHASE

It represents the implementation of a resource organization system so that the resources are easily identifiable. For this, three questions must be answered:

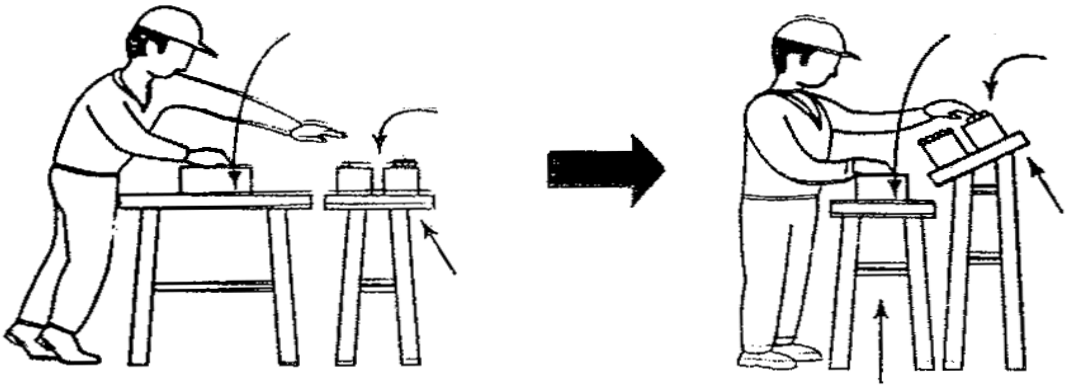
- what do I need?
- where do I keep what I need so as to be easily accessible?
- how much do I need?

The engagement is done as follows: the placement element is defined depending on the usage frequency, the system address with the identification number and the recipient label is determined, and the minimum grade and maximum quantity are decided.

Methods for highlighting and ordering the necessary resources:

- colored panels;
- lining the work areas and the location;
- tools on shelves.

Before improvement (Fig. 3.a) it can be seen that the work table is too wide, the spare parts are too far and situated horizontally, this makes them hard to see and reach. After improvement (Fig. 3.b) it can be seen that the work table has been reduced, the spare parts have been placed so that the worker can reach them and have been sloped slightly to be better grabbed and seen.



a) b)

Fig. 3. Manual assembly operations before (a) and after (b) improving the work space

Like the case in Fig. 3, the portable cone type device must be available to the worker to minimize the wiring time. As far as the mold injection process is concerned, the injected material must be close to the under-pressure casting machinery so as to be introduced in the fueling cone.

4. SEISO – THE CLEANLINESS PHASE

It is the third “S”, which helps us understand how to prevent the material contamination and to insure good working conditions.

After all the elements causing problems regarding work start are eliminated (removal of useless objects for the injection process, respectively the wiring one) and after the materials used for work start are established, the next step is to clean the work area thoroughly (fig. 4). Daily cleaning is necessary so that the workers can be proud of their workplace, as well as to ensure an adequate environment for performing different processes, less dirty equipment and better health protection.

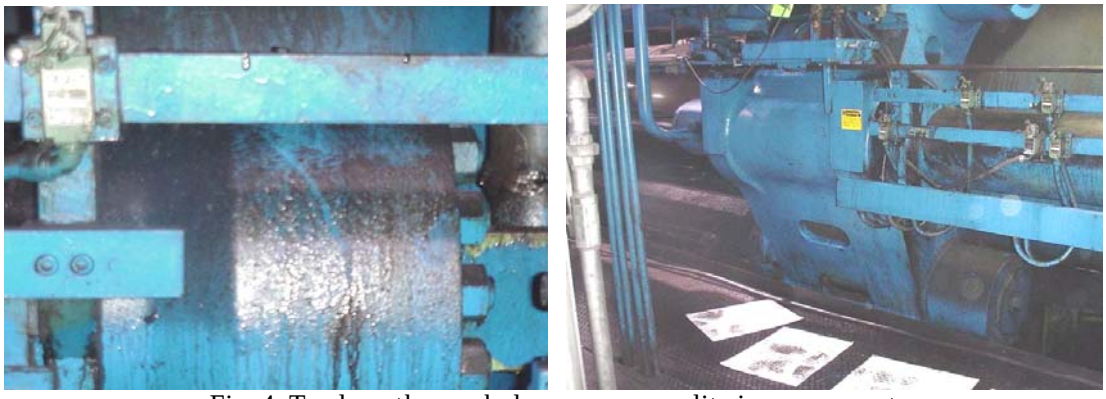


Fig. 4. To clean the workplace means quality improvement

If there were no change in the work area of each worker, then this would lead to decreasing production, angry and stressed workers.

The purpose of cleanliness is to maintain a pleasant work environment in which the need for esteem and status of the employees will be protected, and the work relationships will be improved. All these have considerable effects on the company's productivity.

The cleanliness is done for:

- surface protection in case those sediments alter the physical-chemical properties of that surface;
- preparing technological operations (reconditioning, disassembling, etc.);
- maintenance and improvement of the exterior aspect of the installation, which constitutes an element appreciation of the professional culture of the personnel that maintains, respectively services the installation.

In the case of parts molded under pressure inclusions appear in the part material due to the fact that the form basis and cavity have not been adequately cleaned from impurities. Also, the material introduced in the injection installation must have a certain composition, without being mixed with impurities, to obtain the desired physical and mechanical properties.

Taking into consideration the hydraulic operation of the lateral sliding mechanism, there can be spills of hydraulic oil that must be cleaned.

5. SEIKETSU – THE STANDARDIZATION PHASE

The fourth "S" represents the standardization resulting after the fulfillment and maintenance of the other three steps. Seiketsu is necessary because the workplace degenerates very quickly if certain standards are not imposed. The visual control is made based on:

- warning lights;
- transparent widows;
- color codes;
- tables and marking;
- periodic inspections.

Fig. 5. Examples of marking for notice

The rules referring to visual control once implemented the need to select the best practices and their standardization is felt. All these are done more efficiently by involving employees.

The main objectives of standardization and rule appliance regarding the workplace are the following:

- the workplace design;
- clear work instructions;
- well defined work methods;
- ergonomic work courses;
- reducing the time cycle;
- training and documentation.

Referring to the injection installation, we can say that the means to use it is standardized within the enterprise so as to insure the repeatability of the molding process identically, obtaining the desired material characteristics and thus a higher quality of the part obtained.

6. SHITSUKE – THE SUSTENANCE PHASE

It is the fifth "S" and represents one of the hardest stages because people in general show a certain resistance to change and favor status quo (the desire to maintain the existing situation) in the detriment of change. That is why the efforts will be focused on redefining the de facto condition and the lining of new standards. Shitsuke must insure the continuous supervision of rule application, memorization and correction of derivates.

By establishing a tracking system with indicative display the "5S" are ensured, but the gradual recovery of their initial limits is necessary in a continuous improvement action, respectively the Kaizen. The problems that appear when the 5 points are not insured and mentioned are the following:

- the materials used begin to reappear at the workplace, creating chaos;
- after using tools, they are not placed appropriately, encumbering their location when needed;

- the frequent contamination of equipment does not represent a reason not to clean them, but the contrary;
- the placement of objects in the workers' access area, which can lead to their harm;
- the dirty machinery does not function appropriately and leads to obtaining faulty goods.

7. SAFETY – THE SIXTH "S"

The implementation of the sixth "S" is recommended, namely SAFETY, which wishes to eliminate all workplace accident risks, ensuring the operator's safety.

Fig. 7. The 6S method

There are many reasons for using the sixth "S", which depend on:

- Using adequate tools or adequately marked ones, using the protective equipment where necessary (overalls, gloves, protective glasses, masks, helmets, etc.);
- Maintaining the access aisles free;
- Storing the protective equipment in predetermined easily-accessible locations;
- Non-existence of material spread on the floor, uneven floor, sharp edges, suspended stocks unmarked.

A three-step approach is used for Safety, namely:

- preparation (we take into consideration the client's expectations, we build a purpose, define the goals, evaluate if the event makes sense, prepare the people and place for the beginning of the event);
- operation (we inform the worker team regarding the purpose, goals and expectations of applying this element, we evaluate the losses, come up with improvement ideas, select the best ideas, improve and measure the improved results);
- supervision of the improvements that appear following the application of the "6S".

In the area of the injection installation the workers must work with protective equipment due to the high temperatures that are involved in the material melting. When taking the part out of the mold the worker must use gloves, the parts being hot.


a) b)
Fig. 8. The situation before (a) and after (b) improving the 5S (6S) method in the case of office

The "6S" (Fig. 7) is an instrument whose value is easily understandable. An important quality of the "6S" is the fact that it does not allow doubts. It offers people a working area without events that prevent their activity, and this is a marvelous way in which people can be involved in improving their own working conditions.

The "6S" system helps in the daily activity by preventing and the due remedy of deficiencies and lack of compliance noticed. The results of the applied method are seen in the better performing working manner, efficiency, and low number of complaints from clients, giving the employees a real accomplishment feeling and pride, which can create the beginning of a cultural transition.

8. CONCLUSIONS

The "6S" is modeled after the "5S" process improvement system designed to reduce waste and optimize productivity through maintaining an orderly workplace and using visual cues to achieve more consistent operational results. It derives from the belief that, in the daily work of a

company, routines that maintain organization and orderliness are essential to a smooth and efficient flow of activities. Implementation of this method "cleans up" and organizes the workplace basically in its existing configuration. It is typically the starting point for shop-floor transformation. The "5S" pillars provide a methodology for organizing, cleaning, developing, and sustaining a productive work environment. The "6S" uses these five pillars plus an added pillar for Safety. The "6S" encourages workers to improve the physical setting of their work and teaches them to reduce waste, unplanned downtime, and in-process inventory.

When the six pillars have been implemented and organizational and safety procedures are maintained, the workplace becomes a safer and more efficient place to work leading to increased productivity and worker confidence. Although other Lean methods can be used without using "6S", the "6S" method creates a streamlined workplace and a good base which can often times enhance the results from other Lean processes.

As a general conclusion, we can conclude that the "5S" (and also, the "6S") represents a strategy to develop and maintain a working environment that is clean and organized. Such an environment almost guarantees a better working environment for workers, a more organized system for tools and equipment, and a safer work environment. Start today to make 5S part of any strategy of bringing greater effectiveness and efficiency to all business.

The "5S" is a visually-oriented system of cleanliness, organization, and arrangement designed to facilitate greater productivity, safety, and quality. It engages all employees and is a foundation for more self-discipline on the job for better work and better products. The teamwork and discipline built through the "5S" improve worker-to-worker and worker-to-manager relationships. When people see that what they do makes a difference, and when they see that they have eliminated wasteful practices, their pride grows. This is perhaps the greatest benefit of the "5S".

BIBLIOGRAPHY

[1.] HIRANO, HIROYUKI. *5* Pillars of the Visual Workplace (Portland, Oregon: Productivity Press, 1995).
[2.] PETERSON, JIM, ROLAND SMITH, Ph.D. The 5S Pocket Guide (Portland, Oregon: Productivity Press, 1998).
[3.] Productivity Press Development Team. 5S for Operators: 5 Pillars of the Visual Workplace (Portland, Oregon: Productivity Press, 1996).
[4.] Productivity Press Development Team. 5S for Safety Implementation Toolkit: Creating Safe Conditions Using the 5S System (Portland, Oregon: Productivity Press, 2000).
[5.] Productivity Press Development Team. 5S for Safety: New Eyes for the Shop Floor (Portland, Oregon: Productivity Press, 1999).
[6.] SHIGEO SHINGO – „The SMED System", Productivity Inc., 1985
[7.] http://en.wikipedia.org/wiki/Kaizen
[8.] http://en.wikipedia.org/wiki/Shift_work
[9.] http://en.wikipedia.org/wiki/SMED
[10.] http://membres.multimania.fr/hconline/smed3_us.htm
[11.] MASAAKI IMAI – „Gemba Kaizen", Productivity Inc., 1997
[12.] http://www.theleanman.com/Item-5S-Red-Tags-50-Pak.aspx
[13.] http://www.5stoday.com/

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SPORTS MARKETING MIX IN THE CONTEXT OF TRADITIONAL MIX MARKETING

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ABSTRACT:
Marketing mix is the central part of an organization's marketing tactics, so when an organization decided development to one specific market, the mix marketing has an important role.
The essential feathers of sport marketing are determined by:
- unique nature of sport as a marketing product
- complexity of consumer and its participation in sport
- specificity of industry and sport market

The diversity of industry and sporting phenomenon, led to the delineation of two major sports marketing industry, namely:
- Marketing through sport - which uses sport to promote other types of goods, services or ideas;
- Marketing of sports - sports goods and services.

In sport industry service, the element *product* should be extended, so it is considered by experts that there are at least five major elements of marketing mix in sport marketing namely: product, price, promotion, public relation and distributions.

KEYWORDS:
marketing mix, sport, product, price, promotion, distribution, public relations

1. INTRODUCTION

The uniqueness of the sport as a product resulting from the following:
- Sport is a consumer product, industrial product and service;
- Sport is a subjective, intangible and ephemeral experience, can not be viewed, sent or exhibited before sale;
- Sport is produced and consumed simultaneously;
- Sport is often consumed in groups;
- Sport as a series of mass production is impossible;
- The product sport has a unsteady character;
- Sport has a universal magnetism;
- Sport is a product that is personalized and nationalized;
- Sport offers a high level of personal identification;

2. PRODUCT SPORT

In the marketing mix context, product means what a market is offering for use or consumption, and can be a physical object or service of any kind.
The life cycle of a product, requires a focus on cosmetic products from when he was placed on the market until it is withdrawn.

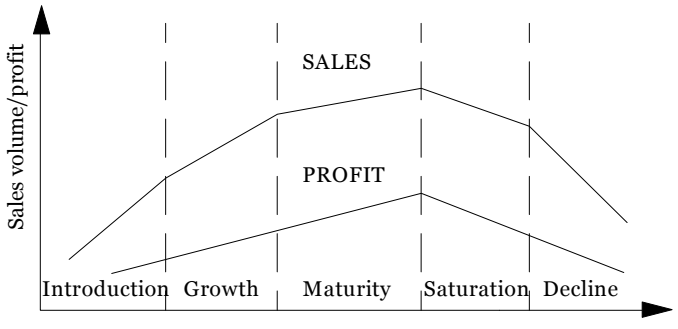

Figure 1 Life cycle of a product

Mullin, Hardy and Sutton, identifies the following components, of product sport namely:

- *Essential benefits* - related to the satisfaction of some needs or desires;
- *A generic form of sport* - competition requires rules, equipment, physical abilities and a certain frame (sports facilities);
- *A specific form of sport* – the specific forms of sport are developed either in a non-institutionalized environment - recreational sports in family, or in one institutionalized environment and sports performance have a proper organizational framework;
- *A marketing mix* - in a industry based in services such as sport, the element *product* should be extended, so it is considered by experts that there are at least five major elements of marketing mix in sport marketing namely: *product, price, promotion, distribution and public relations*.

3. PRICE

An important element of the marketing mix - price - is the only part of the mix that produces benefits, because all other represent costs.

The satisfaction of the consumer - Benefits - Cost involved

In assessing the overall impact of price to the sports consumer, marketing specialist must take into account the actual cost of the product for the consumer, given the fact that in sports there is not a direct determination between the level of income and the price of participation in sport.

4. COMMUNICATIONAL COMPONENT

The specifics of the communication tools used in sports marketing, is given by the double role which they fulfill, namely: communication and funding.

Mullin, Hardy and Sutton, proposing to use an impact matrix which shows the interaction between the main components of the marketing mix in order to explain the relationship of interdependence between marketing communications and other elements of marketing mix:

- The impact between product and promotion - product sets appropriate environment which will communicate the message, and in some cases the choice of environments can have a major effect on the product image;
- The impact between product and public relations - public relations contributes to building a long-term picture, depend on the goodwill of the press and broadcasters and plays a crucial role in consumer responsiveness;
- The impact between price and promotion - the price of a product determines the environments through the product will be promoted, determines the marginal profit generated by the product, with repercussions on the budget communication, which determines the selection of environments;
- The impact between price and public relations - the organization's image, created through public relations media will determine receptivity and subsequent consumer attitudes towards a possible change in price;
- The impact between distribution and promotion – sports complex image is strong and has a direct impact on the image product / service;
- The impact between distribution and public relations - careful management of the staff of a sports complex can help to maintain a positive global image through public relations.

Table 1. Matrix of the 5 P's of marketing mix (Mullin, Hardy, Sutton)

	Product	Price	Distribution	Promotion	Public Relations
PRODUCT		Price-value	Interaction of images	Position of product	Consumer receptivity
PRICE			Interaction of images	The choice of environment	The sincerity of public relations
DISTRIBUTION				Interaction of images	Interaction of images
PROMOTION					Complete interdependence
PUBLIC RELATION					

5. PROMOTION

5.1 PUBLIC RELATION

The main components of public relations are:

- Relations with the media - sending and receiving information to the media's and careful receptivity of the feedback;

- Relations with the community - generate goodwill and understanding from the public.

Strategic planning of public relations in sports involves followings:

- Identifying targets;
- Setting goals;
- Building the image of the organization: setting the content of messages;
- Choosing the most appropriate techniques: printed materials, contacts records, special events, other manufacturers of photography;
- Implementer of the public relations program, which involves: qualification of public relations staff in the art to produce and deliver news; make a list of media; drawing up a timetable of specific activities which details the sequence of actions and deadlines for compliance throughout the campaign;
- Evaluation of results.

5.2 PUBLICITY

5.2.1 Publicity through sport involves:

- advertising for competition;
- sports equipment and referees advertising;
- publicity in sports publications - the choice of publications is based on criteria such as: readers profile, distribution area and circulation, publication timing and selling price of space.

5.2.2 Publicity for sport involves

Sports organizations promote their products / services through the following forms, classical "of advertising:

- advertising on television and radio - broadcasting;
- display and outdoor advertising;
- print advertising - competition schedules, event programs, invitations, admission tickets, stationery;
- special advertising - through ceremonial objects that accompany athletic performance or souvenirs (shirts, pins, keychains, pens, etc.).
- public address systems;
- advertising interactive computer networks – Internet

Personal sales are the most expensive form of promotion and range from simple acquisition of a store orders (or sales office), to create new types of sales over a highly competitive market. Overall sales process has five immediate objectives, and one subsequently as it shows in fig.2.

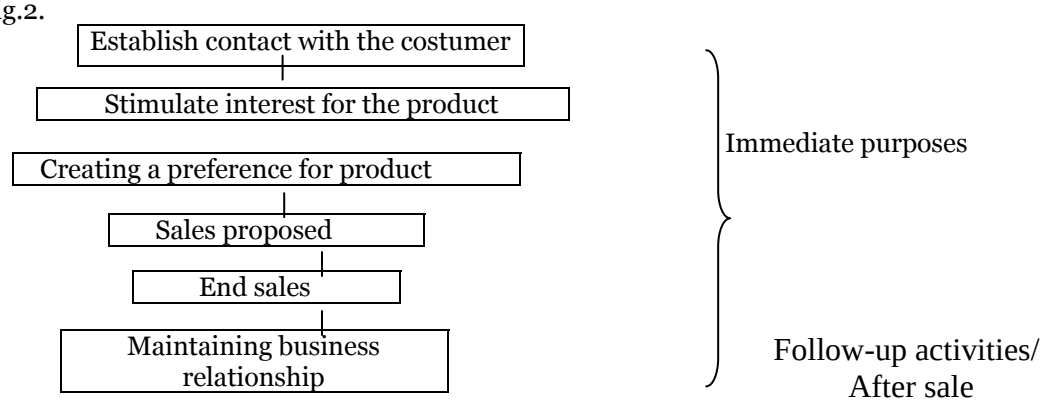

Figure 2 Sales objectives

5.2.3 Sales promotion

For sports, sales promotion may have the following targets:

- Sales forces : main incentives offered are: public recognition, diplomas, awards, medals, cups, titles, bonuses, gifts, special events;
- Intermediaries - in sports they can be owners of databases, agencies selling tickets to games, equipment suppliers;
- Policy makers - people who are recommending through their decision power, participation in sport to other persons: physical education teachers, parents, doctors, dieticians;
- Sponsors: maintain and improve existing partnerships, expanding forms of cooperation with firms that are already sponsoring and rewarding or expressing gratitude to the partners;
- Consumers of sport.

Techniques used for sales promotion:

a) Techniques of promote sustainable by product involves:

- temporary price reductions;
- grants and gifts;

- playing techniques: organizing competitions which purpose is to promote a club and its stars; lottery ticket;
- free trial - providing opportunities to receive individual sports experience through free access to a sports competition or start a free lesson;

b) Promotion techniques able to attract potential consumer to the product; presenting the most advantageous product marketing at its commercial place.

Types of programs to promote sales:

Mullin, Hardy and Sutton differentiated merchandising programs in sport, in:

a) Programs designed to increase the frequency of participation in sports:
- programs to increase the frequency of casual consumer participation;
- programs to increase the frequency of average users;
- programs which maintain the frequency of the active participant.

b) Programs designed to prevent early supporters or motivating them, like:
- providing preferential places to subscription holders;
- offering free competition programs at the renew subscriptions;
- free parking;
- free access to stadium club.

6. DISTRIBUTION

The distribution purpose - transfer the product or service to the consumer named target.

Distribution deals with distribution channels and physical distribution.

The most used distribution channels are:

A. Producer → Consumer
B. Producer → Wholesale seller → Retail seller → Consumer
C. Producer → Wholesale seller → Consumer
D. Producer → Retail seller → Consumer

6.1. Market segmentation

The most common methods of market segmentation have variables of different natures such as geographic, demographic and behavior of the purchaser as listed below:

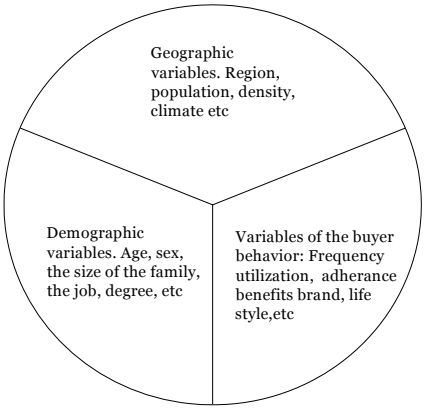

Figure 3 Market segmentation

An important variable in consumer behavior is measurable utilization of purchases volumes.

The main benefits of market segmentation in terms of the seller are:
- the seller has a better picture of the market as a whole, especially in relation to the marketing opportunities of the market segments;
- seller can build the marketing mix depending to the needs of specific segments;
- the seller, familiar with one or more segments can easily evaluate their response, a valuable element in planning.

The main benefit of the consumer's point of view is the fact that they satisfy their needs, taking into account the above variables.

7. CONCLUSIONS

- To attract, right customer, manufacturers and retailers must vary the marketing mix to the needs of different market segments;
- Merchandising programs in sport is based on the different stages which consumer engage in sports participation;
- Objectives which are used in the service of sales promotion techniques, is closely related to age product, regardless of their target hosts, so each phase of the stage of product life cycle corresponds to specific techniques and methods of promotion;
- The goal of mature sports organizations is not only to attract new customers, but more importantly, to increase the frequency of participation of existing customers and as this is done, increase the profitability of the organization;
- Image - immaterial component of the sport, is associated with different aspects of life such as: exercise, relaxation, social identification, prestige, self-realization, business, industry, religion becomes, especially in sports performance, the main purpose of marketing;

- In sports marketing, distribution function focuses on the location and design characteristics of sports and then to establish networks and the sale of tickets for transmission by electronic media (radio, television, Internet), because there is no physical movement of product.

REFERENCES

1. Gerald A.Cole – Management – theory and practice, ed. Ştiinţa, 2004;
2. Oprisan, V. – Marketing and comunication in sport, Ed. Uranus, 2002;
3. Mullin, B.J., Hardy, S.,& Sutton, W.A. – Sport marketing, Ed. A II-a Ed. Human Kinetics, SUA, 2000;