Economic indicators used for EU projects, in other criteria of aggregation than national / regional

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ERRORS AND LIMITATIONS ASSOCIATED WITH REGRESSION AND CORRELATION ANALYSIS

Aivaz Kamer-Ainur

Mirea Marioara

"Ovidius" University of Constanta, Faculty of Economics Sciences, Dumbrava Rosie St. 5, code 900613, E-mail: elenacondrea2003@yahoo.com

Abstract

This paper describes the main errors and limitation associated with the methods of regression and correlation analysis. Those methods have been developed specifically to study statistical relationships in data series.

Key Words: Assumption, linear regression, linear correlation, multiple regressions, multiple correlations.

Introduction

Regression analysis is concerned with developing the linear regression equation by which the value of a dependent variable Y can be estimated given a value of an independent variable X.

If simple regression analysis is used, the assumptions for this technique should be satisfied. The assumption required to develop the linear regression equation and to estimate the value of dependent variable by point estimation is:

1. The relationship between the two variables is linear.

2. The value of the independent variable is a set at various values, while the dependent variable is a random variable.

3. The conditional distributions of the dependent variable have equal variances.

If any interval estimation or hypothesis testing is done, additional required assumptions are:

1. Successive observations of the dependent variable are uncorrelated.

2. The conditional distributions of the dependent variable are normal distributions.

The scatter diagram is a graph that portrays the relationship between the two variables and can be used to observe whether there is general compliance with the assumptions underlying regression analysis. An alternative graph to determine such compliance is the residual plot, which is a plot of the residuals e = $(Y - \hat{Y})$ with respect to the fitted values $\hat{Y}$. The mathematical criterion generally used to determine the linear regression equation is the least squares criterion by which the sum of the squared deviations between the actual and estimated values of the dependent variable is minimized. The standard error of estimate $s_{y,x}$ is the measure of variability, or scatter, with respect to the regression line. It is used to establish prediction intervals for the dependent variable.

Interval estimation of the conditional mean of the dependent variable is based on use of the standard error of the conditional mean $s_{y,x}$, The standard error of forecast $s_{y(next)}$ is used to construct a complete prediction interval for an individual value of the dependent variable. By "complete", we mean that the uncertainty regarding the value of the conditional mean is considered in addition the uncertainty represented by the scatter with respect regression line. When the sample is relatively large, approximate prediction intervals based on use of only the standard error of estimate are considered acceptable. A final area of inference that we considered was interval estimation and hypothesis testing concerning the slope β_1 of the linear regression model.

The most frequently used measure of relationship for sample data is the sample correlation coefficient "r". The sign of the correlation coefficient indicates the nature (direct or inverse) of the relationship between the two variables, while the absolute value of the correlation coefficient indicates the extent of the relationship. The coefficient of determination r^2 indicates the proportion of variance in the dependent variable that is explained statistically by knowledge of the independent variable (and vice versa). The null hypothesis most frequently tested in correlation analysis is that the population correlation is zero, represented by $\rho = 0$. Rejection of this hypothesis leads to the conclusion that $\rho \neq 0$ and that the two variables are related.

The value of the dependent variable cannot be legitimately estimated if the value of the independent variable is outside the range of values in the sample data that served as the basis for determining the linear regression equation. There is no statistical basis to assume that the linear regression model applies outside of the range of the sample data.

If the estimate of the dependent variable in fact concerns prediction, the historical data used to determine the regression equation might not be appropriate to represent future relationships. Unfortunately, one can only sample past data, not future data.

The standard error estimate is by itself not a complete basis for constructing prediction intervals, because the uncertainly concerning the accuracy of the regression equation, and specifically of the conditional mean is not considered. The standard error forecast is the complete measure of variability. However, when the sample is large, use of the standard error of estimate is generally considered acceptable.

If correlation analysis is used, all the assumptions for this technique should be satisfied. These assumptions are:

1.   the relationship is linear

2.   Both variables are random variables.

3.   For each variable, the conditional distributions have equal variances.

4.   Successive observations are uncorrelated for both variables.

5.   The joint distribution is a bivariate normal distribution.

A significant correlation does not necessarily indicate causation, but rather may indicate a common linkage in a sequence of events. One type of significant correlation situation is when both variables are influenced by a common cause and therefore are correlated with one another. For example, individuals with a higher level of income have both a higher level of savings and a higher level of spending. We might therefore find that there is a positive relationship between level of savings and level of spending, but this does not mean that one of this variable cause the other. Another type of situation is one in which two related variables are separated by several steps in a cause-effect chain of events. An interesting example in the medical field is the following sequence of events: warm winter, appearance of viruses, and release of the flu.

The existence of warm, the climatic conditions is not itself the cause of the flu, but these conditions is several steps removed in the cause-effect sequence. For many years, the climatic conditions themselves were thought to be the cause, and so this disease was called flu.

A significant correlation is not necessarily an important correlation. There is much confusion regarding the meaning of significant in the popular press. It is usually implied that a relationship that is significant is also thereby important. However, from the statistical point of view, a significant correlation simply indicates that a true relationship exists and that the correlation coefficient for the population is different from "0". Significance is necessary to conclude that a relationship exists, but the coefficient of determination r^2 is more useful in judging the importance of the relationship.

Given a very large sample, a correlation of, say, r = 0,10 can be significantly different from 0 at $\alpha = 0,05$. Yet the coefficient of determination of $r^2 = 0,01$ from this example indicated that only 1 percent of the variance of the dependent variable is statistically explained by knowledge of the independent variable.

In a comparison of simple linear regression analysis and correlation analysis, the principal difference in the assumption is that in regression analysis there is one random variable, while in correlation analysis, both variables have to be random. The sapling design for a study therefore should consider the analysis to be performed. Regression analysis is used when the main objective is to estimate values of the dependent variable, whereas correlation analysis is used when the main objective is to measure and express the degree of relationship between the two variables. When both variables are random variables, either regression analysis or correlation analysis, or both, can usually be applied to the data.

In multiple regression analysis the value of the dependent variable is estimated on the basis of know values of two or more independent variables, while the extent of the relationship between the independent variables, while the extent of the relationship between the independent variables taken as a group and the dependent variable is measured in multiple correlation analysis. For multiple regression analysis the principal assumption is:

1.   The relationship can be represented by a linear model

2.   The dependent variable is a continuous random variable

3.   The variances of the conditional distributions of the dependent variable are all equal (homoscedasticity)

4. Successive observed values of the dependent variable are uncorrelated
5. The conditional distributions of the dependent variable are all normal distributions.

On the general level, the assumptions associated with multiple regressions and multiple correlation analysis has to be satisfied if the results are to be meaningful. As in simple analysis involving one independent variable, the assumption of linearity and equality of conditional variances can be investigated by obtaining a residual plot based on the multiple regression models.

A specific area of concern when there are several independent variables is the possible existence of multicollinearity. This term describes the situation in which two or more independent variables are highly correlated with one another. Under such conditions, the meaning of the partial regression coefficient in the multiple regression equation is unclear. Similarly, the meaning of the coefficients of partial correlation with a given independent variable is highly negative even through the simple correlation is highly positive. The statistical procedures that represent attempts to handle the problem of multicollinearity it is sometimes to eliminate one of two highly correlated independent variables from the analysis, recognizing that the two variables essentially are measuring the same factors. When correlated variables must be included in the analysis, care must be taken in ascribing practical meaning to the partial regression coefficients and to the coefficients of partial correlation. However, multicollinearity causes no special problem for inferences associated with the overall regression model, such as F test for the significance of the regression effect, confidence intervals for the mean of the dependent variable, and prediction intervals for individual values of the dependent variable. Of course, for any interval estimates the values of the independent variables should be within the ranges of values included in the sample data.

Another area of specific concern in multiple regressions and multiple correlation analysis is the possibility that successive observed values of the dependent variables are correlated rather than uncorrelated. The existence of such a correlation is called autocorrelation. The assumption that the successive values of the dependent variable are uncorrelated has already been identified as a principal assumption in simple regression and simple correlation analysis. However, in simple analysis the existence of such a correlation is easier to observe than a multiple analysis. Typically, autocorrelation occurs when values of the dependent variable are collected as time series values, that is, when they are collected in a series of time periods. When successive values of the dependent variable are correlated values, the point estimate of the dependent variable based on the multiple regression equation is not affected. However, the standard error associated witch each partial regression coefficient b_k is understated, and the value of the standard error of estimate is understated. The results is that the prediction and confidence intervals are narrower (more precise) than they should be, and null hypotheses concerning the absence of relationship are rejected too frequently. In terms of correlation analysis, the coefficients of multiple determinations and multiple correlations are both overstated in value.

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QUANTITATIVE METHODS FOR ANALYZING UNIVERSITY EXAM FRAUDS[1]

Andrei Tudorel

Academy of Economic Studies - Bucharest, andreitudorel@yahoo.com

Teodorescu Daniel

Emory University, Atlanta, USA, dteodor@emory.edu

Tusa Erika

Academy of Economic Studies - Bucharest, erika_tusa@yahoo.com

Vlad Liviu Bogdan

Academy of Economic Studies - Bucharest

Abstract

The process of reforming the Romanian tertiary education has been accelerated after the signing of the Bologna treaty. Ethics in the academic system is one of the most important as well as discussed issues. The paper aims to present the major results of a study conducted among the Bucharest University Center students regarding the main aspects of the academic fraud during the examination activity through exams and papers. A logistic model is developed in order to explain and quantify the main determinants of the academic fraud among students.

Key words: academic fraud, logistic model, tertiary education

1. Introduction

The transition has generated a series of important changes at the tertiary education level in Romania. The reform process of the Romanian tertiary education has been accelerated after the signing of the Bologna treaty. For 17 years, the number of students increased massively. If in the university year 1990/1991 there was a total number of only 192,810 enlisted students, all in the public education sector, in the university year 2003/2004, 620,785 students have been enlisted, of which 476,881 in the public education sector. However, during this period, the pupil – student number ratio decreased. Thus, from a 5.16 ratio in 1990/1991 it reached 1.22 in 2003/2004. Meanwhile, the student number per 10,000 inhabitants has tripled.

In order to determine the characteristics of the tertiary education within Bucharest University Center, a statistic-survey-based assessment has been performed in November 2005. The research components rely on the students' and professors' academic behavior analysis, in close accordance with education performance factors.

2. Sample characteristics

The sample comprised 1025 students and has a 2% error tolerance. For generating the study, the following sampling variables have been used : study curricula, year of study and students' age.

The main characteristics of the three sampling variables are as follows:

1. **Study curricula.** Regarding this criteria, students have been grouped in the following categories: university (with a share of 32,3% in the total number of students), tehnical studies (27,6%), economical studies (22,2%), medicine (6,7%), law (5,5%), agriculture studies (4,0%), art, sports (1,8%). Students' allocation within the sample was proportionally with the total number of students attending day-study for each curricula. The study includes all tertiary education institutions in Bucharest, except of "Politehnica" University Bucharest, where the questionnaires where banned.

2. **The year of study** The sample didn't include the first year students. The distribution of the students was as following: 38.6% from the second year, 33.0% from the third year, and the difference of 28,4% from the forth and fifth year (the fifth year students are from the university of medicine.

3. **The age of students.** The sample's distribution of the students according to their age is presented in the following figure. The average age is 23.5 years and 69.8% are at most 25 years old. The smallest weight is corresponding to the students with the age between 30-34 years.
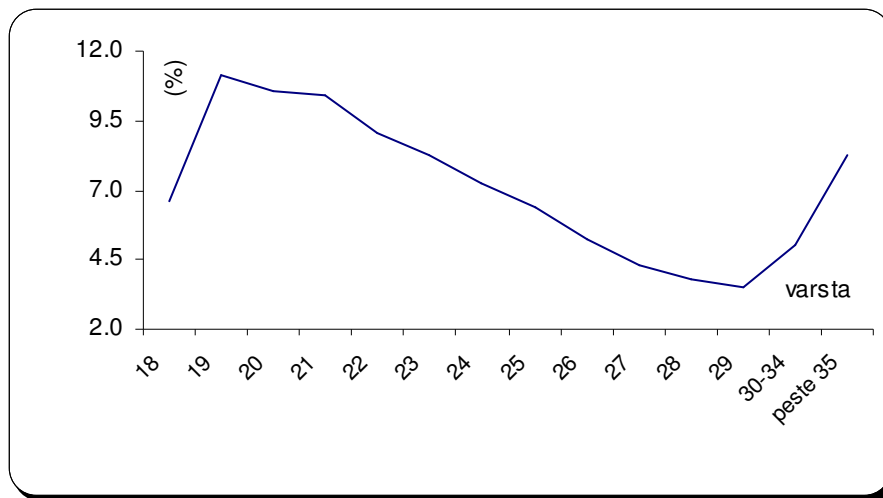
Fig 1. Students' distribution according to age

The analysis of the sample provided information that allowed to characterize the distribution of the students according to the following criteria: the year of high school graduation, the region of graduation (Bucharest, Moldavia, Transilvania, Dobrogea, Oltenia, Muntenia or abroad), the average mark from the previous university year, the gender distribution, the percentage of contribution from self-earned incomes to the university taxes and expenses, the type of dwelling/accommodation (living with the parents, in a university residence, in a rented or own place).

3. Analyzing the university exam frauds

The data collected through the sample is used to analyze two major non-academic methods of passing an exam through fraud: through cheating at an exam or through a direct or indirect intervention to the professor.

The ethics in the Romanian universities was subject to previous studies – such as *"Sociological research – ethics in universities"* coordinated by Ana Bulai or *Barometer of students' opinion"* carried out by Team Work in The University of Bucharest in 2005. The first research is addressing the whole tertiary education and is underlying the favoritism as the most significant ethical problem in the academic environment. According to the study, favoritism is signaled by 36% of the interviewed professors, 29% of the students, 24% of the auxiliary staff and 33% of the PhD students.

Staring from the definition of corruption presented earlier, the questionnaire included several questions that tried to identify the main methods of cheating at an exam as well as the distribution of the students according to the frequency of the attempts to fraud an exam.

The results show that the most important means of the students behavior in a non-academic manner are: (a) copying an exam from another colleague or from other unauthorized sources; (b) a direct or indirect (through intermediaries) intervention to the professor in order to arrange to pass the exam or to get a bigger grade; (c) copying the projects from books or published articles (d) or from colleagues; (e) extra-hours with professors, for a given fee. For each method of cheating at exams, the following table presents the frequency observed by the questioned students with respect to their colleagues:

Table 1 The distribution of the main methods of academic fraud (%)

	a	b	c	d	e
Nobody	3,3	16,3	22,8	5,9	11,0
Small proportion – under 10%	24,1	25,9	12,3	20,4	24,4
Significant proportion – 11-50%	30,1	7,7	3,3	19,2	19,8
Most of the colleagues – 51 -90%	23,1	2,7	1,9	17,2	11,3

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Almost everybody – over 90%	7,2	0,4	0,7	8,9	3,2
I don't know	10,8	45,2	57,5	26,9	29,0
No answer	1,3	1,9	1,6	1,5	1,3
Total	100,0	100,0	100,0	100,0	100,0

As the results in the table show, the most common method of academic fraud is to copy from another colleague or from non-authorized sources both at the exams or projects and papers. On the other hand, a direct approach of the professor is less used, although almost half of the students admit they don't have a enough information with respect to their colleagues.

4. Using the logistic model for analyzing academic fraud

The model is defined starting from the following assumption: the fraud of an exam, as dependant variable (y) is a function of the following independent variables: i) gender (x_1); ii) the level of corruption in the university induced by the behavior of the professors (x_2); iii) the performance level of the student, defined by the weekly time spent, in average for study (x_3) and the students' appreciation of their colleagues performance level (x_4), iv) the quality of the academic activity in the university, measured by the course relevance (x_5) and the course attendance (x_6); v) the free time spent outside the campus (x_7) and in extraprofessional activities (x_8); vi) the predilection to cheat an exam given similar practices during the high school (x_9).

The dependant variable of the model is defined as a binary variable, with the value "1" given for a positive answer to the question: "If there is little chance to pass an exam, would you take the chance to copy from a colleague or other unauthorized materials?" and the value "0" for an answer "No" or "I don't know"

The main characteristics of the **independent variables** are:

A. Corruption induced by professors in the university: The information is given through the students' responses at the following questions: "Did a professor requested or take money from students in exchange for passing and exam or improving a grade?", "Did a professor imposed to the students to buy his book/manual?"and was synthesized in a new variable , which is trying to capture that part of the corruption in the academic system that is perceived by students as induced by the professors.

B. *Level of students' performance* is measured using two variables: "Weekly number of hours for individual study" and "The perception on the colleagues' level of performance".

C. *The quality of academic activity of the professor* is measured using the students' perception on the relevance of the course for the future career and the attendance at the classes.

D. *The free time spent outside the campus* is quantified using the subsequent dimensions: work outside campus and free time – defined as an average of three variables: time spent with friends and colleagues, time spent on internet surfing and time spent on playing computer games.

E. *Cheating at the exams during the high school* is recorded using the answer to the following question: *'In your opinion, during the high school, what is the proportion of your colleagues that used unauthorized methods to get bigger grades?"*

The estimations for the logit model and its characteristics are presented in the next table:

Table 2. Characteristics logistic model

Variable	B	S.E.	Wald	Sig.	Exp (B)
1. Gender (x_1)	-0,0261	0,191	1,867	0,172	0,770
2. level of corruption in the university (x_2)	0,203	0,089	5,237	0,022	1,225
3. Level of students' academic performance					
31. Individual study (x_3)	-0,238	0,067	12,630	0,000	0,788
32. Assessment of colleagues' academic performance (x_4)	0,183	0,110	2,759	0,097	1,201
4. Quality of teaching activity					
41. Relevance of courses (x_5)	-0,224	0,087	6,605	0,010	0,799
42. Attendance at classes (x_6)	-0,543	0,164	10,934	0,001	0,581
5. Free time					
51. Extra-campus work (x_7)	-0,133	0,044	9,067	0,003	0,876
52. Extraprofessional activities (x_8)	0,268	0,070	14,631	0,000	1,307
6. Predilection to cheat in high school (x_9)	0,268	0,094	3,434	0,064	1,190
Regularity	0,488	0,749	0,424	0,515	1,628

The logistic model will be defined as follows:

$$P(\text{fraudarea examenului prin copiere})$$
$$= \frac{\exp(0{,}488\text{-}0{,}0261x_1 + 0{,}203x_2\text{-}0{,}238x_3 + 0{,}183x_4\text{-}0{,}224x_5\text{-}0{,}543x_6\text{-}0{,}133x_7 + 0{,}268x_8 + 0{,}268x_9)}{1 + \exp(0{,}488\text{-}0{,}0261x_1 + 0{,}203x_2\text{-}0{,}238x_3 + 0{,}183x_4\text{-}0{,}224x_5\text{-}0{,}543x_6\text{-}0{,}133x_7 + 0{,}268x_8 + 0{,}268x_9)}$$

5. Conclusion

The characteristics that quantify the number of hours allocated to individual study, during a week, the relevance (perceived importance) of the course and the class attendance generate a reduction in the probability of cheating at an exam.

The students that have to work outside campus on a regular basis are less tempted to fraud an exam. On the other hand, the extraprofessional activities, such as parties and gathering with friends, internet surfing, video games tend to increase the probability of cheating at an exam. More time a student allocates to these activities, more likely to fraud the exam.

The gender has low relevance with respect to the probability to fraud an exam. Nevertheless, the female students are more inclined to cheat at an exam compared to their male colleagues.

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AUTOMATIZATION OF THE ACTIVITY OF SETTING THE VALIDITY TERMS TO A SET OF FOOD PRODUCTS

Antonescu Eugenia

Constantin Brâncoveanu University Piteşti, Calea Bascovului 2A, 0744274298

E-mail: eugenia_antonescu@yahoo.com

In merceology, the design of the computer system meant to pursue the quality of a product is a neat set of assessment means of the computer requirements for a product and defining means of the computer systems, of the databases, as well as of the technologies that meet these requirements. The construction of the computer system and its individual parts has as a working base: the technical solution for the acquisition of the hardware equipment and the configuration of the system's computer networks, the data design, and the interface design with the user, the interaction between the user and the programming system.

All these considerations are to be found in the computer application presented below, for the informational fundamentation of all calculus regarding the validity terms of food products.

Key words: validity term; informatic system; data administration; data base update

1. Database creation and update

The informatic system provides support to a better anticipation of the results and a better usage of the resources, to the modality of getting to know the customers' expectations regarding the products quality during the validity term and the deference of the contract agreements.

The programs used in the study of the products quality, in general, and the food products, in particular, permit data manipulation so that the research in the field of setting the validity term is possible at present by developing complex, dynamic models with considerable advantages that ease and allow a great scientific rigour.

The subsystem for **the experimental data administration necessary to set the validity terms** can be found within the general structure of the informatic system for the firm management next to the subsystems for supply, delivery, production, finance-accounting, marketing.(fig.1).

Each table must be described, including the integrity restrictions, passing then to the real data introduction and actualization.

The relational SGBDs, of which Access is a part of, permits all users to utilize productive variants, such as the one of using predefined electronic forms for data introduction.

Fig.1. The functional structure of the computer subsystem application of validity terms.
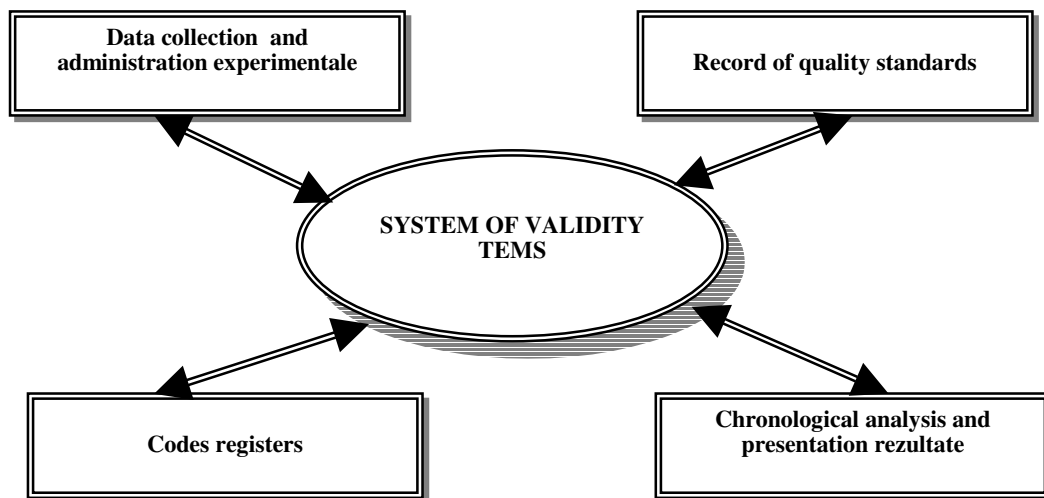
Electronic forms can be made in Access under the assistance of the Form Wizard utility (fig.2.).

Fig. 2. Creating electronic forms with Form Wizard
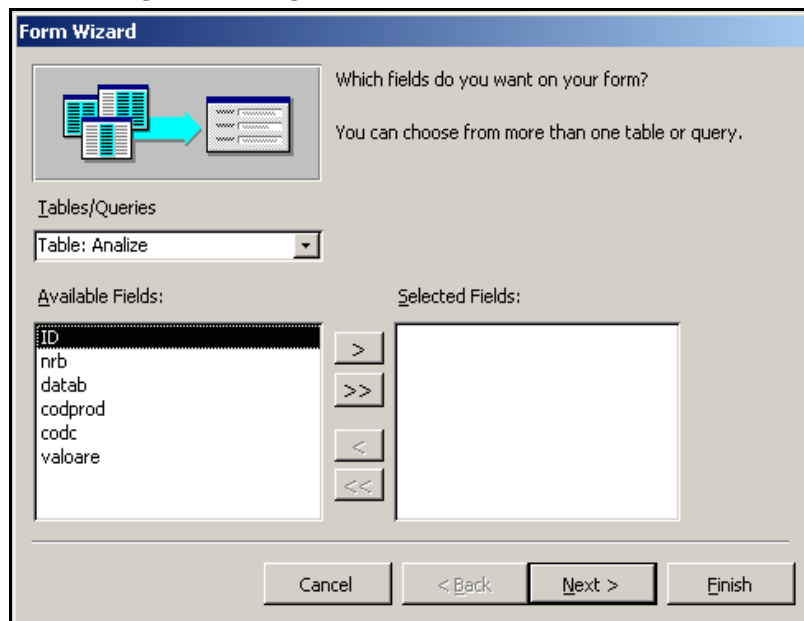
Fig. 3. Electronic form for the introduction of data
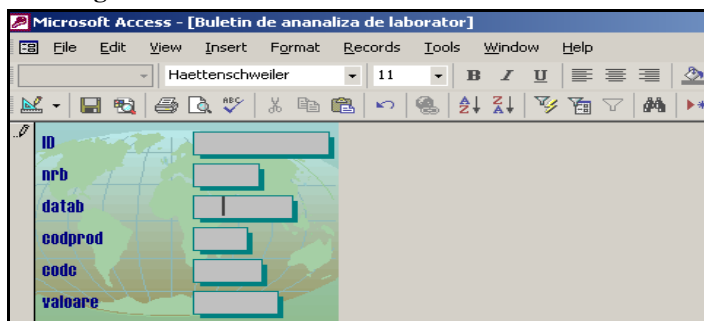
For the current level of the study case we considered as being satisfactory the variant of data introduction soliciting predefined forms made with the above mentioned utility. For the introduction of data in the analyses table we utilize, for example, an electronic form as presented in fig. 3.

The data base actualization is a complex and obligatory process. Generally, any data base actualization refers to two levels of actualization: actualization at the level of the logical structure of the database and actualizations at the level of the informational content of each table.

The actualizations at the level of the logical structure of the database imply modifications to the initial description of each table. All these descriptive elements are memorized in a special file – used by Access for the description synthesis of all its operational objects, tables, interrogations – queries, reports, forms.

The database designer can modify the database description in the sense of adding, deleting tables, and at the level of a table he can add, delete or modify their fields, working in the *design view* module, that can be selected from the window presented in fig.4.

Fig.4. Database Access Window
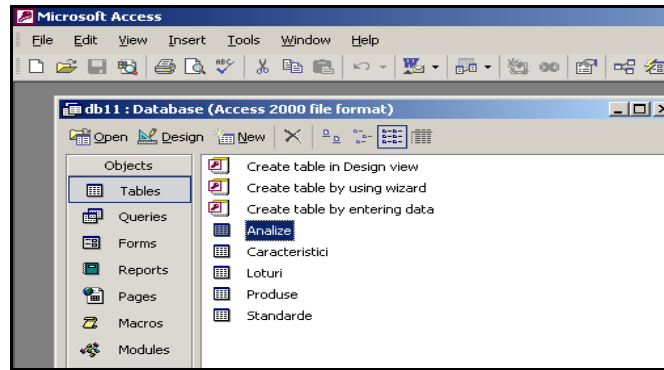
Fig.5. Electronic form of actualization
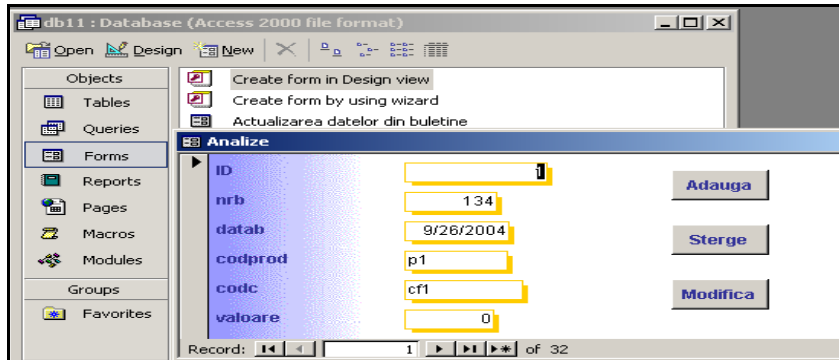
The informational content of every table can be updated (fig.5.) by adding new data, correcting, if there is the case, some data errors or even deleting various records.

2. The Excel–Access Interface for exploiting the database

Exploiting the database materializes the capitalization of the informational fond physically memorized in the dbf files on the disk. The success of every informational system is determined by the way in which we have access to the database, by the easy data find which we need and the extent to which these data are complete, correct and updated.

The nature of the processing that we must accomplish to provide the informational process necessary to set the validity terms for a homogeneous set of products imposes the extraction from the database of the records referring to a certain set, a particular product and the analysis of the evolution in time of the modifications of the physical and chemical, sensorial and microbiological properties.

In order to obtain these results in a very reasonable form for the specialists in merceology we propose as an informatics solution the combined usage of the facilities of the programs Excel and Access, programs included in the integrated software MS Office.

As a first step, we extract the data from the tables of the database using the interrogation language SQL, available with the help of the Query Designer utilitary.

For the next step we use the Excel program of table calculus and graphical representations. We will illustrate the operating procedures which could serve as a methodological working guide for those people who operate the data memorized in the database of the designed subsystem.

The analysis bulletins must be selected for each product separately from the Analyses table. They are centralized in order to construct the comparative table of the evolution per days of the values of the features.

The Query Designer utilitary allows us to associate, on the basis of the relationships, the data in the Analyses, Products and Features tables and then to select the fields that will be parts of the final interrogation. (fig.6)

Fig. 6 Constructing a data base interrogation
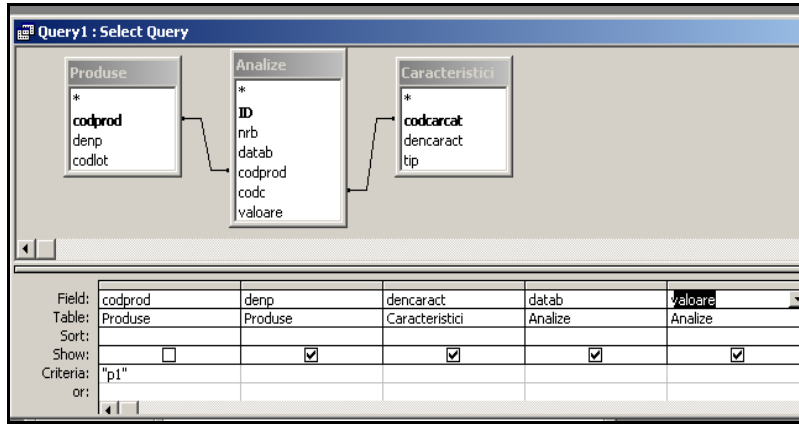
The result of this interrogation must cross another stage of intermediate processing to be transferred for processing to the Excel program. It's about constructing an interrogation of the Cross Tab Query type. (fig.7; 8)

The calculus program Excel can process the data of an Access database because it has the Import External Data function in the Data menu. (fig.9)

The data source submitted to the processing is set by making a number of steps which set the disk, the folder and the mdb file name associated to the Access database out of which the Cross Tab interrogation previously created is extracted.

The data of the experimental observations are associated with the standard values, these values being loaded in an adjacent calculus form, within the same workbook.

From the data selected we can easily obtain the graph (fig.11) so necessary to the chronological analysis of the features of the values, on the basis of which we decide which is the validity term that will be set to the tested set of products.

To provide good user-computer collaboration and to overcome any possible operating mistakes it is recommended to include all these procedures in a general menu where one can select the working options for every development stage of the lab tests. The computer system must be developed from a case study stage to an operational system stage by finalizing all the actualization procedures even by including, where possible, some well-formalized procedures for the calculus of the validity terms.

Fig.7 Crosstab Query 1 Interrogation

Fig. 8 Crosstab Query 2 Interrogation

caract fiz chim_Crosstab : Crosstab Query			
dencaract	6/26/2004	6/29/2004	9/26/2004
apa%		0	0
Grasimi	0	0	
mgNO%	2.158	3.67	
NaCl%	2.92	3.4	

Fig. 9 The Import External Data Function in Excel
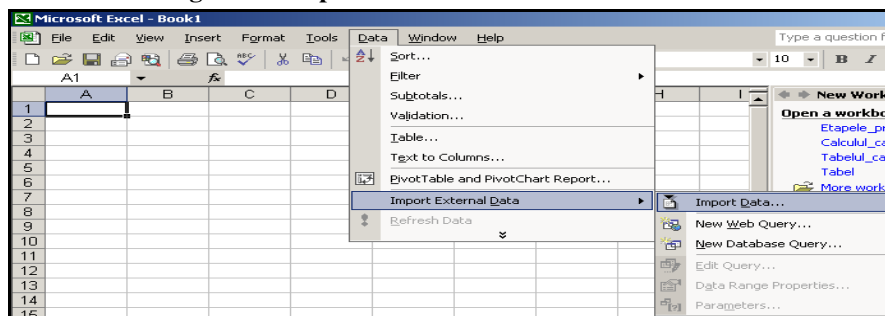
Fig.10.The Access data source selection for the Excel processing
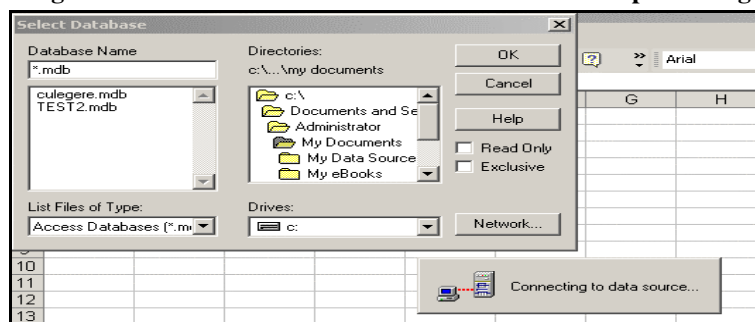
Fig.11. The graphical processing of the experimental data in Excel

	A	B	C	D	E	F
1	dencaract	6/26/2004	6/29/2004	7/3/2004	7/5/2004	7/5/2004
2	apa%	65.65	65.24	64.45	61.92	64.77
3	Nitriti mg/100g	1.439	1.252	0.975	0.512	0.475
4	NaCl%	2.34	2.34	2.6	3.1	3.8

Analiza cronologica
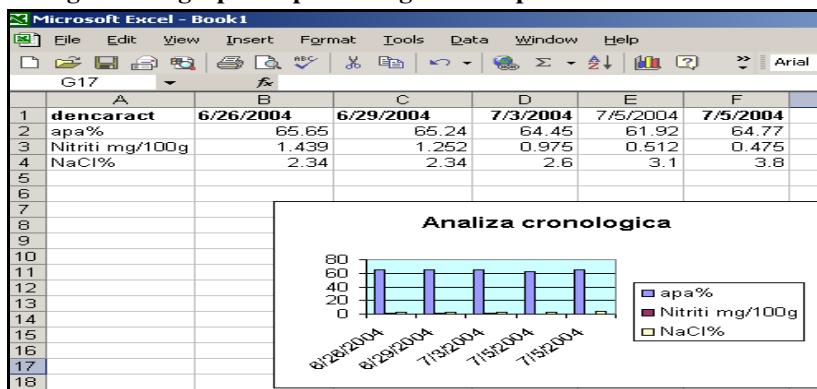
The informatic subsystem must be developed from the level of the study case to the level of an operational system by defining all actualization procedures or even by including, where possible, some well-formed procedures, for the calculus of the validity terms.

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DATA MINING DECISION TREES IN ECONOMY

Bădulescu Laviniu Aurelian

University of Craiova, Faculty of Automation, Computers and Electronics, Software Engineering Department, G. Fotino str., No. 2, b8, 3, 11, Craiova, 0722276554, laviniu_aurelian_badulescu@yahoo.com

Nicula Adrian

University of Oradea, Faculty of Economics, Str. Universității nr. 1, Oradea, anicula@uoradea.ro

Data Mining represents the extraction previously unknown, and potentially useful information from data. Using Data Mining Decision Trees techniques our investigation tries to illustrate how to extract meaningful socio-economical knowledge from large data sets. Our tests find 5 attributes selection measures that perform more accurate then the best performance of the 17 algorithms presented in literature.

Data Mining, Decision Trees, classification error rate

1. Introduction

In today's knowledge-driven economy, Data Mining (DM) is an essential tool in the pursuit of enhanced productivity, reduced uncertainty, delighted customers, mitigated risk, maximized returns, refined processes and optimally allocated resources.[8] DM is defined as the process of discovering patterns in data. The process must be automatic or semiautomatic. The patterns discovered must be meaningful in that they lead to some advantages, usually an economic advantage. The data is always present in substantial quantities.[16] Machine learning provides the technical basis of DM. The main ideas behind DM are often completely opposite to mainstream statistics.[6]

DM ultimately provides a framework for dealing with uncertainty. As organizations and the global economy become more complex, sources of uncertainty become more plentiful. To make decisions more confident, new and sophisticated approaches are required. [8]

The tasks of DM like the explanation and the prediction of economic phenomena, to forecast the future or to discover the hidden laws that underlie the unknown dynamics, are the ultimate goals of economics.[2] DM techniques help to decide what tasks, activities and transactions are more economical and beneficial to use at the time.[11] DM has become more viable economically with the advent of cheap computing power based on UNIX, Linux, and Windows operating systems. [15]

Using Decision Trees (DT) techniques our investigation tries to illustrate how to extract meaningful socio-economical knowledge from large data sets derived from the Current Populations Survey. However, the extraction of useful knowledge from such large data sets is a very demanding task that requires the use of sophisticated techniques. The data sets need to be filtered and preprocessed to eliminate irrelevant attributes and incompleteness before building classifiers and predictors to efficiently extract information. [10]

DT are often used in credit scoring problems in order to describe and classify good or bad clients of a bank on the basis of socioeconomic indicators (*e.g.*, age, working conditions, family status, etc.) and financial conditions (*e.g.*, income, savings, payment methods, etc.). Conditional interactions describing the client profile can be detected looking at the paths along the tree, when going from the top to the terminal nodes. Each internal node of the tree is assigned a partition of the predictor space and each terminal node is assigned a label class/value of the response. As a result, each tree path, characterized by a sequence of predictor interactions, can be viewed as a production rule yielding to a specific label class/value. The set of rules produced constitutes the predictive learning of the response class/value of new objects, where only measurements of the predictors are known. As an example, a new client of a bank is classified as a good client or a bad one by dropping it down the tree according to the set of splits of a tree path, until a terminal node labeled by a specific response-class is reached. [14]

Before starting the experiment, we need to specify the knowledge we want to extract, because the knowledge specificity determines what kind of mining algorithm to be chosen. In our investigation, we want to learn in which income class a person should be in real world. That is a categorized problem, therefore we decide to use DT, the one of the basic techniques for data classification, to represent the knowledge that would be mined.

Classification is a form of data analysis, and it can be used to extract models describing important data class or make future predictions. Through this mining experiment, we build a DT in order to get some classification rules and use them to predict what amount of credit line should be given to a new applicant.

We chose an attribute named "class <=50K, >50K" as class target attribute since we want to learn, based on census data, the proper classification of income (income<=$50K/yr or income>$50K/yr) for every person. These two groups can be targeted for special treatments, treatments too costly to apply to the people base as a whole. Based on income level the manager of a company could identify customers who might be attracted to different services the enterprise provides, one they are not currently enjoying, to target them for special offers that promote this service. In today's highly competitive, customer-centered, service-oriented economy, data is the raw material that fuels business growth—if only it can be mined [16].

Our investigation can be used for a demographic and socioeconomic segmentation. Demographic and socioeconomic segmentation is based on a wide range of factors including age, sex, family size, income, education, social class and ethnic origins. So it is helpful in indicating the profile of people who buy a company's products or services [12].

2. Performance tests

2.1. Decision Tree Induction

For the performance tests we use software developed by C. Borgelt [4]. At first, DT was induced on the 32561 test records of the *Adult Database*. *Adult Database* [5] was donated by Ron Kohavi[7] and has 48842 instances (train=32561, test=16281) and 15 attributes: *age*, *workclass*, *fnlwgt*, *education*, *education-num*, *marital-status*, *occupation*, *relationship*, *race*, *sex*, *capital-gain*, *capital-loss*, *hours-per-week*, *native-country*, *class* (target attribute). Missing values are confined to attributes *workclass*, *occupation* and *native-country*. There are 6 duplicates or conflicting instances. For the label ">50K" the probability is 23.93% and for the label '<=50K' it is 76.07%. Extraction was done by Barry Becker from the 1994 Census database. Prediction task is to determine whether a person makes over 50K a year. *Adult Database* was used in many others publications [9].

There has been used 29 attribute selection measures on which the splitting of a node of the DT has to be realized. They are found in the literature, some of them being used in the induction of some very well-known DT. Attribute selection measures [3, 4] used for induction, pruning and execution of DT are: information gain (*infgain*), balanced information gain (*infgbal*), information gain ratio (*infgr*), symmetric information gain ratio 1 (*infsgr1*), symmetric information gain ratio 2 (*infsgr2*), quadratic information gain (*qigain*), balanced quadratic information gain (*qigbal*), quadratic information gain ratio (*qigr*), symmetric quadratic information gain ratio 1 (*qisgr1*), symmetric quadratic information gain ratio 2 (*qisgr2*), Gini index (*gini*), symmetric Gini index (*ginisym*), modified Gini index (*ginimod*), relief measure (*relief*), sum of weighted differences (*wdiff*), χ^2 (*chi2*), normalized χ^2 (*chi2nrm*), weight of evidence (*wevid*), relevance (*relev*), Bayesian-Dirichlet/K2 metric (*bdm*), modified Bayesian-Dirichlet/K2 metric (*bdmod*), reduction of description length - relative frequency (*rdlrel*), reduction of description length - absolute frequency (*rdlabs*), stochastic complexity (*stoco*), specificity gain (*spcgain*), balanced specificity gain (*spcgbal*), specificity gain ratio (*spcgr*), symmetric specificity gain ratio 1 (*spcsgr1*), symmetric specificity gain ratio 2 (*spcsgr2*).

Performances regarding the *size of the file which contains DT* and the *time needed to induce DT* have been noticed. As it can be seen on the Figure 1, excepting 5 attribute selection measures (*rdlrel*, *spcgr*, *rdlabs*, *bdmod*, *bdm*) that needed long periods of time for inducing DT, the other 24 measures had small values at this performance. Related to the file size containing DT, only one measure (*spcgr*) has a very large value in comparison to the other 28 measures.

Figure 1. DT induction and classification error rates on test data with different attribute selection measures
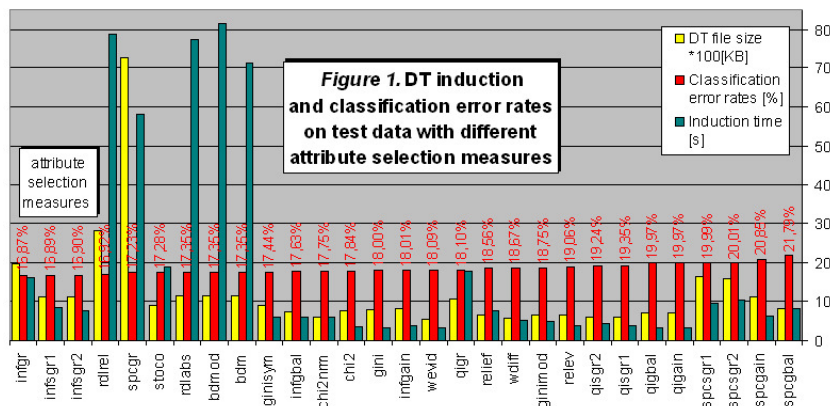
DT induced at this step, has been executed on the 16281 test samples of the *Adult Database*. The most important performance for the classification of the different DT, the *classification accuracy on the test data*, data completely unknown at the training of DT, has been distinguished. This performance is expressed by *classification error rate* on the test data and is represented next to the performance of the f*ile size containing DT* and the amount of *time* of the DT induction in the Figure 1 chart. In this chart, the performances are sorted in the ascending order of the classification error rates values on the test data. It can be noticed that the highest performance for the error rate on the test data is obtained by the *infgr* measure.

Figure 2. Pessimistic prunning DT execution on test data with different attribute selection measures
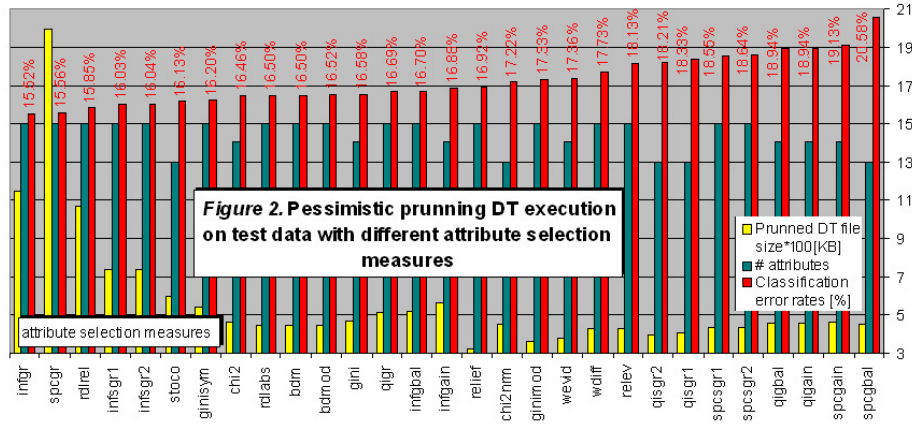
2.2. Decision Tree pruning with pessimistic pruning method

DT induced at the previous step was pruned by using the pessimistic pruning method. The performances that were brought in sight at this pruning were *number of attributes used by DT* and *pruned DT file size*. We can see that a number of 5 measures (*chi2nrm, qisgr1, qisgr2, spcgbal, stoco*) needs only 13 attributes in the construction of pruned DT, a number of 7 measures (*chi2, gini, infgain, qigain, qigbal, spcgain, wevid*) needs 13 attributes in the construction of pruned DT, and the other 17 measures use all the 15 attributes in the construction of pruned DT. DT pruned at this step with pessimistic pruning method, was executed on the 16281 test data of the *Adult Database*. The most important performance for the classification of the different DT, the accuracy of classification on the test data, which are completely unknown at the DT training, is represented along with the performance *number of attributes used by DT* and *pruned DT file size*, in the Figure 2 chart. In this chart, the performances are sorted in ascending order by values of the classification error rates. Correlation coefficient between pruned DT file size and classification error rates, *-0.503*, suggests a negative correlation. The greater the pruned DT file sizes, the smaller the error rate value.

We can notice that the best performance at the classification error rate is obtained by the same *infgr* measure. For pruned DT the accuracy of the classification error rate is better than for unpruned DT.

2.3. Decision Tree pruning with confidence level pruning

DT induced at first step was pruned using confidence level pruning. The performances taken into consideration at this pruning were the *number of attributes used by DT* and *pruned DT files size*. It's noticeable that a (*chi2nrm*) measure needs only 9 attributes to build pruned DT, a (*spcgbal*) measure needs 10 attributes to build pruned DT, a number of 6 measures (*infgbal, qisgr1, spcsgr1, spcsgr2, stoco, wdiff*) needs 12 attributes to build pruned DT, a number of 11 measures (*bdm, bdmod, chi2, gini, qigain, qigbal, qigr, qisgr2, rdlabs, rdlrel, wevid*) needs 13 attributes to build pruned DT, a number of 4 measures (*infgain, relief, spcgain, spcgr*) needs 14 attributes to build pruned DT, and the other 6 measures use all the 15 attributes to build the pruned DT. It is noticeable that the number of the necessary attributes of the pruned DT for the classification has decreased unlike the pessimistic pruning.

Pruned DT at this step with confidence level pruning was executed on the 16281 test samples of the *Adult Database*. The accuracy of the classification on the test data is expressed in the classification error rate and is represented along with the performance of the *number of attributes used by DT* and *pruned DT file size* in the Figure 3 chart. In this chart the performances are sorted in the ascending order of the values of the classification error rates on the test data. We can notice that the best performance of the classification error rate on the test data is obtained by the same *infgr* measure. The accuracy of the classification is better than for the unpruned DT and for the DT pruned with pessimistic pruning method.

Figure 3. Confidence level prunning DT execution on test data with different attribute selection measures
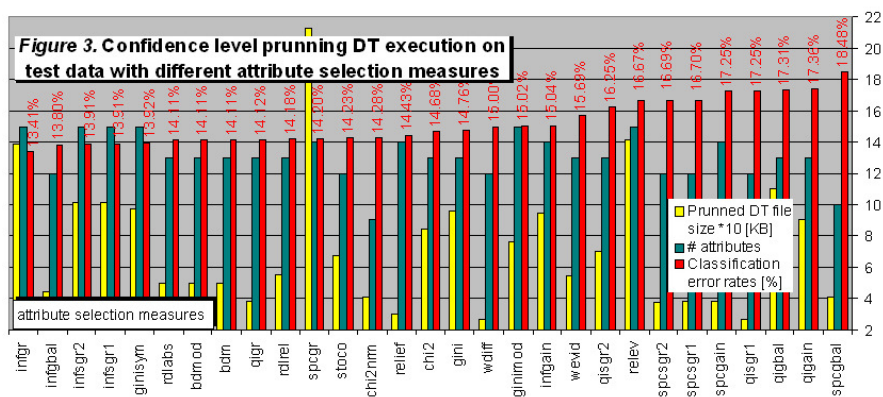
3. Conclusions

From documentation of *Adult Database*[1] we find that the following algorithms, with the classification error rates specified in square brackets: *FSS Naïve Bayes* [14.05%], *NBTree* [14.10%], *C4.5-auto* [14.46%], *IDTM (Decision table)* [14.46%], *HOODG* [14.82%], *C4.5 rules* [14.94%], *OC1* [15.04%], *C4.5* [15.54%], *Voted ID3 (0.6)* [15.64%], *CN2* [16.00%], *Naive-Bayes* [16.12%], *Voted ID3 (0.8)* [16.47%], *T2* [16.84%], *1R* [19.54%], *Nearest-neighbor (3)* [20.35%], *Nearest-neighbor (1)* [21.42%], *Pebls* [Crashed], were run on *Adult* test data, all after removal of unknowns and using the original train/test split. The best performance of classification accuracy on test data is performed by *FSS Naïve Bayes algorithm* with value of 14.05% for classification error rate. Our tests find 5 attributes selection measures that outperform the best performance of the 17 algorithms presented above. Thus, for confidence level pruning DT our tests were showed that *infgr* measure obtain an error rate of 13.41%, *infgbal* an error rate of 13.80%, *infsgr1* and *infsgr2* an error rate of 13.91%, and *ginisym* an error rate of 13.92%.

Our task was to use DM tools, like DT algorithms, to address what facts are and how they affect the income of a person. From the view of business values, this investigation has commercial benefits in real business world today to attract more and more potential and valuable customers, enlarge market shares in the industry, and minimize the risks for the financial companies [13].

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THE RICHARDSON – SHANKS TRANSFORMATION

Băndoi Anca

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor, Str. A.I. Cuza, nr.13, 0745525229,anca_bandoi@yahoo.com

Dănciulescu Daniela

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor

Tomiță Ion

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor

Abstract: The general structure of the paper is the following: *Definition of extrapolation methods; The Richardson transformation, definition and algorithm; The Shanks transformation, representation; The Richardson – Shanks transformation, definition and algorithm.*

Keywords: extrapolation, method, convergence, transformation.

1. Introduction

An important problem is to find or to approximate the limit of an infinite sequence $\{x_n\}$. The elements x_n of this sequence can show up in different forms. To solve this problem we can use an extrapolation method or a convergence acceleration method.

The Aitken Δ^2 – process and the Richardson transformation are the most popular representatives of extrapolation methods.

Let the sequence $\{x_n\}$ be such that :

$x_n = x + a\lambda^n + r_n$, where x, a, λ, r_n are in general complex scalar.

The Aitken Δ^2 – process applied to $\{x_n\}$ produces the sequence $\{X_n\}$:

$$X_n = \frac{x_n x_{n+2} - x^2_{n+1}}{x_n - 2x_{n+1} + x_{n+2}} \quad (1)$$

Definition: Let the sequence $\{x_n\}$ and the sequence generated by applying the extrapolation method $\{X_n\}$.

we assume that $\lim_{n\to\infty} \frac{|X_n - x|}{|x_{\zeta_n} - x|} = 0$.

We say that the extrapolation method accelerates the convergence of $\{x_n\}$. The number $\frac{|X_n - x|}{|x_{\zeta_n} - x|}$ is called

the acceleration factor of $\{X_n\}$.

Remark: A good extrapolation method is one with a factor of acceleration that goes to 0.

An important subject regarding extrapolation methods is to analyze the convergence and the stability of the method. The first step to solve the problem of convergence is to find the conditions that need to be impose to the sequence. Another step is to analyze the errors $(X_n - x)$ that arise from the algorithm considering those preliminaries conditions.

When we compute the sequence $\{X_n\}$ in finite precision arithmetic we obtain a sequence $\{X'_n\}$ that is different from $\{X_n\}$, the exact transformed sequence. This is caused by errors in x_n. The stability problem is to determinate how much $\{X'_n\}$ differs from $\{X_n\}$, so we want to estimate $|X'_n - X_n|$.

It is proved that the cumulative error $|X'_n - x|$ is at least of the order of the corresponding theoretical error $|X_n - x|$.

When we apply an extrapolation method to a convergent sequence, numerically, we must be able to compute the sequence $\{X_n\}$ without $|X'_n - X_n|$ becoming unbounded for increasing n. It is very important the development of an efficient algorithm for implementing extrapolation methods. We must try to use a small number of arithmetic operations.

2. The Richardson transformation

In some problems, the sequence $\{x_n\}$ is related to a function f(y) that we know. So we have the next relation: $x_n = f(y_n)$, for n=0,1,...

The sequence assumes that if $\lim_{n\to\infty} x_n = x$ then:

$$f(y) = x + \sum_{k=1}^{s} \alpha_k y^{\sigma_k} + O(y^{\sigma_{k+1}}) \,(2)$$

where $\sigma_k \neq 0, k = 1,2,...,s+1$.

The idea of Richardson extrapolation method is to eliminate y^{σ_k} from the relation above and to obtain a new, a better approximation of x. We have the following equivalent relation:

$$f(y) \approx x + \sum_{k=1}^{s} \alpha_k y^{\sigma_k} \quad (3)$$

An algorithm for this problem can be:

- Set $f_0^{(j)} = f(y_j)$, $j = 0,1,2,...$

- Set $c = \omega^{\sigma_n}$ and then compute $f_n^{(j)} = \dfrac{f_{n-1}^{(j+1)} - c_n f_{n-1}^{(j)}}{1 - c_n}$, j=0, 1, ..., n=1, 2, ...

The theorems from below prove the convergence of the Richardson transformation.

Theorem: Let the function $f(y) = x + \sum_{k=1}^{s} \alpha_k y^{\sigma_k} + O(y^{\sigma_{k+1}})$.(4)

In case the integer s is finite and largest possible, for $n \geq s + 1$ we have the relation:

$$f_n^{(j)} - x = O(y_j^{\sigma_{s+1}}) \text{ when } j \to \infty. \,(5)$$

In case we have s=1,2,3,..., we have the relation:

$$f_n^{(j)} - x \approx \sum_{k=n+1}^{\infty} U_n(c_k) \alpha_k y_j^{\sigma_k} \text{ when } j \to \infty .(6)$$

Theorem: Let the function $f(y) = x + \sum_{k=1}^{s} \alpha_k y^{\sigma_k} + O(y^{\sigma_{k+1}}) \,(7)$.

In case s is finite and largest possible then we have:

$$f_n^{(j)} - x = O(\omega^{\sigma_{s+1} n}) \text{ when } n \to \infty .(8)$$

In case we have s=1,2,3,..., j fixed we have the relation:

$$f_n^{(j)} - x = O(\omega^{\mu n}) \text{ when } n \to \infty .(9)$$

A particular case of the Richardson transformation is the polynomial Richardson extrapolation. We have the polynomial function f, and the constants t_k.

Using Aitken formula we obtain a new polynomial function:

$$P_{k+1}^{(n)}(y) = \frac{P_k^{(n+1)}(y)(y - t_n) - P_k^{(n)}(y)(y - t_{n+k+1})}{t_{n+k+1} - t_n} \,(10)$$

Let $R_k^{(n)} = P_k^{(n)}(0)$. We have the relation:

$$R_{k+1}^{(n)} = \frac{t_n R_k^{(n+1)} - t_{n+k+1} R_k^{(n)}}{t_n - t_{+k+1n}} \quad (11)$$

and $R_0^{(n)} = f(t_n)$.

We have the following theorem: Theorem: If we have a polynomial function f and the constants t_k then: $\lim\limits_{n \to \infty} R_k^{(n)} = \lim\limits_{n \to \infty} f(t_n)$, $\forall k$, $\lim\limits_{k \to \infty} R_k^{(n)} = \lim\limits_{p \to \infty} f(t_p)$, $\forall n$

Theorem: Let a polynomial function f, a sequence of constants $\{t_n\}$,

$$\lim\limits_{n \to \infty} t_n = 0, \quad \frac{t_p}{t_{p=1}} \geq a, \forall p, a \geq 1 . (12)$$

The sequence $\left(R_{k+1}^{(n)}\right)_n$ converges to $x = \lim\limits_{n \to \infty} f(t_n)$ faster then the sequence $\left(R_k^{(n)}\right)_n$ if and only if

$$\lim\limits_{n \to \infty} \frac{R_k^{(n+1)} - x}{R_k^{(n)} - x} = \lim\limits_{n \to \infty} \frac{t_{n+k+1}}{t_n} .$$

3. The Shanks transformation

The Shanks transformation is a very effective extrapolation method. It is an extrapolation method that we apply to the sequence $\{x_n\}$ to obtain the sequence $\{X_n=e_k(x_n)\}$ where $e_k(x_n)$ has the form of a ratio of two determinants:

$$e_k(x_n) = \frac{\begin{vmatrix} x_n & x_{n+1} & \cdots & x_{n+k} \\ \Delta x_n & \Delta x_{n+1} & \cdots & \Delta x_{n+k} \\ \vdots & \vdots & \vdots & \vdots \\ \Delta x_{n+k-1} & \Delta x_{n+k} & \cdots & \Delta x_{n+2k-1} \end{vmatrix}}{\begin{vmatrix} 1 & 1 & \cdots & 1 \\ \Delta x_n & \Delta x_{n+1} & \cdots & \Delta x_{n+k} \\ \vdots & \vdots & \vdots & \vdots \\ \Delta x_{n+k-1} & \Delta x_{n+k} & \cdots & \Delta x_{n+2k-1} \end{vmatrix}} \quad (13)$$

where $\Delta x_n = x_{n+1} - x_n$.

Remark: k is the order of the Shanks transformation.

This form is obtained by solving with Cramer method the next nonlinear system:

$$x_r = e_k(x_n) + \sum_{i=1}^{k} \beta_i \Delta_{r+i-1} , \quad n < r \leq n+k . (14)$$

To use in an algorithm that calculate $e_k(x_n)$ the form above is very difficult. The ε - algorithm of Wynn is very efficient as it produces all of $e_k(x_n)$:

$$\varepsilon_{-1}^{(n)} = 0, n = 0,1,\cdots; \quad \varepsilon_0^{(n)} = x_n, n = 0,1,\cdots; \quad \varepsilon_{k+1}^{(n)} = \varepsilon_{k-1}^{(n+1)} + \frac{1}{\varepsilon_k^{(n+1)} - \varepsilon_k^{(n)}}, n, k = 0,1,\cdots$$

We have the following relations:

$$e_k(x_n) = \varepsilon_{2k}^{(n)}, n, k = 0,1,\cdots; \quad \varepsilon_{2k+1}^{(n)} = \frac{1}{e_k(\Delta x_n)} \quad (15)$$

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4. The Richardson – Shanks transformation

Let say we have the following sequence $\{x_n\}$ to witch we associate the relation:

$$x_n \approx x + \sum_{k=1}^{\infty} \alpha_k \lambda_k^n, \ where \ n \to \infty. \ (16)$$

We assume that λ_k are known, λ_k are distinct for all k, $\lim_{k \to \infty} \lambda_k = 0$.

The first step in this extrapolation method is to eliminate λ_k from the relation from above., to obtain a new sequence $\{X_n\}$. We do this using the Richardson extrapolation method.

$$a_{-1}^{(n)} = 0, n = 0,1,\cdots ; a_0^{(n)} = x_n, n = 0,1,\cdots$$

$$a_p^{(n)} = \frac{a_{p-1}^{(n+1)} - \lambda_p a_{p-1}^{(n)}}{1 - \lambda_p}, n = 0,1,\cdots, p = 1,2,\cdots, s \ (17)$$

$$X_n = a_s^{(n)}, n = 0,1,\cdots$$

We obtain the following relations:

$$X_n \approx x + \sum_{k=s+1}^{\infty} \tilde{\alpha}_k \lambda_k^n, \ n \to \infty \ (18)$$

where $\tilde{\alpha}_k = \alpha_k \prod_{i=1}^{s} \frac{\lambda_k - \lambda_i}{1 - \lambda_i}$.

The second step of this extrapolation method is to apply the Shanks transformation to $\{X_n\}$. We denote the resulting approximations $\varepsilon_{2n}^{(j)}$ by $\tilde{\varepsilon}_{2n}^{(j)} (\{X_k\})$.

An interesting application for the Richardson – Shanks transformation is to problems in which a sequence $\{x_n\}$ satisfies:

$$x_n \approx x + \sum_{k=1}^{s} \beta_k \mu_k^n + \sum_{k=1}^{\infty} \delta_k v_k^n, \ where \ n \to \infty \ (19).$$

We want to calculate: $X_n = x + \sum_{k=1}^{s} \beta_k \mu_k^n$

First, we apply the Richardson – Shanks transformation to this sequence with the sequence $\{x_n\}$ and $\lambda_k = \mu_k$, k=1,2,..., s. The approximation of x is $\tilde{\varepsilon}_{2n}^{(j)} (\{X_k\})$.

So, we have the sequence:

$$X_n \approx X + x\left(\frac{1}{\mu_r}\right)^n + \sum_{\substack{k=1 \\ k \neq r}}^{s} \beta_k \left(\frac{\mu_k}{\mu_r}\right)^n + \sum_{k=1}^{\infty} \delta_k \left(\frac{v_k}{\mu_r}\right)^n, \ n \to \infty \ (20).$$

Next, we apply the Richardson – Shanks transformation to the sequence $\{X_n\}$ with $\lambda_k = \frac{\mu_k}{\mu_r}$ for

$1 \le k \le s, k \neq r$, and $\lambda_r = \frac{1}{\mu_r}$ and we obtain the approximations

$$\tilde{\mathcal{E}}_{2n}^{(j)} (\{ x_k \mu_r^{-k} \}) \quad .(21)$$

After we approximate x and β_r, we form the sequence:

$$\tilde{X}_n^{(j)}(m) = \tilde{\mathcal{E}}_{2n}^{(j)} (\{x_k\}) + s\sum_{r=1} \tilde{\mathcal{E}}_{2n}^{(j)} (\{x_k \mu_r^{-k}\}) \mu_r^m \quad (22),$$

which approximate X_n.

Sequence of this type arises when we want to solve numerically time-dependent problems with solutions that are periodic in time. This may be the result of the periodicity built directly into the equations associated to the problem. This can also result from the boundary conditions that are periodic in time.

In some problems, we can have only a part of the sequence $\{x_n\}$, and we want to approximate this sequence. This is possible if we apply the Richardson – Shanks transformation to the sequence $\{X'_k\}_{k=0}^{\infty}$, where $B'_k = B_{j+k}$, k=0,1,2,....

Example: We consider the linear system of differential equations:

$$y'(t) = Cy(t) + f(t), \ t>0; \ y(0)=y_0 \ (23),$$

where C is a constant matrix, the function f is periodic.

Because we have:

$$y(t) = e^{Ct} y_0 + \int_0^1 e^{C(t-s)} f(s)ds \ (24)$$

we can prove that $y(t) = y^{trans}(t) + y^{steady}(t)$ where $y^{trans}(t)$ is transient and has the limit 0, and $y^{steady}(t)$ is periodic and has the same period as the function f.

Using other formulas we obtain the relation:

$$y_m = \sum_{k=-L}^{L} b_k (\omega^k)^m + \sum_{k=1}^{q} d_k v_k^m \ (25)$$

Now we can apply the Richardson – Shanks transformation to the sequence y_m.

5. Open problems and future works

From this article the following problems arise:

- How to implement an algorithm for same applications. If we consider a class of problems then we can implant a good algorithm, but if we get another problem that isn't in that class we can't use the same program.

This is a very important problem: how to create an algorithm and how to implement it so that we can use it to solve different classes of problems.

For example if we want to solve a system of differential equations, we must implement the same algorithm in different ways considering the form of the system and the initial conditions.

- Another problem is to improve the algorithm for the Richardson – Shanks transformation so that we can use it in the same form for different classes of problems.
  An algorithm for the Richardson – Shanks transformation can be this:

1. transform the problem so that we obtain a sequence like this:

$$x_n \approx x + \sum_{k=1}^{\infty} \alpha_k \lambda_k^n, \ where \ n \to \infty. \ (26)$$

2. apply the Richardson transformation to this sequence;
3. apply the Shank transformation to the sequence that result from the second step;
4. extract the solution of the problem.

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There are a lot of problems when we must transform the problems in order to obtain a sequence to which we can apply first the Richardson transformation. If this problem is solved then the rest is easy.

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EXPERIMENTAL SYSTEM FOR E-ADMINISTRATION

Bănică Logica

University of Pitesti, Piteşti, str. Tg. din Vale, nr.1, tel.: 0248-218804, e-mail: olga_banica@yahoo.com

Roşca Doina

University of Craiova, Craiova, str. A. I. Cuza, nr. 13, tel.:0721632019, e-mail: rosca2na@yahoo.com

Abstract

Today's IT community is increasingly offering new services at the Application Level of the referential TCP/IP model. Many of those services are based on electronic data interchange (EDI) that allows customers to generate, manipulate and access electronic documents.

This paper brings new ideas and new elements related to this topic, presenting a complex system for e-administration, based on the syntax and semantic rules of processing and transmission of electronic documents, EDIFACT.

The experimental system SEDAC is a proposal for a complete integration of document interchange between companies, private citizens and public administration in a unique portal of information.

Keywords: Electronic Data Interchange, EDIFACT, client/server technology, electronic document

1. INTRODUCTION

The goal of Electronic Data Interchange (EDI) is to deliver unambiguous and durable business transactions, financial transactions and administration reports via electronic means. More than that, its purpose is to establish a standard for commercial electronic data interchange that is open and accessible to all.

This article presents the architecture of an experimental model for public administration realized in EDIFACT alternative.

The unique portal for administration must be applied in respect of three main principles:

- *automated* data interchange between the companies and administration requires adopting a law that will allow defining formality and introduction into practice of an electronic document;
- *formatting/un-formatting* of messages according to the UN/EDIFACT international recommendations;
- *establishing* the access protocols to the public receiver servers for electronic documents.

United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport (*UN/EDIFACT*) comprise a set of internationally agreed standards, directories and guidelines for the electronic transfer of structured data between independent, computerized information systems [1]. The International Standard EDIFACT specifies the syntax rules dictionaries to be used in electronic data interchange between partners involved in commerce, transport, export and import activities. The latest version of UN/EDIFACT directories is D.06B, available for download from the UNECE (United Nations Economic Commission for Europe) Web server.

Building applications based on the electronic data interchange is an essential tool to interface multiple user applications through EDIFACT in transmission networks. This will change completely the way to conceive documents and transmit information between partners, this time the relation being done at the computer application layer.

The experimental system *SEDAC – System for Electronic DAta interChange* is the alternative conceived for public administration and the business environment system, according to the requests formulated previously.

2. THE ARCHITECURE OF THE EXPERIMENTAL MODEL

The experimental model respects the client/server technology and consists of two main elements [2][3]: *Client-application* and *Server-application.*

A. The **client-application** has the following components:

a. The user application interface that supplies the primary information (at the Transmitter) or processes the received information (at the Receiver);

b. Formatting/Un-formatting the messages according to the EDIFACT standard;

c. Encrypting/Decrypting the messages related to the security of the communication through the Internet;

d. Transmission/Reception of the messages through the Internet Network to/from a Server to which are connected both the transmitter and the receiver.

The client-application is designed to function *identically for each company-partner of the electronic data interchange,* therefore, the control of dataflow will be allowed in both ways [4]. Also, it is designed *to transfer electronic documents* to public administration, Figure 1.
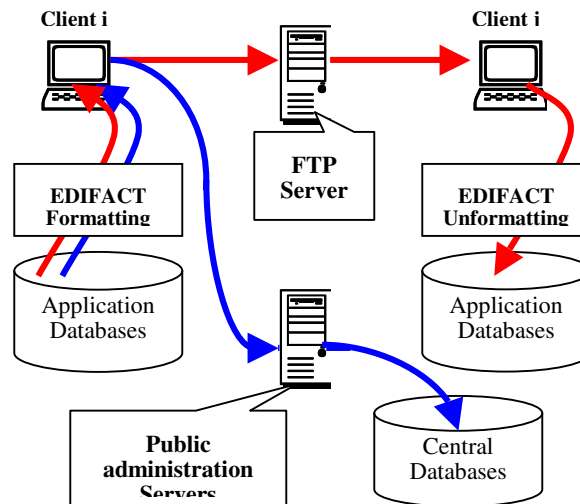
Figure 1. The client-application structure

According to these functions, the application will contain seven functional modules [5][6]:

1. *Update* – maintaining the EDIFACT database, according to the final versions of EDIFACT dictionaries;

2. *Consulting* – description and information about the hierarchical structure of the EDIFACT message;

3. *Branching Diagram* – graphical representation of a message structure;

4. *Formatting* – creating the standard message by using the agency database and according to the EDIFACT syntax rules;

5. *Un-formatting* – extracting and interpreting the information from encrypted files, transmitted through Internet;

6. *Security* – integrity and security of the message through Internet, by encryption;

7. *Communication* **–** transmission and reception of the structured data in the electronic form through Internet.

Client-application is an object oriented Windows based software application. The graphical user interface (GUI) and the *Formatting*, *Un-formatting, Update, Consulting* modules are developed in Visual Basic environment. To accomplish Branching Diagram, Security and Communication modules, we used C++ Builder. The EDI station works with Access databases and use the facility of Visual Basic to interrogate and manipulate them.

B. Server-application - between the emitter-partners, that can be companies or persons and the receiver-partner, which is the public administration, is recommended the development of a client/server technology that can solve problem of the the concurrencies request and can raise the dissociation between the application and database[2].

The connection of the client to the database server must be made after its authentication, based on name and password. The server-application analyzes the information and the connection is accepted or denied.

Because of the complexity of the system proposed in this paper, the client application doesn't connect directly at the server, for several reasons:

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- the existence of simultaneous and concurrent requests that establish priorities for their treatments in serial order by a reception queue;
- the access right follows some particular and complex rules with the purpose of direct description in the server application;
- between client and server the communication is made through the network that has a certain speed and whose performances decreases conditioned by intense exchange of information with database.

Therefore, it is necessary to introduce two server systems, on the same computer or different computers: **Receive Message Server** and **Insert Server**.

The experimental model for receiving and processing electronic documents in public administration consists of three servers in linear connection, as in Figure 2.

The <u>Receive-Message Server</u> is an Internet server, for concurrent accesses of all companies that want to transfer electronic documents. Its functions are:

- *receiving* documents and archive them in a receiver queue, that will be processed by the Insert Server;
- *establishing* a unique company identifier, that will be archived and transmitted to the client; this identifier will be the proof of accomplishing the administrative formalities by the company.

The <u>Insert Server</u> represents the interface between the Receive-Message Server, and the central database. The <u>Database Server</u> is an Oracle server because we consider that is the most performing relational and advanced security model for the moment.

The Web site is used mainly for publishing the information about EDIFACT standard, the structure and the formatting mode of the documents, as well as the changes and the developments of the standard dictionaries or the data processing system.
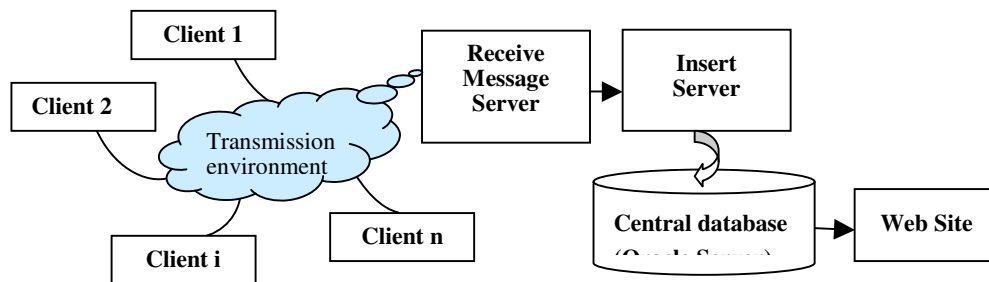
Figure 2 The structure of the experimental system

The second purpose of the site is to give the right information about the electronic documents that the companies have sent to the public administration. In the new advanced version the companies will be able to consult on-line a journal for received and archived documents at the public administration, their transmission date and the period referred.

Using a replication process (Figure 3) monitored by a clock synchronization protocol [7], the system copies some information on the other servers of public administration: National House of Pensions and Other Social Insurance Rights, National House of Health or the Chamber of Commerce and Industry for public access.

The copies can't be modified; they will be read only and used for specific reports.
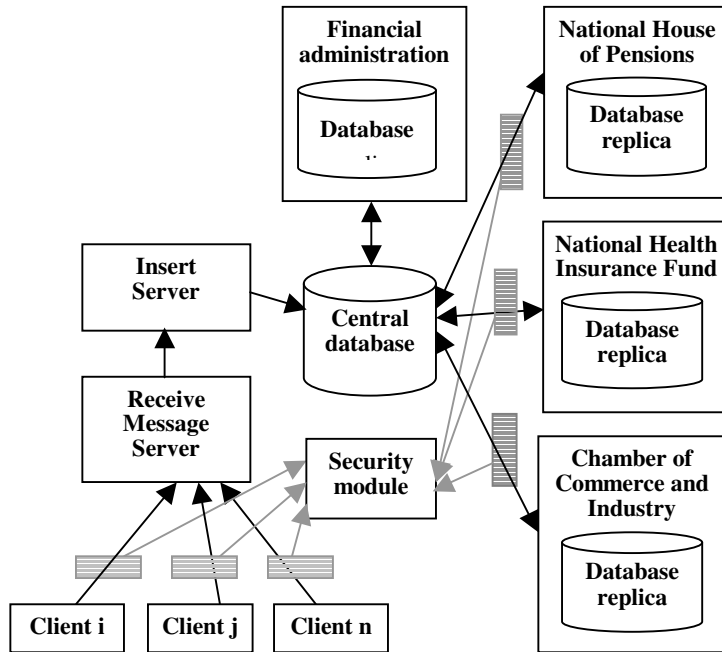
Figure 3 The central database replica

Here are few of the most important advantages of the replication process:

− the applications at each level of public administration use local information without restrictions; they use a small, specific volume of data;
− the information is available even the connection with the central server doesn't work;
− the response time at the queries is fast.

3. THE RECEIVE-MESSAGES SERVER

The communication module of the SEDAC system has two main components:

− FTP Send Daemon - client application, existing at the company or person that transmits the electronic document;
− FTP Receive Daemon - server application that receives the document.

FTP Send Daemon contains FTP client components for the binary files transfer, in asynchronous mode. The user must indicate the communication parameters: *the address* of the communication server (*Host* field), *the access* parameters to the host (*User* and *Password* fields), *the destination folder* of the communication server (*Destination* field), *the local folder* from taking the documents (*Source* field) and *the mask* for the transmitted files (*Files* field). These parameters will be stored in *Registry*, so will not be necessary to introduce them each time when the software is open. At the receiver, the documents will be archived in a special folder.

The Receive-Messages Server can be implemented on a single computer or distributed.
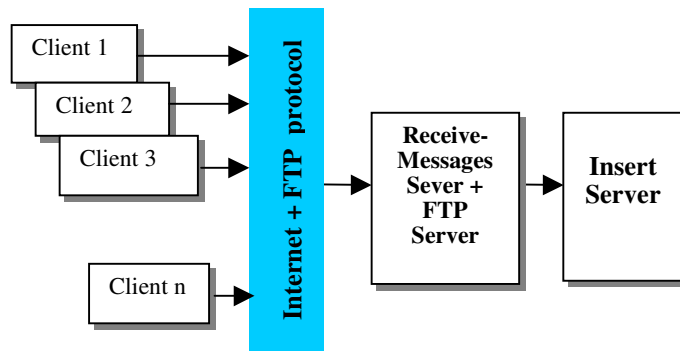
Figure 4 Concentrated Receive Messages Server

This version of the experimental system is based on the first solution: receiving all the electronic documents in the same folder and processing them in a sequential mode. That solution supposes that each company has a unique name for a correct identification.

In this case the logical structure of central database is the following:

a. Companies and usual persons: generally information introduced at the client registration and modified when is necessary, a list of the documents for the public administration;

b. Documents: the type of documents and their database location, received documents in EDIFACT format; users (public administration segments) that have access to the documents and their authentication, the electronic documents general structure, received documents journal for searching and reporting.

c. Information replica: replication schedule (objects, frequency, period, destination), replication journals (history about previous operations);

d. Data control: security information (users, passwords, rights), errors backlog (user, error date, error type).

4. CONCLUSIONS

A software system for electronic data interchange in the public administration is an imperious request of any modern state advocate to the electronic commerce. The international standard EDIFACT specifies syntax rules and the dictionaries to be used in electronic data interchange between partners involved in commerce activities.

The experimental system SEDAC is our proposal for the electronic data interchange in public administration, conforms to the rules specified in EDIFACT standard, with creation of the encrypted message-files, transmissible over the Internet and functions for extracting data and interpreting them according the EDIFACT rules into an Oracle central database.

Based on what was presented here, the development of an EDI system leads to the following *conclusions*:

- There is a lot of interest for the electronic document transfer especially from business community and government agencies;
- The future and increasing usage of electronic document transmission depends mainly of the evolution and security of computer networks;
- EDIFACT documents are generated off-line therefore it requires less Internet communication;
- EDIFACT rules in formatting a document results in an small dimension ASCII file that contains a lot more real user data than control information;
- The Working Group EDIFACT was able to standardize a high number of documents offering a unified form system all over the world;
- User data goes from the transmitter's database in the receiver's (public administration) central database and they are available for public access.

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ANALYSIS OF THE DYNAMICS AND THE FACTORS OF INFLUENCE ROMANIA'S EXTERNAL ECONOMIC RELATIONS

Begu Liviu-Stelian

Academy of Economic Studies, 0724204189 liviubegu@yahoo.co.uk

The paper is about evolution of the main economic indicators for external relations for Romania in 1996-2004. The paper is based on balance of payments and the major economic aggregates. The results shows us that the Romanian economy is not yet in order but some indicators are very good for a market economy.

Key words: Balance of Payment, Current Account

The analysis of the evolution of Romania's latest external economic relations has the purpose of completing the image of the economic state, as well as drawing a possible trajectory of hers.

The study emphasizes the main transactions with the exterior, which are pointed out in the country's balance of payments.

First of all, we can determine the weight of every post in the total returns (PX) and the weight of every post in the total payments (PM) [1], according to the next relations:

$$PX = \frac{x_j}{X} \cdot 100 \quad ; \quad PM = \frac{m_j}{M} \cdot 100. \text{ [1]}$$

The weight of payments/ returns in the total of the current account

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
Goods and services (PX)	92,7	91,4	89,2	91,2	89,6	87,7	88,1	89,0	85,5
Incomes (PX)	0,8	1,9	2,5	1,4	2,4	3,0	2,2	1,6	1,3
Current transfers (PX)	6,5	6,7	8,3	7,4	8,0	9,3	9,7	9,4	13,2
Goods and services (PM)	96,4	94,8	93,8	93,9	94,4	94,3	94,2	94,7	89,4
Incomes (PM)	3,0	4,0	5,2	4,6	4,1	4,2	4,3	4,0	9,3
Current transferes (PM)	0,6	1,2	1,0	1,5	1,5	1,5	1,3	1,3	1,3

The table shows that the post "goods and services" has the biggest weight in the current account, every year. This post represents the accomplished exports and imports that, thus the commercial balance.

We can notice the bigger weight that the payments index has as opposed to the returns index, which shows the negative balance account of the commercial balance and implicitly of the current account.

Another index is *the contribution of a post to the general unbalance (D_j),* which is calculated according to relation (the index can be used when both substractions have the same sign):

$$D_j = \frac{x_j - m_j}{X - M} \cdot 100 = \frac{s_j}{S} \cdot 100. \text{ [2]}$$

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The balance account of the current account's posts in the total current account

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
Goods and services Incomes	111	112	110	114	142	137	169	135	108
	12	15	14	27	20	12	30	21	49

In this case, the index for the "goods and services" post is bigger than 100%, which means that this unbalance is partially counteracted by that of the transfers that has a sign counter to the balance account of the current account and has not been calculated.

By reporting the current account to the gross domestic product (GDP) we obtain another important index used for estimating the economic situation, after a time, ***the weight of the balance account of the current account in the gross domestic product (PSCC) :***

$$PSCC = \frac{X^{CC} - M^{CC}}{PIB} \cdot 100 . \text{ [3]}$$

The weight of the balance account of the current account in the GDP

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
The balance account of the current account in the GDP	-7,3	-6,0	-7,0	-4,7	-5,2	-5,7	-3,5	-5,1	-8,6

We can notice that, outwards the year 1999, every year the index surpasses the -5% threshold, which can be a communication cord for the governmental decision-making factors. Anyway, there is a good side, in the sense that the index has known, in an absolute value, a decrease over the whole period.

If instead of the substraction in the index above we totalized the accomplished exports and imports, we would obtain ***the relative significance of international trade in goods and services (GDE)*** of a country, or the international "ventilation" of the gross domestic product of that country:

$$GDE = \frac{X + M}{PIB} \cdot 100 \text{ [4]}$$

The relative significance of international trade in goods and services

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
The relative significance of international trade in goods and services	52,7	53,4	52,9	60,1	71,0	64,0	80,9	71,0	83,5

In regards to the evolution of this index, we can estimate that it is a positive one for the country, keeping in mind that the index shows the way in which foreign trade takes part in the accomplishment of the gross domestic product. The increase is significant in 2002, although we must not forget that the imports have had a more rapid evolution rather than the exports, which reduces the favorable signification of the index's evolution. Also, the index shows that the destination for consumption of the gross domestic product has decreased internally.

The relative significance of international trade in total transactions (MRS) that are put down in the balance's "j" post, is another index that shows the importance of the balance account.

$$MRS_j = \frac{x_j - m_j}{x_j + m_j} \cdot 100 . \text{ [5]}$$

The relative significance of international trade in total transactions

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
Goods and services	-12,9	-10,7	-14,7	-7,8	-7,4	-10,6	-7,4	-9,6	-11,2
Incomes	-66,2	-44,1	-45,6	-57,5	-30,5	-23,6	-35,9	-48,8	-79,4

The results show that the imports remain unpaid through exports.

The balance's analysis through balance accounts can be accomplished only if the sign of the balance account remains the same. This shortcoming can be eliminated by comparing, in the likeliness of a ratio between payments (debts) and returns (book debts), resulting *the percentage coverage of payments by incomes (GA).*

At the level of post or account, the formula is:

$$GA_j = \frac{x_j}{m_j} \cdot 100 \text{ [6]}$$

At the level of the whole balance of payments:

$$GA = \frac{X}{M} \cdot 100 \text{ [7]}$$

The evolution in dynamics of the ratio between returns and payments is calculated with the help of *the index of the percentage coverage of payments by incomes (IGA).*

$$IGA = \frac{GA_1}{GA_0} = \frac{X_1}{M_1} : \frac{X_0}{M_0} = \frac{X_1}{M_1} \cdot \frac{M_0}{X_0} = \frac{X_1}{X_0} : \frac{M_1}{M_0} = \frac{I_{1/0}^X}{I_{1/0}^M} . \text{ [8]}$$

From the calculations have resulted the next values of the percentage coverage of payments by incomes for the posts "goods and services" and "incomes":

The percentage coverage of payments by incomes

Index (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004
The percentage coverage of payments by incomes									
- goods and services	77,2	80,6	74,4	85,3	86,2	80,8	86,2	82,4	79,8
- incomes	20,4	38,8	37,3	26,9	53,2	61,7	47,1	34,4	11,5

The results shows us that the Romanian economy is not yet in order but some indicators are very good for a market economy. Also, the external economic relations of Romania could be better but there are private aspects in economy and this stop the external relations for the moment.

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SELECTED INDICATORS OF COMPARATIVE ADVANTAGE. CASE STUDY: ROMANIA AND EU-25

Boboilă Cristea

Mathematics and Informatics Department, University of Craiova, Romania, E-mail: cristea.boboila@gmail.com

Abstract. In this paper, I will look at the changes in foreign trade in the last years. I will extract my examples from Romania's experience. Romania experienced major difficulties in her move towards/ transition to a free market economy.

Romania was trying to gain access to the Western European and global markets and the competitiveness within the European market is increasing. Already in 2007, two Eastern European countries, Bulgaria and Romania, have joined EU-25.

I will use revealed comparative advantage indicators and data sets from 2002-2005 to search for Romanian comparative advantages. I will place the analysis in its context and I will conclude by laying out the perspectives of Romania after EU-25 integration.

Keyword: foreign trade, exports, imports, comparative advantage/disadvantage

1. Introduction

Today more and more states in Central and Eastern Europe want to be part of the European Union. After the fall of communist regimes in the late 1980s, dramatic changes took place in the Eastern economies. The first steps towards a market economy resulted in major drops/falls in production. This triggered substantial rises in unemployment and escalating inflation. Foreign trade was also paralyzed; both exports and imports shrank, due to the elimination of the former common market (Fischer et al, 1996). Considerable reorientation took place in Eastern European foreign trade. Furthermore, they are in the process of joining the EU. Already in 2007, two Eastern European countries, Bulgaria and Romania, have joined EU-25.

Romanian exports and imports went down/fell because Romanian factories did not adapt fast enough to market competition. The country gained comparative advantages in textiles in late 1990s. Currency depreciation, normally a stimulant for exports, did not have this effect in Romania, since it was not accompanied by efficient inflation control. Only in the last years has some economic growth occurred (Frankel et al, 1999). Romania can serve, thus, as a model for the difficulties Eastern European countries have faced in the move towards a free market.

2. The revealed comparative advantages (RCA)

The determination of the comparative **advantages** of the foreign trade of Romania constitutes a complex and important domain of research imposed by the need for efficient integration of the country into larger structures, by the profound and evolving impact of globalization, and by the consolidation of basic strategies for developing the national economy, both in the near future and in the long run (Zaman et al, 2001).

For any given moment, within the export and import production structures, the comparative advantages reflect the activities and domains in which a country, as a consequence of specialization with respect to the global economy, is relatively efficient in its foreign trade relations. Even if the analysis of comparative advantages or disadvantage reveals certain unfavorable situations, the determination of these allows the initiation of a counteractive mechanism through a series of changes, which may lead to the identification of certain competitive advantages. Furthermore, as a consequence of being able to predict of the influence of factors during various time periods, measures, actions, and programs designed to raise the efficiency of foreign trade can be implemented.

I will carry out the analysis of Romanian trade by using several methods to assess its competitiveness. The comparative advantage is a measure of efficiency in the exchange of goods and services. At present, studies are being carried out in this field in Romania, with the hope of optimizing trade, free market transition, and European integration. Furthermore, it is useful to know areas in which comparative disadvantages exist, and to decrease their export shares. I will use indicators for quantification of revealed comparative advantages (RCA) and Romanian export and import data from 2003, 2004 and 2005. In this period the Romanian economy was reaching the end of transition (Svejnar, 1991).

Imports and exports: indicator of the global comparative advantage:

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$$RCA_i = \frac{DX_i}{DM_i} = \frac{\dfrac{X_i^j / X^j}{X_i^T / X^T}}{\dfrac{M_i^j / M^j}{M_i^T / M^T}} \qquad (1)$$

Where: DX_i / DM_i - Exports/Imports dependence formula;

X_i^j / M_i^j - Exports of i products of j country;

X^j / M^j - Total exports of j country;

X_i^T / M_i^T - Global exports of i product;

X^T / M^T - Total global exports.

The date in Table 1 (expressed in millions of US dollars) calculates the RCA for certain Romanian products.

Table 1 RCA for certain Romanian products, 2004-2005

	2004					2005				
	EU-25		Romania		RCA	EU-25		Romania		RCA
	Exports	Imports	Exports	Imports		Exports	Imports	Exports	Imports	
Food, drink & tobacco	48550	57884	729	2060	0.55	51286	59393	758	2434	0.48
Raw materials	19191	46195	5314	7107	2.37	21861	49923	7144	9856	2.19
Chemicals	151420	86683	956	2584	0.28	163390	93843	1234	3021	0.31
Machinery & transport Equipment	437791	353886	4122	7750	0.57	479023	375720	4887	9461	0.54
Other manufactured Articles	237405	261535	5238	4112	1.85	253088	283249	5231	4132	2.92
Total (including other products)	1024741	1083935	23485	32664		1071981	1181335	27730	40463	

Source: author's calculations based on data from the Economist Intelligence Unit (www)

The data in Fig.1 shows that "raw materials" (2.37 in 2004 and 2.19 in 2005) and "other manufactured articles" (1.85 in 2004 and 2.92 in 2005) have an ongoing comparative advantage during the analyzed years. For other products, the comparative advantage is not significant, as the RCA has values between 0.28 and 0.57.
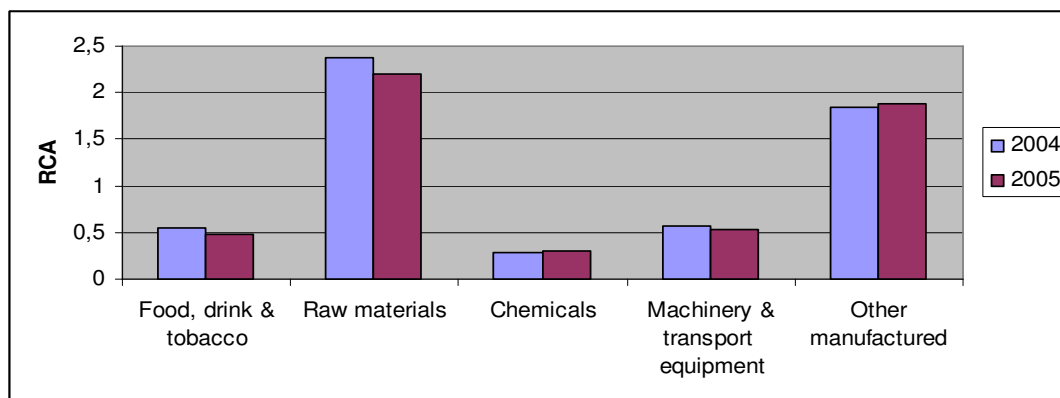
Fig. 1 RCA for certain products, 2004-2005

3. The PSIIC indicator

The PSIIC indicator (Prospective Studies and International Information Center) compares the real trade balance with the theoretical balance in the hypothetical situation of no comparative advantages/disadvantages for any country. The global deficit or surplus is divided between the countries according to their shares in foreign trade.

The PSIIC indicator is expressed in thousandths of the GDP, for the parity of buying power, and it compares the real trade balances with their theoretical values. The latter is determined by disregarding the comparative advantages or disadvantages of each country, and by redistributing the global surplus or deficit among the different countries according to their respective shares in foreign exchanges (Rosu-Hamzescu et al, 2003).

The PSIIC indicator has the following formula:

$$AD_i = \frac{1}{GDP}\left(RB_i - TB_i\right)\cdot 1000 \qquad (2)$$

Where: AD_i = comparative advantage/disadvantage in trade relations with country j;

RB_i = real trade balance for country j;

TB_i = theoretical trade balance for country j, i.e. the magnitude and sign of the trade balance for country j if all countries have equal shares of the market (average AD.)

By substituting the import and export indicators, the formula becomes:

$$AD_i = \frac{1}{GDP}\cdot\left[\left(X_i - M_i\right) - \frac{(X-M)\cdot(X_i+M_i)}{X+M}\right]\times 1000 \qquad (3)$$

Where: i = a product/industry/country;

X_i, M_i = exports/imports for country i

$X_i - M_i$ = net balance for the product/ industry/country i ;

$X - M$ = global net balance.

Next, I will look at competitiveness and/or lack thereof in Romanian trade with EU-25 countries in 2002-2004.

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The AD_i represents comparative advantages and comparative disadvantages. If AD_i is positive, the country j is competitive. Alternatively, for negative values, the country has a comparative disadvantage in the trade of goods and services. The total sum of the values of the indicator is 0.

Table 2 includes data (expressed in millions of Euros) and calculations for the function AD in 2002, 2003 and 2004.

Table 2: The values of and changes in comparative advantages for 2002-2004

Country	AD2002	AD2003	AD2004	Change (%)		
				2003/2002	2004/2003	2004/2002
Comparative Advantages						
Greece	3.99	3.12	4.00	0.78	1.28	1.00
Italy	8.89	9.11	6.56	1.02	0.72	0.74
Netherlands	2.61	4.66	3.79	1.79	0.81	1.45
Great Britain	5.49	10.07	10.24	1.83	1.02	1.87
Cyprus	0.18	0.07	0.82	0.36	12.31	4.47
Estonia	0.01	0.03	0.01	3.43	0.55	1.90
Latvia	0.05	0.09	0.08	1.81	0.90	1.64
Malta	0.36	0.49	1.07	1.35	2.19	2.96
Comparative Disadvantages						
Austria	-1.79	-2.15	-2.79	1.20	1.30	1.56
Denmark	-0.92	-1.04	-0.60	1.13	0.58	0.66
Finland	-0.91	-1.09	-0.87	1.20	0.80	0.96
Germany	-1.24	-1.67	-6.15	1.35	3.67	4.97
Ireland	-1.03	-0.92	-1.32	0.90	1.43	1.28
Portugal	-0.19	-0.61	-0.47	3.17	0.78	2.48
Spain	-0.90	-0.63	-1.68	0.70	2.67	1.87
Sweden	-2.00	-1.67	-2.17	0.84	1.30	1.09
Czech Republic	-5.68	-5.55	-5.88	0.98	1.06	1.04
Lithuania	-0.01	-0.11	-0.03	13.61	0.32	4.42
Poland	-4.40	-5.17	-5.13	1.17	0.99	1.17
Slovakia	-2.41	-2.75	-2.83	1.14	1.03	1.18
Changes in Comparative Advantage						
France	2.50	-2.08	1.80	-0.83	-0.87	0.72
Luxembourg	0.03	-0.08	-0.16	-3.18	2.00	-6.35
Slovenia	0.24	-0.46	-0.21	-1.92	0.46	-0.88
Belgium	-0.43	-0.10	1.02	0.22	-10.65	-2.39
Hungary	-2.45	-1.53	0.92	0.63	-0.60	-0.38

Source: Data prepared in accordance with the Statistical Annual of Romania

An analysis of comparative advantages/disadvantages with respect to certain EU-25 countries reveals a preponderance of disadvantages (Fig. 1).

Fig. 2. Competitiveness in Romanian Foreig Trade with EU-25
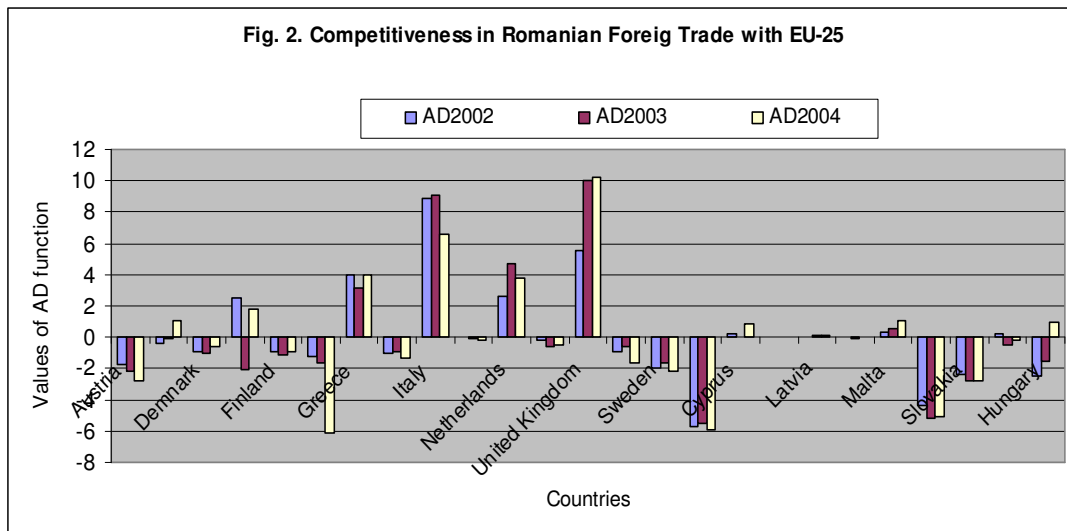
Practically speaking, in 2002, Romania had a consistent comparative advantage in commercial activity only with respect to five EU-25 member countries, and in 2003, Romania maintained an advantageous position in only four cases (United Kingdom of Great Britain and Northern Ireland, Italy, the Netherlands, and Greece); in 2004, Romania still had a comparative advantage with respect to the same 4 countries as the year before.

For the entire period analyzed, the comparative advantage of Romania with respect to the UK and North Ireland grew stronger, remaining the same or dropping slightly in the case of the Netherlands, Italy, and Greece.

The change in comparative advantages reveals a significant increase of 12.3 times with respect to trade relations with Cyprus, from 2003 to 2004; as for the other countries, the increases are not significant, for the most part having values ranging between 0 and 2.

With respect to most of the EU-25 countries, there is a preponderance of comparative disadvantages. The most consistent values are to be found in commercial relations with Austria, Germany, the Czech Republic, Poland, and Slovakia.

The change in the comparative disadvantages in trade relations with Lithuania is reflected by a significant increase in the values of the AD function, which grow by a factor of 4.42 from 2002 to 2003; likewise, there are significant rises in comparative disadvantages with respect to Germany, Portugal, and Spain.

The most pronounced fluctuations in comparative advantages are to be found in the trade relations with France and Hungary. In 2003, the comparative advantage in trade relations with France is lost, but in 2004, it is regained, as well as the advantage with respect to Hungary and Belgium.

In terms of the fluctuating comparative advantage in trade relations with Belgium, there is a spectacular fall in the values of the AD function from 2003 to 2004; likewise, there is a drop of -6.35 in the values of the function for the period from 2002 to 2004 with respect to the trade relations with Luxemburg. For the other countries, the increases and decreases are insignificant, with absolute values falling for the most part between 0 and 2.

4. Conclusions

Firstly, as concerns the magnitude of the range of function's extreme values, it increases for the advantageous relations and decreases for the disadvantageous ones. This constitutes evidence for increasing efficiency and organization in Romania's external trade. However, the narrowness of the range of values for advantages and their tendency towards the lower limit indicates the tenuousness of Romania's position in the EU market.

All of the above-mentioned aspects of Romania's foreign trade with the EU member countries indicate shortcomings in this domain and the circumstantial nature of the evolution of trade relations with different countries during the period from 2002 to 2004. One can also hypothesize, based on the data, that Romanian national policies during this period are not cohesive enough to foster economic growth and to permit economic agents to implement strategies for economic development and schemata for optimizing their industrial production.

Romania's newly-attained EU membership is increasing the country's visibility for potential investors. Since 2004, Romania, partly thanks to its comparative advantages, has met the EU membership criteria of economic progress. However, the real issue is whether the Romanian socio-economic system will enable [those] "who are initially disadvantaged to catch up with the initially advantaged in a reasonable period of time." (Krugman et al, 1995) Yet, despite this concern, Romania joined the EU on January 1, 2007 and one can hope that its economic integration into this larger structure will prove beneficial for the country's trade relations in the long run.

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THE STUDY OF CORRELATION IN THE MULTIFACTORIAL ANALYSIS

Boboilă Cristea

Faculty of Mathematics and Computer Science, University of Craiova, Romania, E-mail: boboila@central.ucv.ro

Abstract. The statistical mathematical functions offer a variety of options for analyzing economic trends. The practical method of selecting one or the other of these functions is a question whose solution presupposes the prior study of the chronological series being analyzed, followed by the elucidation of these aspects: the element of randomness in trends; components of a trend (the trend itself, the seasonality, the cyclicity, the auto regression, and the residual tendency); the trend in the context of the interdependencies between multiple factors.

This article intends to go over some of the analytical methods frequently used in the statistical analysis of correlation, as well as the opportunities for the practical implementation of the linear function in evaluating the correlation between the evolution of Romanian exports/imports between 1996-2005 and the evolution of the exchange rate of the national currency within the context of the European Integration.

Keywords: foreign trade, exports, imports, statistical-mathematical functions, correlation

1. Introduction

In the analysis of correlations, which are the quantified expression of the strength of the causal relationship between variables, there are two main aspects (Vasilescu, 2000a):

  a. **The regression,** which, through the use and interpretation of the regression coefficients for the various statistical-mathematical functions, denotes the response of the effect variable with respect to the explanatory variable;

  b. **The strength of the correlation**, quantified with the help of correlation coefficients.

For a simple correlation, in which the correlative pair comprises two variables: the *output* (response or effect) variable *y* and the *input* (explanatory) variable *x*, the first factor (regression) can be determined with the help of several functions: in the case of causative correlations of the linear kind– a linear function; for higher-order parabolic correlations – a hyperbolic function; for correlations characterized by a logarithmic exponential – a semi logarithmic function; and for nonlinear correlations, a logistic function, and so on. The choice of one or the other of these functions is determined by the manner in which the parametric demands, which are utilized as a measure for the accuracy of these functions, are satisfied, and one of the essential parameters is determined by the method of least-squares, which addresses the deviation between the y_i empirical values and the theoretical values Y_x as determined by the function employed (Georgescu et al, 1999).

Table 1, in section 2, highlights the developmental tendencies of the Romanian foreign trade (expressed in ROL) between 1996 and 2005, and the conclusion is that a linear function best satisfies the parameter determined by the smallest squares method, and therefore, we will use that function in the analysis of the linear regression and of the strength of the simple correlation for foreign trade (Roşu-Hamzescu et al, 2003).

2. The linear regression

For the analysis of the linear regression, the corresponding linear function is defined as:

$$Y_x = a + bx \qquad (1)$$

in which:

Y_x = theoretical values;

a = a measure of the variability of *y* resulting from factors other than the input variable *x*;

b = the regression coefficient, which quantifies the variation observed in Y, as it corresponds to a change in X equal to one;

x = the $x_1, x_2, ..., x_n$ values of the input variable *x*.

The *b* parameter plays an essential role in the regression analysis because it is used to measure the influence of the input variable *x* on the response of the outcome variable *y*.

The least-squares expression is both an estimator of the accuracy of the function, and a practical method of determining the parameteres *a* and *b*, with the specification that, in order to simplify the calculation of the parameters, we will be using the **centered moments**, which can be calculated with the following equation:

$$\mu_{1(x)} = \frac{\sum (x_i - \bar{x})}{n} = 0; \; \mu_{2(x)} = \frac{\sum (x_i - \bar{x})^2}{n} = \sigma^2; \; \mu_{4(x)} = \frac{\sum (x_i - \bar{x})^4}{n}. \qquad (2)$$

After carrying out the operations imposed by the minimum-value condition of the least-squares method, we arrive at the following system of equations:

$$\begin{cases} \sum y_i = na + b \sum x_i \\ \sum x_i y_i = a \sum x_i + b \sum x_i^2 \end{cases} \qquad (3)$$

From the first equation of the system the value of *a* is determined to be the following:

$$a = \frac{\sum y_i - b \sum x_i}{n} = \bar{y} - b\bar{x} \qquad (4)$$

By substituting *a* in the second equation of the system (3) with its equivalent from the first equation, we obtain the following equation:

$$b = \frac{\sum x_i y_i - \bar{y} \sum x_i}{\sum x_i^2 - \bar{x} \sum x_i} \qquad (5)$$

If instead the x values we use their deviations from their respective means (Wonnacott et al, 1991), then the expression (4) becomes:

$$a = \bar{y} - \frac{b \sum (x_i - \bar{x})}{n} = \bar{y} - b\mu_{1(X)} = \bar{y} \qquad (6)$$

Similarly, if we take into account the following equation:

$$\sum (x_i - \bar{x})(y_i - \bar{y}) = \sum (x_i - \bar{x}) y_i \qquad (7)$$

We will obtain the following value for *b*:

$$b = \frac{\sum (x_i - \bar{x}) y_i - \bar{y} \sum (x_i - \bar{x})}{\sum (x_i - \bar{x})^2 - \bar{x} \sum (x_i - \bar{x})} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \qquad (8)$$

If in above calculation of *b* (8) we divide the numerator and the denominator by *n*, the expression for the **second-order central moment** (i.e., dispersion) of the input variable *x* can be derived. Thus, we obtain the following equation:

$$b = \frac{\dfrac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n}}{\dfrac{\sum (x_i - \bar{x})^2}{n}} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n\mu_{2(X)}} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n\sigma_X^2} \quad (9)$$

If we denote the deviation of the x_i values from their mean as X and the deviation of the y_i values from their mean as Y, we obtain a simplified expression of the linear regression coefficient equation (Isaic-Maniu et al, 1998):

$$b = \frac{\sum XY}{n\sigma_X^2} \quad (10)$$

The ratio $\dfrac{\sum XY}{n}$ is termed **covariance,** and the XY product denotes the correlation between the two variables for any given pair of values.

We apply the linear function in evaluating the correlation between the evolution of Romanian exports/imports between 1996-2005 and the evolution of the exchange rate of the national currency (Roşu-Hamzescu et al, 2003). The empirical values of these two variables, as well as the values obtained by the simplified calculation using the deviations of these empirical values from their mean, are presented in Table 1.

The values of parameters are the following:

- a_t = 821070787; b_t= 51253   for total foreign trade;
- a_e = 346289811; b_e= 21525   for exports;
- a_i= 474780976; b_i= 29728   for imports.

Table 1. The correlation between exports/imports (Y) and the exchange rate(X)

Year	Exchange rate (x$_i$) (ROL/$)	Total (ROL million)		Exports (ROL million)		Imports (ROL million)	
		y_i	Y_x	y_i	Y_x	y_i	Y_x
1996	3,083	60,169	366,705	24,920	366,705	35,250	366,705
1997	7,168	141,280	454,641	60,426	454,641	80,854	454,641
1998	8,876	178,754	491,397	73,685	491,397	105,069	491,397
1999	15,333	289,670	630,391	130,330	630,391	159,340	630,391
2000	21,693	508,066	767,284	224,889	767,284	283,177	767,284
2001	29,061	782,812	925,882	330,858	925,882	451,954	925,882
2002	33,055	1,048,718	1,011,864	458,446	1,011,864	590,271	1,011,864
2003	33,200	1,381,820	1,014,977	584,919	1,014,977	796,901	1,014,977
2004	32,637	1,832,511	1,002,848	766,470	1,002,848	1,066,041	1,002,848
2005	29,137	1,986,909	927,511	807,957	927,511	1,178,952	927,511
Total	213,241	8,210,708	7,593,501	3,462,898	7,593,501	4,747,810	7,593,501

Source: Data prepared by the Romanian Trade Promotion Center (www) and
www.bnro.ro/Ro/Info/Istoric/Curs_a.htm

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From Table 1 we observe that the $\sum x_i = \sum Y_{x_i} \Rightarrow \bar{y} = \bar{Y}_x$ property serves as a control for the analysis of correlation, which holds trues for all the statistical mathematical functions(Vasilescu, 2000a).

The Figure 1 and Figure 2 show the empirical and linear trends for Romanian total foreign trade, exports and imports in the 1996-2005 periods (Macklup, 1991).

Figure 1: Empirical and linear trends for Romanian exports

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Empirical trend	25	60	74	130	225	331	458	585	766	808
Linear trend	367	455	491	630	767	926	1012	1015	1003	928

Figure 2: Empirical and linear trends for Romanian imports

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Empirical trend	35	81	105	159	283	452	590	797	1066	1179
Linear trend	503	624	675	867	1056	1275	1394	1398	1382	1278

3. The strength of the linear correlation

To determine the strength of the simple linear correlation we use the Pearson linear correlation coefficient (Vasilescu, 2000b) (Wonnacott et al, 1991), which is the simple arithmethical average of the product of the deviation from the normative x_i and y_i values, calculated by the following equation:

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$$r = \frac{\sum \left[\frac{x_i - \bar{x}}{\sigma_x}\right]\left[\frac{y_i - \bar{y}}{\sigma_y}\right]}{n} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n\sigma_x\sigma_y} \qquad (11)$$

In which: σ_x, σ_y = the standard deviations of the input variable x, with respect to the output variable y.

By substitution of the equations for calculating the standard deviations, we obtain the following equation:

$$r = \frac{n\sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{\left[n\sum x_i^2 - (\sum x_i)^2\right]\left[n\sum y_i^2 - (\sum y_i)^2\right]}} \qquad (12)$$

From a practical point of view, in order to simplify the calculation, in place of the x_i and y_i values, we can substitute their deviation from their respective means. As a result, the linear correlation coefficient can be expressed by using the usual product-moments, or the centered moments, as in the equation:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n \cdot \sqrt{\sigma_x^2} \cdot \sqrt{\sigma_y^2}} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \cdot \sum (y_i - \bar{y})^2}} \qquad (13)$$

If the centered moments are used, the equations becomes:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n \cdot \sqrt{\mu_{2(x)}} \cdot \sqrt{\mu_{2(y)}}} \qquad (14)$$

The correlation coeficient is a measure of the linear association between two variables. The value of the linear correlation coefficient (Isaic-Maniu, 1998) lies in the interval $-1 \le r \le 1$, and has the following significance: a negative value indicates an inverse correlation between the two variables, which becomes stronger as r approaches -1. A positive value indicates a direct correlation which becomes stronger as r approaches 1.

4. Conclusions

The analysis of correlations is closely related to the analysis of regressions, since both express the relationship between two variables.

In this case of the practical application of these analyses, the value of the correlation coefficient for foreign Romanian trade between 1996 and 2005 is $r = 0.862181819$, which denotes a very strong, almost perfect, direct correlation between the ROL value of exports and the evolution of the national currency exchange rate.

The calculated value of the correlation coefficient for Romanian imports between 1996 and 2005 is $r = 0.795168682$ which likewise indicates a powerful direct correlation between the lei value of imports and the evolution of the national currency exchange rate.

For the total value of the Romanian foreign trade for the period analyzed, the value of the correlation coefficient is $r = 0.693414967$, which also testifies to a direct correlation between the average lei value of imports and the evolution of the national coin exchange rate.

Neither of these regression and correlation analyses can be interpreted as establishing a causal relationship – they can only indicate how or to what degree the variables are correlated. The correlation coefficient only measures the degree of linear association between two variables; any conclusions as to a cause-and-effect relationship must be based on the reasoning of the analyst.

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RESEARCH REGARDING THE LINK BETWEEN TOURISM AND BANKING SECTOR

Condratov Iulian

Faculty of Economics and Public Administration, "Stefan cel Mare" University of Suceava, 9-Universitatii Street, 720225, Suceava, Romania, Mobil: 0740696309, E-mail: iulianc@seap.usv.ro

Hapenciuc Valentin Cristian

Faculty of Economics and Public Administration, "Stefan cel Mare" University of Suceava, 9-Universitatii Street, 720225, Suceava, Romania, Mobil: 0744156467, E-mail: hapivali@fim.usv.ro

Abstract: The bank services and the touristic ones are and must be tightly connected in order to offer the maximum comfort to the tourists. The concrete ways of cooperation are diversified and continually increasing in number.

In a world where services have a growing share in total transactions bank and touristic services must fortify their position.

The systematically vision of Romanian tourism's development strategy, in the new context of global and European's trends, have put into evidence the fact that tourism will become a high priority industry and its development is directly influenced by the other social and economic industries and sectors.

As a growing economic branch, a main priority, in the present and future development of tourist sector, on both perspective: globally and locally, is to study this process in order to find out major factors of influence which could have a beneficial role or on the contrary, regarding the dynamic of this economic sector.

Key words: touristic sector, bank's strategy, statistical research.

The necessity of financial aid for the touristic sector

The reintegration of Romanian tourism in the international tourism's contest, at a global and continental level, the maintaining at the same level with the touristic market demand it must become not a momentarily state of economic development option but a firm action method, well oriented, that will allow the long term consolidation of this industry, named as the smokeless industry.

The touristic sector is a consumer of cultural and natural resources, of direct and indirect services, being at the same time an in-house service generator. At the level of the Suceava County there is a multitude of rich zones in natural and antropic resources therefore the touristic development could attract the national and international touristic fluxes and could lead to the appearance and development of localities as holiday resorts.

The share of touristic activity which could contribute to the general economic development of a country reveal the fact that tourism could become a dynamic factor in the global economic system. This implies that the specific demands are fulfilled, regarding technologies, products and services which are made in different economic sectors.

The integration of the Romanian tourism on the European market could be made by aligning the touristic units to the standards and norms of classification applied at the international level. From this point of view it is necessary to modernize the touristic accommodation structures. This requires an existing space and equipment that is necessary to assure the touristic conditions of relaxation, comfort and hygiene. It is very important: the size of rooms, sanitary, the furniture endowment, and the functioning hygienic installations. The accommodation units must be personalized in order to have some aesthetic-ambient identity.

The investment and international touristic integration phenomenon is a direct result of the phenomenon's trans sector characteristic and touristic product, which are the complex expression of many industrial and economic sectors contribution to actual existence and dynamic in the conditions of economic recession period, the capital markets display a certain reserve concerning the investments in the touristic sectors, which could register smaller demand for certain periods.

The relationship between banks and touristic units – study case of Suceava County

This research aims to discover the way two major and high priority sectors of the Romanian economy interacts, more precisely with the touristic and banking sectors.

A prime aspect of this analysis is represented by the investment behavior characteristics of economic agents from the touristic sector having as background the integration of our country in the European Union and the legislative harmonization for touristic sector at the European standards.

The selection of financial resources represents an essential aspect of the management activity for every economic agent and the way they choose to make this selection is an issue that can be studied.

In order to accomplish this general objective we can underline the following aspects:

- The establishment of the period of the last major capital investment in touristic units.
- The underlinement of the economic agent's perception regarding the necessity of new investments for their touristic unit's modernization. If this necessity is confirmed then it is important to find out what kind of financial resources will be used by the agents in this activity.
- In the event of choosing a bank credit as main financial source for such investment projects I consider significant to underline the most important criterions to make a decision about a bank product.
- Underscoring the general relation between bank and touristic unit.
- The determination of the satisfying level of touristic units regarding the bank implication in promoting new products which correspond to the needs of long term financial investments of touristic units.

On the other hand I was preoccupied to make out an evaluation of the way in which the Romanian banking sector tries to sustain the touristic sector progress, especially in Suceava County, through specialized products and services.

It is well known that the Romanian banking sector had a remarkable development in the past decade, the credit activity was mainly oriented to precise economic activities. Continuing my previous argument, I have tried to determine the degree to which bank units in Suceava consider the touristic sector as a priority in their development of strategies of new bank products and services.

So, it is essential to underline the objectives of this analysis:

- The determination of the touristic sector position in the hierarchy of priorities of bank units from Suceava.
- The determination of the fundamental characteristics of bank products/services on the market (or in plan to be introduced in a nearby period of time), oriented especially to touristic sector.

Because this analysis contains two economic sectors, it was necessary to delimit two statistical collectivities.

First collectivity is made of the total of touristic units which are localized in Suceava County range. The necessary statistics were found in the *Touristic Breviary of Suceava County, 2004 edition.*

Table 1: Structures of tourists reception with functions of tourists accommodation by category of comfort in 2004

	Total	Categories of comfort					
		5 stars	4 stars	3 stars	2 stars	1 star	Not classified
Total	143	-	12	22	85	22	2
Hotels	23	-	2	4	14	3	-
Hotels for youth	1	-	-	1	-	-	-
Hostels	1	-	-	1	-	-	-
Motels	2	-	-	-	2	-	-
Touristic inns	-	-	-	-	-	-	-
Touristic villas	17	-	2	4	5	6	-
Touristic chalets	3	-	-	-	2	-	1

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Camping	3	-	-	2	1	-	-
School and pre-school champs	1	-	-	-	-	-	1
Urban touristic boarding houses	30	-	5	7	15	3	-
Rural touristic boarding houses	22	-	2	2	13	5	-
Touristic boarding houses	38	-	1	1	33	3	-
Touristic halting places	2	-	-	-	-	2	-

Source: Touristic Breviary of Suceava County, 2004, INS

The territorial disposer (Suceava County area) of all 143 touristic units, the limitation of financial and time resources make impossible the carrying out of a total research, so I have applied to a statistical inquiry using questionnaires for a representative sample made of from 30 units (approximately 20% from total collectivity).

I have preserved the ponders founded at general collectivity level regarding the structures of touristic reception.

The second collectivity that was analyzed is made of bank units amount working in Suceava County, exactly, this collectivity contained, at the research moment, 14 units.

Concerning the research objectives, for both collectivities, this was transposed in questions contained in two questionnaires.

The responses gathered using questionnaires was organized in the period July 3-9, 2006.

General conclusion of the study. Proposals

Regarding the study of the bank sector that promotes tourist development in Bucovina we can underline some general conclusions.

The tourism in Bucovina undergoes a period of development, a statement based on the growing trends of the main indicators expressing the accommodation capacities of the Suceava County. The development we have identified is based, mainly, on the financial efforts of the entrepreneurs. According to our study more than half of the touristic entrepreneurs based their investment process on auto financing during the last five years.
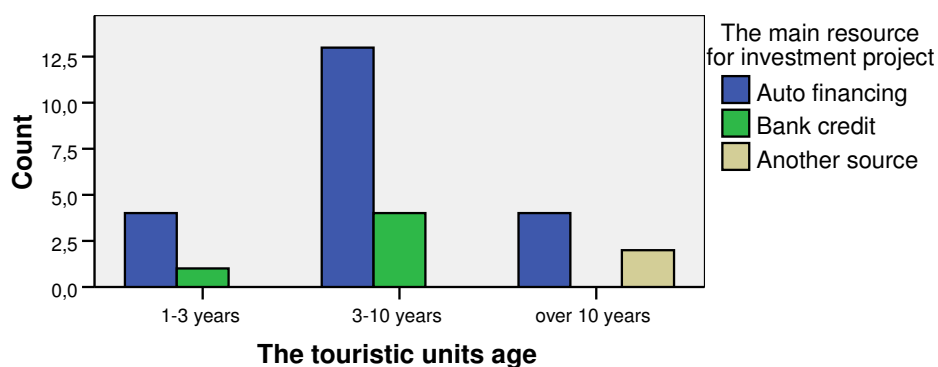
Figure 1. Selection of financial resources in corellation with the touristic units age

This situation maybe should change in order to realize a sustainable development in the tourism from this area, maybe a closer collaboration among the Romanian economic sectors would be appropriate, and we mean of course the relation between the bank and its client - a touristic unit.

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As we could determine by questioning the bank units in Suceava only three of them have found desirable to launch a product addressing to the touristic agencies, all this in the context of an unanimous statement that the sector of tourism is part of their strategy.

The main reasons bankers call down the weak presence of bank products on the market destined mainly to the touristic sector, are as follows: the low dimension of the touristic sector at present, the complex procedure of implementing a new bank product, the desire to simplify the portfolio of services/products managed by the bank.
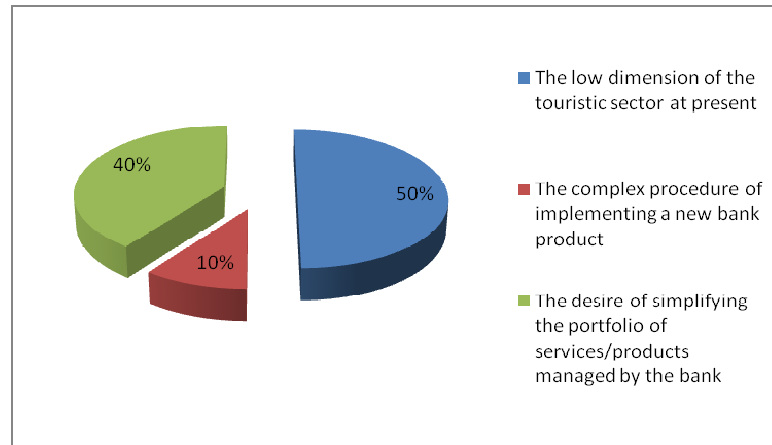
Figure 2. The main reasons for the weak presence of bank products dedicated mainly to the touristic sector

This state of fact shows premises to turn up. Five out of nine bank units in which it was known at the time of the survey about the possibility of offering some new products/services supporting the investment in tourism have declared the existence of this kind of projects.

We refer to more than 50% of the banks which means additional support for the touristic units and, at the same time, for the Romanian touristic sector as a whole and part of the European Union framework.

And the market of this sort of products seemingly exists. 90% of the touristic units included in the survey admit the necessity of new investments and one third of them have planned as the main source of investment the bank loan.

Still, these touristic units have some expectations from the bank and from this we can underline the followings: a cheaper loan, the creation of new products/services addressed to them, aspect put into light by 46% of the questioned units, improvement of the bank consultancy offered to the touristic agencies.

Some of these issues had been anticipated by the banks and their strategies in issuing new products looking to attract new clients from the touristic sector by offering attractive loans to agencies, but attention is paid in equal measure to facilities regarding the credit's documentation and term.
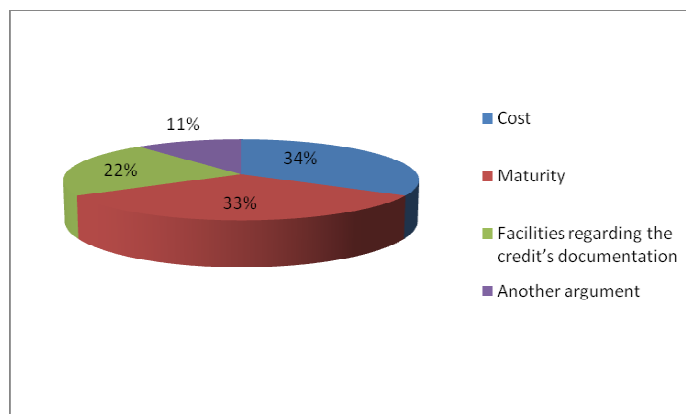
Figure 3. The main benefits of the future products

Also, bankers have taken into account some other ways of improving their offer, such as:

- A correlation between credit reimbursement and the seasonality of the touristic activity,
- Accepting to offer the credit without material warranties.

As an overall conclusion this study highlighted the fact that measures are being taken on both sides in realizing a fruitful partnership, and the crystallization of a long term relation client (touristic unit) – bank.

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EXCEL 2007 MACROS FOR FINANCIAL CALCULATIONS

Cosma Emil

Ovidius University Constanta, Faculty of Economics Sciences, Telephone 0721/279981, E-mail: ecosma@univ-ovidius.ro

The performing of the financial calculations (but also of other types of calculations) often becomes a routine**,** repeatable activity. In Excel the automation of the work is possible by using macros which are registered and which can be edited. By the Recording procedure the addresses related to a domain of cells is memorized, that can be an impediment for the developing of the calculation in another zone of the electronic calculation sheet. The visual Basic for Application language associated with the Excel editing environment offers the possibility to remedy this drawback.

Key words: Macro, Visual Basic for Application, Shortcut, FV(the future value).

The *Excel* editing environment, in fact just like the *Visual Basic for Application* language →**VBA**, associated to any Office program, includes many financial functions, useful for making up applications which administer the personal or business incomes, calculations related to: the monthly installment of a loan, the future value of a rent, or the annual depreciation (clearing off) of fixed means being necessary.

VBA offers the possibility to create a set of instructions which communicates the *Excel* program the necessary operations to be performed in order to accomplish a certain task, by defining a *script* which is called *macro*. A *macro* represents a list of instructions – *macro instructions (macro statements).* Some instructions perform operations specific to macro, but most of them correspond to the menu macros and to the options from the dialogue cassettes of the basic application. Nevertheless what *Office* program is used, the repeating of some operations is, many times, necessary (for example, the introducing and of a text section forming, the resuming of a series of menu macro). The macros are meant to lessen the editing work and the reducing of the necessary time to perform it. It is possible to *automation* a routine or repeatable activity, its spreading out, by the simple selecting of a macro, pushing of a keyboard or click on a button from a bar of instruments.

Used financial calculation functions:

	Returns
FV*(rate,nper,pmt,pv,type)*	the future value of an annuity based on periodic, fixed payments and a fixed interest rate.
PV*(rate,nper,pmt,fv,type)*	the present value of an annuity based on periodic, fixed payments to be paid in the future and a fixed interest rate.
NPer*(rate,pmt,pv,fv,type)*	the number of periods for an annuity based on periodic fixed payments and a fixed interest rate.
PMT*(rate,nper,pv,fv,type)*	the payment for an annuity based on periodic, fixed payments and a fixed interest rate.
IPMT*(rate,per,nper,pv,fv,type)*	the interest payment for a given period of an annuity based on periodic, fixed payments and a fixed interest rate.
PPMT*(rate,per,nper,pv,fv,type)*	the principal payment for a given period of an annuity based on periodic fixed payments and a fixed interest rate.
Rate*(nper,pmt,pv,fv,type,guess)*	the interest rate per period for an annuity.
IRR*(values,guess)*	the internal rate of return for a series of periodic cash flows (payments and receipts).
MIRR*(values,finance_rate,reinvest_rate)*	the modified internal rate of return for a series of

	periodic cash flows (payments and receipts).
NPV*(rate,value1,value2…)*	the net present value of an investment based on a series of periodic cash flows (payments and receipts) and a discount rate.
DDB*(cost,salvage,life,period,factor)*	the depreciation of an asset for a specific time period using the double-declining balance method or some other method you specify.
SLN*(cost,salvage,life)*	the straight-line depreciation of an asset for a single period.
SYD*(cost,salvage,life,period)*	the sum-of-years digits depreciation of an asset for a specified period.

Common **arguments** for the financial functions:

rate	The fix installment of the interest until the term of the borrowing or investment.
nper	Shortening of the expression *number of periods*. It is the number of installments or of deposits until the term of the reimbursement or of the investment.
pmt	Shortening of the expression *payment.* Represents the installment or the periodical depositing.
pv	Shortening of the expression *present value*. It is the current value of the borrowing (capital) or of the initial depositing in an investment.
fv	Shortening of the expression *future value* It is the future value of the borrowing or investment.
type	Type of installment or depositing. Its value is 0 (implicit value) for the final installments or depositing and 1 for the installments or depositing of the first part of the period.

The registering of a VBA macro

The simplest method for creating a macro is the using of the *Macro Recorder* modules. By means of this method the possibility of registering is activated and the wished operations to be automated are performed gradually (the selecting of a text, the spreading out of some menu macros, the choosing of some options from a dialogue cassette). The *Recorder* changes all the operations into VBA instructions (VBA modules).

In *Excel*, the macro will be placed in current work register, a new work register of in *Personal Macro Workbook* register (the macros will be available in all the work registers). The registering of a macro begins by establishing a name for a macro (such as *FVFunction*) and a *shortcut key* (here *Ctrl+f*):
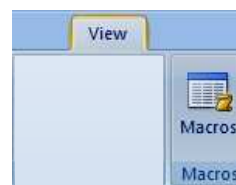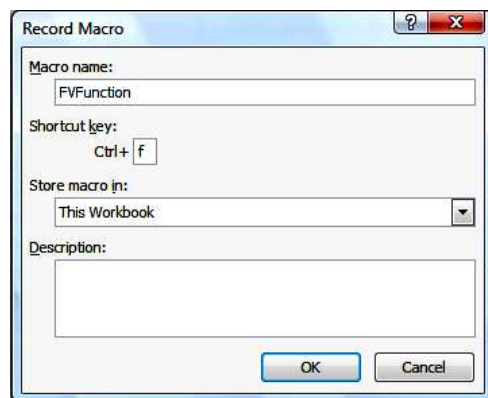
As the registering modules of the macros memorizes all the actions of the user, the nonperforming of unessential macros during the recording is indicated. The entering in the "recording "state is marked in the state bar of the *Excel* program – button .This button will be activated in the moment the registering is finished.

The activating of the VBA editor (Visual Basic Editor – VBE)

VBE can be launched in more ways:

- by visualizing a recorder macro;
- by *Alt+F11 shortcut* (in fact, this *shortcut* is a *switch* that facilitates the passing between the *Visual Basic Editor* and the basic application).
- The activating of the button ![icon] (*Visual Basic*) from the *Developer* tab. This tab is not implicit visualized, but it may be activated: click on ![icon] the *Microsoft Office button*, *Popular, Options,* ☑ Show **D**eveloper tab in the Ribbon ⓘ .
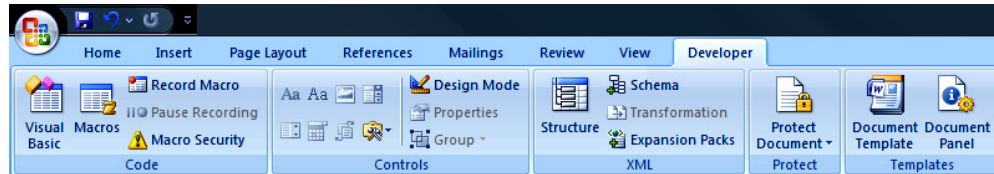
Running of a macro

A macro can be launched when running:

- by activating *Macros* tab (*View* tab), *View Macros, Run;*
- using tab *Run,* ▶ ,from VBE;
- by its *shortcut* (here *Ctrl+f*);
- by general *shortcut Alt+F8.*

If in the *Message Bar* it is notified that the performing of the macros is not permitted because of security reasons (**Security Warning** Macros have been disabled), the user may take the adequate decision activating the Options... button.

The recording of a macro for the calculation of FV function

- Record Macro (Macro Name : *FVFunction*, shortcut key: *Ctrl+f*);
- Editing of the data for calculation and of FV function:

	A	B	C	D
1	interest rate		0,1	
2	number of payment		2	
3	payment		100	
4	the future value-FV		-210,00 lei	
5				
6				

- Commuting in VBE and visualization of the generated instructions:

```vba
Sub FVFunction()
'
' FVFunction Macro
'
' Keyboard Shortcut: Ctrl+f
'
    ActiveCell.FormulaR1C1 = "interest rate"
    Range("A2").Select
    ActiveCell.FormulaR1C1 = "number of payment"
    Range("A3").Select
    ActiveCell.FormulaR1C1 = "payment"
    Range("A4").Select
    ActiveCell.FormulaR1C1 = "the future value-FV"
    Range("C1").Select
    ActiveCell.FormulaR1C1 = "0.1"
    Range("C2").Select
    ActiveCell.FormulaR1C1 = "2"
    Range("C3").Select
    ActiveCell.FormulaR1C1 = "100"
    Range("C4").Select
    ActiveCell.FormulaR1C1 = "=FV(R[-3]C,R[-2]C,R[-1]C)"
    Range("C5").Select
End Sub
```

The main deficiency of this macro instruction is the fact that, as many times as its performing is desired, the developing of the calculations takes place only on the A1:C4 cell domain – a fixed zone from the electronic calculation sheet. If the repeating of the calculation is desired in other zones of the electronic calculation sheet, the generated instructions in the *Recording* modules can be replaced:

```vba
Sub FVFunction()
'
' FVFunction Macro
'
' Keyboard Shortcut: Ctrl+f
'
l = ActiveCell.Row
c = ActiveCell.Column
'
Cells(l, c).Value = "interest rate"
Cells(l + 1, c).Value = "number of payment"
Cells(l + 2, c).Value = "payment"
Cells(l + 3, c).Value = "the future value-FV"
'
```

```vba
        Cells(l, c + 2).Value = 0
        Cells(l, c + 2).Activate
        a1 = ActiveCell.Address
        '
        Cells(l + 1, c + 2).Value = 0
        Cells(l + 1, c + 2).Activate
        a2 = ActiveCell.Address
        '
        Cells(l + 2, c + 2).Value = 0
        Cells(l + 2, c + 2).Activate
        a3 = ActiveCell.Address
        '
        Cells(l + 3, c + 2).Value = "=FV(" + a1 + "," + a2 + "," + a3 + ")"
        '
        Cells(l, c + 2).Activate
        '
    End Sub
```

The performed changes allow the developing of the calculation in any zone of the calculation sheet. The necessary values of the calculation may be introduced (reintroduced) in the new cell domain, the calculation function returning the resulting value.

	C	D	E	F	G
48					
49		interest rate		0	
50		number of payment		0	
51		payment		0	
52		the future value-FV		0,00 lei	
53					

F52 f_x =FV(F49;F50;F51)

	C	D	E	F	G	H
48						
49		interest rate		0,1		
50		number of payment		2		
51		payment		100		
52		the future value-FV		-210,00 lei		
53						

Some explanations:

- The **l** and **c** variables retain the address (top left corner of the new cell domain (the entering data are initialized with zero);
- With **Cells (…., ….) Value** the textual and numerical values (the entering data are initialized with zero) are displayed;
- With **Cells (…., ….). Activate** the calculation cells for retaining their addresses are activated;
- **a1, a2, a3** are the addresses of the cells that contain the necessary data of the calculation;
- **FV** function is the written text and it results from concatenation of strings of characters.

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WORD 2007 MACROS FOR FINANCIAL CALCULATIONS

Cosma Emil

Ovidius University Constanta, Faculty of Economics Sciences, Telephone 0721/279981, E-mail: ecosma@univ-ovidius.ro

The performing of the financial calculations (but also of other types of calculations) often becomes a routine, repeatable activity. In Word the automation of the work is possible by using macros that are registered and which can be edited. By the "Recording" procedure one can define a macro to which a button in Quick Access Toolbar can be associated. It can be stocked Store macro in) in any open pattern (it becomes available for any document in which the pattern is used) or in any open document (it will be possible to be used only in the respective document). Such a button can become useful in more documents. He Visual Basic for Applications language associated with the Word editing environment offers you the possibility of editing macros.

Key words: Macro, Visual Basic for Applications, Shortcut, FV(the future value), Quick Access Toolbar.

The *Visual Basic for Applications → **VBA**, associated to any *Office* program, includes many financial functions, useful for making up applications that administer the personal or business incomes, for the calculations related to: the monthly installment of a loan, the future value of a rent or the annual depreciation (clearing off) of fixed means.

VBA offers the possibility of creating any set of instructions that communicates the *Word* program the necessary operations to be performed, in order to accomplish a certain task, by defining a *script* called *macro*. A *macro* represents a list of instructions – *macro instructions (macro statements).* Some instructions represent specific operations to a macro, but most of them correspond to the menu macros and options from the dialogue cassettes of the basic applications. Nevertheless what *Office* program is used, the repeating of some operations is, many times, necessary (for example, the introducing and formatting of a text section, the resuming of a series of menu series. The macros are meant to lessen the editing work and the reducing of the necessary time to perform it. The *automation* of a routine or repeatable activity is possible, by the simple selecting of a macro, the pushing of a keyboard or click on a button from a bar of instruments.

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type	Type of installment or depositing. Its value is 0 (implicit value) for the final installments or depositing and 1 for the installments or depositing of the first part of the period.

Recording a VBA macro

The simplest method for creating a macro is the use of *Macro Recorder* modules. By means of this method the registering possibility is activated and the wished operations to be automated are performed gradually (the selecting of a text, the spreading out of some menu macros, the choosing of some options from a dialogue cassette…). The *Recorder* changes all the operations into VBA instructions *(VBA modules).*
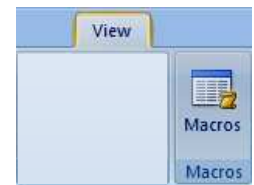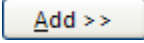
The recording of a macro begins by establishing a name for the macro (such as a *Calculator*). In *Word* the macro can be associated with a button on a bar of instruments, or, with a combination of keyboards (**Keyboard → Alt+, Ctrl+).** It can be stocked (**Store macro in**) in open pattern (thus, it becomes available for any document which uses the pattern) or in any open document (it will be possible to be used only in the respective document). The **Description** text cassette contains, optionally, the describing of the macro.

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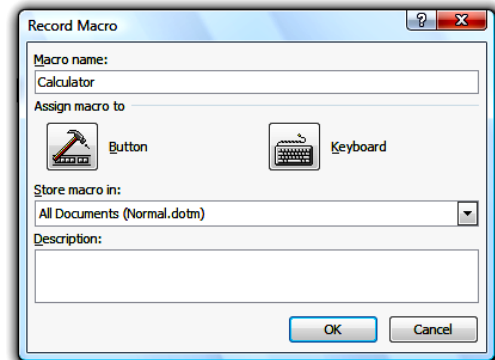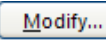
The entering in the *"Recording"* state is marked by the changing of the indicator's form of *mouse* and in the state bar of the *Word* program – button. This button will be activated in the moment the registering is finished.

The adding of a button in Quick Access Toolbar (for resuming a macro)

Quick Access Toolbar includes the buttons which are used most frequently. For creating a new button:

- A document is opened in editing.
- The registering of a macro, *Record Macro*, is initiated.
- The name of the macro (*Calculator*) is established, which will be associated with a button (*Assign macro to*, **Button**).
- In *Word Option* window, Customize, Normal.NewMacros.Antet, Add >> .
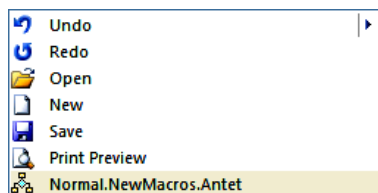
- The button Modify... is activated.
- A symbol is selected (for example) from *Modify Button* window.

- A new button will appear in *Quick Access*:
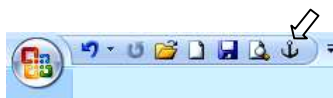
- The registering is closed pushing the button, from the state bar.
- The macro, being associated with the document, can be used any time by activating button.

Activating the VBA editor (Visual Basic Editor – VBE)

VBE can be launched in more ways:

- by visualizing a registered macro;
- by **Alt+F11** *shortcut* (in fact, this *shortcut* is a switch that facilitates the passing between *Visual Basic Editor* and the basic application).
- Action of the button (*Visual Basic*) from the *Developer* tab. This tab is not visualized implicit, but it can be activated: click on *Microsoft Office* button, *Popular, Options*, ☑ Show Developer tab in the Ribbon ⓘ .

Adding a form for financial calculations

The previously created macro should not contain any instruction:

```
Sub Calculator()
'
' Calculator Macro
'
End Sub
```

In Visual Basic Editor, for the initiated project, a form (*Insert, User Form*) is included. This form assumes to be a small "pocket calculator", for the calculation of FV, PV and Pmt functions. This will be launched from the Sub *Calculator* Procedure (User form 1. Show), with the **sel** work variable, selecting the function (for **sel = 1** is **FV**):

```
Public sel As Byte
Sub Calculator()
'
' Calculator Macro
'
sel = 1
UserForm1.Show
End Sub
```

The accomplishing of the next "calculator" needs the introducing of some controls in the form and the editing of the code sequences associated to them (methods).
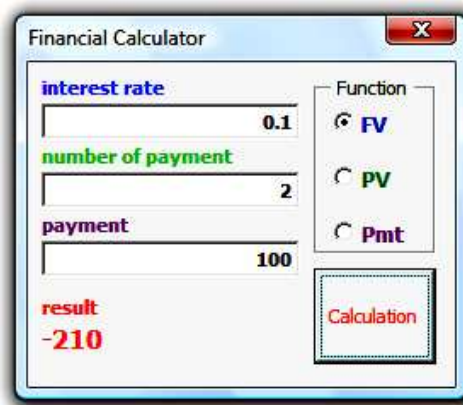
Controls

Control	Type	Property	Property value
UserForm1	Form	**Caption**	Financial Calculator
Label	Label	**Caption**	interest rate
Label	Label	**Caption**	number of payment
Label	Label	**Caption**	payment
Label	Label	**Caption**	result
txtR	TextBox	**TextAlign**	*3-FmTextAlignRight*
txtN	TextBox	**TextAlign**	*3-FmTextAlignRight*
txtP	TextBox	**TextAlign**	*3-FmTextAlignRight*
lblResult	Label	**ForeColor**	*Red*
frmFunction	Frame	**Caption**	Function

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Radio Button	OptionButton			
rbnFV		Caption	FV	
rbnPV		Caption	PV	
rbnPmt		Caption	Pmt	
btnCalcul	Buton	Caption	Calculation	

Methods

Control	*Code sequence d*
| rbnFV | ```vb
Private Sub rbnFV_Click()
   sel = 1
End Sub
``` |
| rbnPV | ```vb
Private Sub rbnPV_Click()
   sel = 2
End Sub
``` |
| rbnPmt | ```vb
Private Sub rbnPmt_Click()
   sel = 3
End Sub
``` |
| btnCalcul | ```vb
Private Sub btnCalcul_Click()
Dim R, N, P As Single
   If  IsNumeric(txtR.Text) And  _
       IsNumeric(txtN.Text) And  _
         IsNumeric(txtP.Text) Then
    .     R = Val(txtR.Text)
       N = Val(txtN.Text)
       P = Val(txtP.Text)
       Select Case sel
          Case 1
            lblResult.Caption = FV(R, N, P)
          Case 2
            lblResult.Caption = PV(R, N, P)
          Case 3
            lblResult.Caption = Pmt(R, N, P)
       End Select
     Else
       MsgBox ("Error!")
     End If
End Sub
``` |

Running of a macro

The macro can be launched in performing using the button from *Quick Access Toolbar*. If in the Message Bar it is notified that the performing of macro is not permitted, because of security reasons (**Security Warning** Macros have been disabled.) the user can take the adequate decision activating the button.

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FORMAL THEORY OF THE INTELLIGENT ECONOMICS SYSTEMS

Dănciulescu Daniela

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor, 0252/329191, danadanciulescu@yahoo.com

Radu Carmen

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor

Iancu Anica

Universitatea din Craiova, Facultatea de Economie şi Administrarea Afacerilor

Abstract: Intelligent systems have received much more attention of scientists since the second half of 20th century. Nevertheless, the concept of intelligent system is not fully understood, and this affects interpretation of the existing research results as well as the choice of new research directions in all fields of science. In this paper the subject is considered from the multidisciplinary point of view, and the phenomenon of intelligence is demonstrated as a computational one. It emerges as a result of the joint functioning of several operators: grouping, focusing of attention (filtering), searching, and formation of combinations. We assume that, when information is processed by these operators, multi resolution systems of knowledge develop, and nested loop of knowledge processing emerge. This conceptual structure permits the explanation of most processes characteristic of intelligent systems, and the researchers in economy can utilizes these artifacts for developing effective information systems based on intelligent agents.

Keywords: intelligence, intelligent systems, multi resolution systems, computational phenomenon.

Introduction

It has been possible following the progress of the researches in neurosciences (neurophysiology, neuropsychology, neuroanatomy, neuropharmacology, psychophysics, behavior psychology, biological cybernetics), biomechanics, artificial intelligence, control theory, management, informatics and applied mathematics, respectively robotics, mecatronics and automate control. Its implications on the scientific, economical, military and social plan have been in useful time, fact that opened the way towards creating a new species – the intelligent artifacts (systems). For the researchers in economical informatics and especially for the projecting engineers and developers of informational systems the results obtained in this field can no longer be neglected. Actually, the attention has to be focused on the role of the intelligent agents in the configuration of the new architectures of intelligent cars and informational systems of the future, so useful for the modern economics.

Intelligence, fundamental instrument in evolution

It has been scientifically proven that the man is the result of education but also the supreme factor in the projection of his own becoming, certainly based on the perceptions of the environment and on the materialization of his own ideas concerning the modeling of future. If the environment doesn't seriously affect his physical and mental health, the man can't survive without intelligence and proactive, transforming attitude, without a well-established purpose and hopes that this one will be satisfied. His brain help him elaborate new projects (thoughts, plans and projects, inventions, innovations, visual arts, music, poetry etc). As specie it is obvious that intelligence helped the man survive in expected or unexpected situations of life. Also, the idea of expected/ unexpected situations suggests that the species endowed with intelligence follow the react of a **goal**, they expect to obtain **benefices/ advantages** or some **success.** This is how the relation with intelligence becomes very obvious. This way we can observe that **evolution and intelligence** have something very important in common and they both have a determining impact on the human life.

Certainly, we are not talking about the talent that the Almighty gave to man. The intelligence and the experience obtained following the active involvement in the transformation of the environment represent essential requests when we are talking about systems created by man or about artifacts. On this plan of ideas, we have to keep in mind that evolution is often interpreted as a mechanism for projecting artifacts endowed with intelligence. It isn't hard to observe that **evolution and intelligence use the same techniques**.

1. they both transform the real experiences and perceptions in symbolic representations and the keep the messages well organized in an adequate form;
2. then they use these messages memorized for the purpose of finding similar groups of information and they generalize it

3. they repeat the generalization in a recursive manner so that it can be obtained a more efficient organization of information;

4. increases the efficiency of information by focusing the attention only on certain components

5. uses processes of research for combining the information components and for organizing it in messages that couldn't be obtained from experiences. The human brain, in its complexity accomplishes very subtle processes of decision and has capacity of cognition.

This is how we motivate the apparition of a fabulous field – **intelligent systems** that can work much better and much faster to man's advantage, including for the acceleration of his evolution, and more efficiently that the instruments created by man would have done it. Evolutions, until today a field appropriate only for the live bodies becomes possible for artifacts also: robots, autonomous vehicles, all types of cybernetic cars, artificial brain and other instruments that we don't even imagine endowed with **language** and **capacity of multi resolution thinking**. Intelligent systems materialize precisely this ultramodern vision: the accomplishment of the decision-making processes and the solving of problems with the help of multi resolution informational architectures inspired from the accomplishment of the research in knowledge technology.

Multi resolution principle and intelligent systems

The multi resolution representation is a formidable human discovery in the intention of projecting new ways of accomplishment of evolution. For over a century they observed that the human mind uses images different as dimension, contents, representation and closeness when making decisions. Consequently people use different representations and make decision different as effect and correctness because of the different solutions found for the problems/ questions they have. In the live of informatics engineers we observe different communities that use different approaches and technologies, usually the ones they know best. For example, the ones who deal with fractals understood that this technology offers a mechanism for representing information with which the objects from nature can be reconstituted; the ones who deal with Web technologies are good with projecting portals and virtual enterprises; the ones who deal with knowledge technologies (expert systems, fuzzy systems, connection systems, etc.) are capable of projecting very complex informational architectures, including hybrid ones where the principle of multi resolution is the most obvious. By combining these technologies we can accomplish large amplitude intelligent solution and utility for all types of organizations or for private purposes. The multi resolution principle (Rosenfeld, 1984) is an exceptional discovery concerning the human mind architecture in the sense that the key problems of the "min project" can be solved only by the reconstruction of this one's structure in a multi resolution manner. Certainly, we can't observe the structure of our mind but we can restore/ reconstruct it from the registrations concerning its multidimensional and diversified functioning. This process of descending and ascending reconstruction of the functioning of the human mind is possible within the context of cognitive science (Dennett, 1998), according to the request of reverse engineering.

We have to admit that the reconstruction of functioning of the brain as a multi resolution pattern is a captivating field for all the researchers wanting to study the understanding and simulation of the cognitive processes that can be implemented in the intelligent systems. After many years of research in the fields that contributes at the substantiation of the artificial intelligence as science and technology, the multi resolution patterns can be used now successfully at the construction and exploitation of all types of cars, artifact systems and organizations qualified simply with the term of intelligent systems.

We have to know that the intelligent systems emulate the human abilities of perception of the realities from the environment in which they act, of collection and organization of the knowledge perceived, of projection of the things (objects, situations, events, processes), plans and programs of their use, and to execute and control these plans and programs according to the most efficient decisions.

The functioning of these systems has to ensure the evolution and welfare of human kind.

Artificial systems intelligence

Intelligence is the ability of a system to act adequately in an uncertain and/ imprecise environment so that it accomplishes with chances as higher as possible the purpose for which it was created. In this definition be **adequate action** we understand the action by which the changes of getting success are increased and the accomplishment of the **goal** is possible by the accomplishment of all the **sub-goals** that support the final goal of the system. The criterion of success and the criterion of the final goal are defined from outside the system.

For the intelligent systems, the developers, projecting engineers, programmers and even operators, define these criteria. For the biological human beings the final goal is propagated genetically and the criteria of success are defined by natural selection.

Anyway, we have to remember that a minimum intelligence of a system needs the ability to perceive the environment, to perceive and interpret a situation, to make decision and to control its own actions. Higher levels of intelligence include the ability to recognize objects and events from the environment of action, to represent the knowledge as an adequate model of the real world, to plan actions and to reason about the future.

Following that, an intelligent system, in its advanced forms, has to offer the ability to perceive and to understand, the ability to choose based on the reasonings made, the capacity to act successfully under the conditions of a multitude of circumstances in order to survive, prosper and ensure the reproduction in an environment as complex and as hostile as it may be.

It is understood that under these circumstances, the definition of intelligence has to incorporate numerous representations from biology, psychology, mathematics, informatics, control theory, linguistics, management and engineering; all these fields can give their own definitions to intelligence.

For example, from the perspective of psychology and biology, intelligence is the behavior strategy by which the individual obtains the ways of maximizing his chances of survival by propagating his own genes. *Intelligence is the integration of perception, reasoning, emotions and behavior in a system that feels, perceives, knows, takes attitude, accomplishes plans and acts accordingly.* Intelligence, from the perspective of control theory is a phenomenon obtained by the integration of knowledge and retraction in a system sensitive to the actions of the environment and of control oriented towards a certain goal.

Levels of intelligence

From thorough researches resulted the existence of different levels or degrees of intelligence determined by the characteristics of an intelligent system this way:

1. The power of calculation and inferring of the system
2. The complexity of the algorithms and inferential mechanisms used in the sensorial processes, of modeling of the real world, of behavior generation, of judgment of the values and of global communication;
3. The data, information and pieces of knowledge stocked in the system memory
4. The complexity of the processes of functioning of the system

Such levels of intelligence can be notices by measuring with the help of some well-established performance criteria (costs, time, accuracy etc) of the success of the accomplishment of the goals and/ decision of the intelligent system. Intelligence can be observed evolving by increases of the power of calculation and inferring, of decision and perception, of action in environments more and more complex and uncertain in continuous change.

The developers, the projecting engineers and the programmers have an important part in the increase of the power of calculation and inferring of the intelligent system. The can accomplish the *adaptation and the growth of the intelligence of the system* by accelerating the learning. *Learning* is the mechanism allowing the refining of the knowledge about the field or the real worlds, about the improvement of the reasonings and skills of action of the system.

Calculation and inferring phenomenon

Usually, in theory, intelligence is treated as a calculation and inferring phenomenon based on the unitary functioning, in a closed cycle, of **four fundamental processes**:

1. generating behavior
2. modeling of the real world (the field)
3. sensorial processing
4. judgment of the value

These processes can work in full cooperation with the goal of processing the information received from the sensors installed in the environment, the construction, maintenance and use of the ground of knowledge, selection of the goals, reaction to the signals of the sensors, the execution of the duties and control actions.

The sensorial processing accomplishes functions of establishment of attention, detection and grouping of the events, calculation of attributes, comparison of the observations with the expectations, the acknowledgement of the objects and events, respectively the analysis of the situations.

The modeling of the world builds and stocks the internal representation of the entities, events, relations and situations according to which it generates/ infers predictions, expectations, beliefs and estimates the probable results of the future actions.

The judgment of the value calculates the cost, the benefice, the risk and the expenditures expected with the plans, attributes a value to objects, events and situations in accordance with which decides what is important and insignificant, what is profitable and what is a problem, what degree of trust can be attributes to the entries in the model of the real world.

The behavior generator selects goals, decomposes duties, generates plans, coordinates the activities and controls the action.

These four fundamental processes are interconnected by **a calculation of cyclic control with retroaction**. This control is inside the in intelligent system and it is accomplished at the sensorial processing by the modeling of the real world and judgment of the value by the behavior generator.

The existence of an internal connection between the model of the real world and the sensorial processing generates predictions that can be compared with the observations of the sensors. With its help we can close the cycle from inside the system that can be used at the recursive estimation, at the predictive filtration or as a request of stocking the events in the short-term memory. Let's also notice the existence of an internal connection between the behavior generator, the modeling of the real world and the judgment of the value that closes the cycle of the internal planning when a variety of plans is simulated and assessed before the selection of one for execution.

Such computational cycles – from the perception to action, from the modeling of the worlds to the sensorial processing and from the behavior generation to the modeling of the worlds, the judgment of the value and back again – are repeated within an intelligent system at several levels just like the sub-systems are aggregated in entities, events and situations in accordance with the decomposition of the goals in sub-goals according to which are generated the orders. Within each cycle, the modeling of the world maintains a basis of knowledge with a certain resolution capacity. At each level the plans are elaborated and updated for different horizons of time, and the short-term memory stocks the perceptions of the sensors at certain intervals of time according to which retroaction changes its characteristics. *This model with multi resolution hierarchy of the computational cycles offers a greater power of insight of the behavior, perception, cognitive, emotional, of solving problems and learning phenomena.* Up to now this model is the only one that supports a formal theory of the intelligent systems.

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NEURONAL NETWORKS FOR COMPLEX ECONOMIC PROBLEMES

Dăscalescu Ana Cristina

Universitatea Crestina Dimitrie Cantemir, Facultatea Management Turistic si Comercial, telefon 0721717162, cristina.dascalescu@gmail.com

Nidelea Marinela

Universitatea Crestina Dimitrie Cantemir, Facultatea Management Turistic si Comercial, telefon 0722759923, matemaia@yahoo.com

The article describes solutions in solving business microperiodicity issue. It also estimates the risk of bancruptcy through neuronal networks appliance.

The article contains:

- initiatory notes related to neuronal networks (components of biological neuron, structure of artificial neuron, models of artificial neuronal netwoks)
- external factors concerning business microperiodicity issue and also appraisal risk of bankruptcy
- prevision CAF development
- projection CAF satges
- final results of CAF reviews
- development of bankrupcy global analyse pattern and CAF prevision based on artificial inteligence techiques

The two parts of the selected model are presented, and also their conversion, using neuronal networks.

Preliminary notions

The AI techniques based on neuronal networks start from the biological structure of a human brain neuron. A biological neuron includes:

The nucleus, the cell body;

- dendrites, formed by enering into the cell (the cel receptors);
- the axon, formed by the coming out of the cel (neuron response);

The artificial neuronal networks imitate the biological structure of the neuron and are formed of severasl nodes each containing artificial neurons.The interconnection between the nodes follow differnt patterns.more clearly the structure and operation of the artificial neuron is as follows:

- Entrances are comparable to electric impulses received by the dendrites from other neurons;
- Exits are signals by the nucleus through the axon;
- A type of synapse is appealed for conections between the axon and another cell.

Theoretically the artificial neuron simulates the behaviour and the operation of the biological nucleus. However the first behaves relatively in a rigid way and „ it is not at all a quick learner" functioning on the basis of retroactive algorhytms(from experience).

Generally speaking, the artifficial neuronal network is a dynamic and adaptive system made up by several neurons groupped by levels.

where:

- X_j = entrances;
- P_i = weights associated to entrances;
- S = the ponderal sums of entrances;
- F_a = activation function;
- P_a = the activation limit;
- Y = the exit/response of the neuon.

There are several types of artifficial neuronal networks depending on configuration, complexity, etc the most frequently used and the most complex being the artifficial neuronal networks with multiple levels.

Applications of neuronal networks in the problem of business microcyclicity and the assesment of bankrupcy risks

Main exogene factors :

F1- the cyclic evolution of businesses at sector or macroeconomic level respectively the phase through which the economic system passes (we have in view CAM- subsequently analised- when we suggested that the studies in the domain should be taken into account; moreover for middle-sized and big companies it is recommended that studies of this kind should be done.

F2 – The number, the type and the proportion of the relations with clients (we have in view the possible bankrupcy situation of some important client specially if the company depends on a small number of clients)

F3 – The number, type and proportion with the relation with providers (the antithesis of the prior factor)

F4 – The acess to the capital and to the support granted by the bank system (we have in view the event of a bankrupcy of the bank where the company has its current account)

F5 – The juridic protection instituted by law over the evolution of the company's business (the regulation of the MORATORIU and of the concordance by the legislation regulating the reorganisation and judicial liquidation, respectively Law 4/1995 for Romanian companies.

F6 – Public support, by law of the company in a difficult state so that it is given the chance to set rights (exempting from income tax, granted credits, consultancy and support)

F7 – Competition in the domain of activity of the company respectively the market where the company activates (number, power of competitors)

F8 – A mixed factor deriving from the particular situation of the company or less frequent causes: ocult maneuvers of some groups sharing diverse interests, the country risk speciffic to external market, expropriations and nationalizations;

The main endogene factors :

F9 –Justification of cash flow and its implementation including measures to fit into the plan, improvement (shortly liquidities)

F10 – The quality of top management, the professional training of the leading staff including the quality and the training of the other managers (we also include here the trainingof the "entertainer" of the company – sole or majority proprietor and the latter's ability t excert his powers)

F11 – The quality and the training of the other employees of the company, the attitude towards the mission of the company and their loyalty.

F12 – The management applied whithin the company and especially inovation and receptivity to inovation in the domain (structures, the information system, decisions, management systems and methods, stimulating the staff) appeal to information technology for assistance etc.

F13 – Control over stock level (raw material, goods) inclusively applicatons of the JIT type, ie. Just in time, diminishing the inventory)

F14 – The company's place on the market respectively the share when compared to other competitors whether direct or indirect; the tendency to increase or decrease the market share, the market policies and the allotted funds

F15 – Client credit policy, payment terms, the place of the client in the vision of the company, studies on request tendency, studies on the demographic factor and on revenues, claims and settlements, the medium term for delivery, direct discussions with clients.

F16 – The position gained by negotiations with providers, the volume of delivery on the bases of delivery credit, payment terms and methods.

F17 – The salary system and the staff expenses- managers and other employees – as well as their corelation (salaries, bouses) the weight of salaries in costs, the relation between increase of salaries and the increase of productivity.

F18 – The organisation of the information accountability system (financial accountability and management accountability) this includes aspects like payment methods, patrimony assesment, relation with financial bodies.

F19 – The cyclic evolution in business at the level of the company and the phase business has reached (we have in view the study of the business cycle proper to the company- CAF that we shall deal with further on; what is taken into account is the history of CAF, the period that have been done)

F20 – Research, innovation, antepreneurial attitude from the top to the base of the pyramide, explicitly for the product that has been created (technological process, inovations, patents or investments but also distribution, markets (funds alotted for R&D, weights in turnover or profit, number of inovations and patents, qualification and R&D staff, new products, ways of delivery, identification of future needs)

F21 – Launching in business opportunities of the type „ false opportunities" (without prior analysis) specific to backstage activity which have a great impact on current liquidities, the relation assets and liabilities.

F22 – A factor made up of elements as it follows: the inflational period that the national economy is going through, the excessive dependence on a couple of big companies, severe accidents like fires etc.

The specialists' focus on the assessment of bankrupcy risk of the company has had as an effect favourable results (the Z model, the A model) but essentially the problem has not yet been solved. A global solution to this problem may be reached- or at least this step could be taken- if efforts were made for the analysis to go on a parallel way, respectively in the direction of the study of CAF. The analysis in this way implies the development of enough „models" and associated data bases.

On the main national economy sectors

- By the dimension of companies
- By other criteria.

Before developing such models for the economic sectors and by the dimension of the company it is understood that the most complex task resides in the projection of a general model whether or not based on artifficial inteligence techniques- a model which shall subsequently represent reference framework. For so far as the organization of the accounting informational system differs from one country to another, it is recommendable that the projection of such models for the general analysis of bankrupcy be limitted to a certain national economy. Anyhow such models may have as an aim the assessment and symultaneous prediction both of the cycle of the company's business and of the associated bankrupcy risk. system projected. that the projection of such

In all cases in which the prediction of CAF is possible, the associated bankrupcy risk is also estimated for that particular company. The reciprocal of the statement is to a large extent true, respectively the assessment of bankrupcy risk from a global perspective implicitly presupposes the projection of a certain CAF. By conexing the two problems that have been discussed , we reach a common solution which shall express more acurately the situation of the companies in the real economy. More than that, CAF prediction directly supports the decident to control business development, to make reserves and to remain in an aeria which is bankrupcy „safe". The CAF prediction trial must be based on the company's history (statistic data) which characterize its evolution up to the respective moment; subsequently CAF projection may have many variants inclusively the neuronal network for bankrupcy analysis. Out of the graphic as a possible situation reached when analysing CAF it follows:

- On the basis of strict statistic data which characterize the evolution of the company up to moment T the decident may have three possible options for the protection of CAF which is V_i, V_2, V_3;
- *If,* for exempleanalysis is made   by a representative of the bamk system it then appears probable that he selects variant V_1.
- When the analysis is made by the superior decident of the company he should complete his analysis by relating to the three variants to the CAM evolution.

On the other side, the development of a bankrupcy global analsis and of CAF prediction may take place especially on the basis of artifficial inteligence techniques. Such a model – for the global analysis of bankrupcy in parallel with CAF study and prediction must be made up of two parts:

PART I - Determining a diagnosis on the basis of financial indicators at the moment named t (it can resort to example Z, example Varetto/Marco, etc.);

Fig. 1 - Bankruptcy zone

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PART II - Supplementing the diagnosis on the basis of factors influence estimation.

For combining both parts of the model, an incontestable help offers IA techniques and high efficiency computers. We consider that for the problem we refer to, the most convenient method is to resort to neuronal networks, as it follows:

1. Part I of the model follows to be structured depending on the type and number of the record indicators kept for the analysis. Structuring knowledge within the framework of "data base" is quite flexible and can be created depending on relevant data that human experts might have.

2. In part II of the model, factors Fi, F2,….F22 will "decompose" on four or five levels – taking into consideration the interdependence between them – in order to create a new data base.

Information on the basis each factor F, F2, ……..F22 describes in decay/derivation structure becomes *inputs* for the data base, become Xi, X2, …..X, as network entering stimulus. It is very important to mention that the data base can be permanent loaded through transfer of some data from the external knowledge base which human expert has. In fact, we must discuss about two *global neuronal networks,* each of them composed of many neuronal sub networks, as follows:

– a global neuronal network (for the fist part of the model) that will process, through sub networks, relevant data offered by the retained indicators;
– a second global neuronal network (second part of the model), these will follow to process through sub networks, inputs due to factors Fi, F2, ……F22.

The model's graphics structure can be draw as it follow

Fig. 2

DIc – data connected to retained indicators;

DF - derivate data for factors Fi, F2, F22;

Those two exists/scores generates by those two global networks will be entries to a different network which, by comparison, will offer the final score.

In the final phase of the model's functioning, depending on the pre established power between its two parts, it would follow that each of them to participate at some rate in solution's structure at the problem of bankruptcy risk estimation and prediction of CAF. The final solution will look as in interval - (1, 10), for example – for which it establishes three or four   sub intervals of interpretation (in fact, we talk about the interference device):

– (6,10) very positive situation;
– (3,6) average situation;
– (0, 3) maximum risk of bankruptcy.

Concomitantly, to a certain extent, at the analysis moment t of the bankruptcy risk it processes with model's help the relevant data regarding the company's situation for the last five years, then the final mentioned solution before includes five principal points for tracing CAF (figure 3)

Fig. 3

ELECTRE ALGORITHM APPLIED IN INFORMATICS, AN USEFUL METHOD FOR OPTIMIZATION MULTICRITERIA DECISIONS

Demian Horia

Abrudan Maria-Madela

University of Oradea, Faculty of Economics, No 1, University Street, 410087, Bihor, Tel. 0259 408 796, e-mail: horia_demian@yahoo.com, m_abrudan@yahoo.com

Abstract: The present paper wishes to tackle from the point of view of computer science, the problem of decision rationalisation through using the Global Utility Method and the ELECTRE Method, in the case of multicriterial decisions with one decisional factor.

Key words: ELECTRE, decision, multicriteria

The use of the ELECTRE model in dealing with the problems with multicriterial decision was done for the first time in 1965 by a group of French researchers.

Management is primarily a chain of interdependent decisions. The decision represents the central point in management as it is found in all management –related activities and functions. To decide means to choose from many variants of action the one which is considered to be the most proper for attaining certain objectives, and to take into consideration several criteria while performing this activity.

Considering the knowledge of the environment by the decisional factor and the variables that influence the potential results, decisions are divided into the following categories: the ones taken in circumstances of certainty, the ones taken in circumstances of uncertainty and risc.

In the process of rationalising decisions, in circumstances of certainty, methods such as the Global Utility Method, the ELECTRE Method and the Onicescu Method can be used.

The present paper wishes to tackle from the point of view of computer science, the problem of decision rationalisation through using the Global Utility Method and the ELECTRE Method, in the case of multicriterial decisions with one decisional factor.

The first step in tackling the methods of decision optimisation in the case of decisions taken in circumstances of certainty is the realization of the utility matrix starting from the economic consequences matrix (criteria (minimum / maximum), variants, importance values).

The first step was the realization of an interface used for the introduction of the entry data.

fig. 1.

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With the help of this interface, the user will have the posibility to establish the number of criteria, the importance value associated with them, whether a certain criterion is minimum or maximum, and also the number of variants and the coresponding economic consequences. All these data can be saved in an XML file, which can then be used for remaking the calculations.

By presssing the Assessment button, the utility matrix, the concordance and discordance values, the subsequent matrix resulted from comparing these values and the display of results are all automatically calculated.

ETAPA I

Calcularea utilitatilor

Coloana: 1

Valoarea minima: 68.0000

Valoare maxima: 74.0000

U11=(70.0000 - 68.0000)/(74.0000 - 68.0000)

U21=(74.0000 - 68.0000)/(74.0000 - 68.0000)

U31=(68.0000 - 68.0000)/(74.0000 - 68.0000)

	Criteriu	Utilitati	Criteriu	Utilitati	Criteriu	Utilitati	Criteriu	Utilita
Coeficienti	1		2		3		1	
Minim/Maxim	Maxim		Minim		Maxim		Minim	
Variante/Criterii	Prodctia fizica		Cost de prod.		Profit anual		Viteza de rotat	
Varianta1	70	0.3333	11	0.5000	671	0.5085	110	0.750
Varianta2	74	1.0000	10	1.0000	700	1.0000	116	0.000
Varianta3	68	0.0000	12	0.0000	641	0.0000	108	1.000

(Matricea variantelor / Matricea Rezultatelor pt. metoda ELECTRE)

fig. 2

Coloana: 2

Valoarea minima: 10.0000

Valoare maxima: 12.0000

U12= 1 - (11.0000 - 10.0000)/(12.0000 - 10.0000)

U22= 1 - (10.0000 - 10.0000)/(12.0000 - 10.0000)

U32= 1 - (12.0000 - 10.0000)/(12.0000 - 10.0000)

Coloana: 3

Valoarea minima: 641.0000

Valoare maxima: 700.0000

U13=(671.0000 - 641.0000)/(700.0000 - 641.0000)

U23=(700.0000 - 641.0000)/(700.0000 - 641.0000)

U33=(641.0000 - 641.0000)/(700.0000 - 641.0000)

Coloana: 4

Valoarea minima: 108.0000

Valoare maxima: 116.0000

U14= 1 - (110.0000 - 108.0000)/(116.0000 - 108.0000)

U24= 1 - (116.0000 - 108.0000)/(116.0000 - 108.0000)

U34= 1 - (108.0000 - 108.0000)/(116.0000 - 108.0000)

Coloana: 5

Valoarea minima: 6.0000

Valoare maxima: 10.0000

U15=(8.0000 - 6.0000)/(10.0000 - 6.0000)

U25=(6.0000 - 6.0000)/(10.0000 - 6.0000)

U35=(10.0000 - 6.0000)/(10.0000 - 6.0000)

****

ETAPA II

Calcularea coeficientilor de concordanta

Coeficientul de concordanta C[1,2]= (1.0000 + 3.0000)/ 10.0000

Coeficientul de concordanta C[2,1]= 1- (1.0000 + 3.0000)/ 10.0000

Coeficientul de concordanta C[1,3]= (1.0000 + 2.0000 + 3.0000)/ 10.0000

Coeficientul de concordanta C[3,1]= 1- (1.0000 + 2.0000 + 3.0000)/ 10.0000

Coeficientul de concordanta C[2,3]= (1.0000 + 2.0000 + 3.0000)/ 10.0000

Coeficientul de concordanta C[3,2]= 1- (1.0000 + 2.0000 + 3.0000)/ 10.0000

****

ETAPA III

Calcularea coeficientilor de discordanta

Ecartul maxim este: 1

Coeficientul de discordanta D[1,2]= (MAX(|0.3333-1.0000| ,|0.5000-1.0000| ,|0.5085-1.0000|))/ 1.0000

Coeficientul de discordanta D[1,3]= (MAX(|0.7500-1.0000| ,|0.5000-1.0000|))/ 1.0000

Coeficientul de discordanta D[2,1]= (MAX(|0.0000-0.7500| ,|0.0000-0.5000|))/ 1.0000

Coeficientul de discordanta D[2,3]= (MAX(|0.0000-1.0000| ,|0.0000-1.0000|))/ 1.0000

Coeficientul de discordanta D[3,1]= (MAX(|0.0000-0.3333| ,|0.0000-0.5000| ,|0.0000-0.5085|))/ 1.0000

Coeficientul de discordanta D[3,2]= (MAX(|0.0000-1.0000| ,|0.0000-1.0000| ,|0.0000-1.0000|))/ 1.0000

****

ETAPA IV

Calcularea diferentelor intre coef. de concordanta si cei de discordanta

Diferenta C12-D12 = -0.2667

Diferenta C13-D13 = 0.1000

Diferenta C21-D21 = -0.1500

Diferenta C23-D23 = -0.4000

Diferenta C31-D31 = -0.1085

Diferenta C32-D32 = -0.6000

****

ETAPA V

Calcularea matricei de surclasare

Verificam Dif[1,2] > DIF[2,1]NU

Verificam Dif[1,3] > DIF[3,1]DA

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Verificam Dif[2,1] > DIF[1,2]DA
Verificam Dif[2,3] > DIF[3,2]DA
Verificam Dif[3,1] > DIF[1,3]NU
Verificam Dif[3,2] > DIF[2,3]NU
****

ETAPA VI
Afisarea rezultatelor

	Rezultat
Varianta1	1
Varianta2	2
Varianta3	0

fig. 3- Results

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WEB APPLICATIONS WITH DATABASE ACCESS

Demian Horia

Anton Mihai

Universitatea din Oradea, Facultatea de Stiinte Economice, str. Universitatii Nr. 1, Oradea
410087, Bihor, Romania

Abstract

This paper present the mechanism of transferring data from web pages to a record in a database, using stored procedures. You can see the mechanism of defining the parameters (name, type and length). A special case is the case of uniqueidentifier.

Stored procedures, ASP2.0

ASP.NET 2.0 is the last technology created by Microsoft for developing XML web services and web application. This paper presents some aspects regarding the process of creating web application with database access.

First of all, we have to begin with the creation of database. The analysis of our problem, help us to decide the informational attributes which have to be recorded in our database. For example, a database for recording some information for persons looks.

fig. 1

In the image above, you can see *Persoana* table, which structures contains fields for recording the first name, the last name, the address etc. After we have finished designing the database we have to decide the structure of our web application. In this moment, from our analysis there are two types of information:

- for public access
- for private access

Because some information will be available only for some special visitors of our site, we have to create a mechanism which helps us in filtering these visitors. Some will be public visitors, and other will be private visitors. This mechanism is known as authentication. A public visitor can become a private visitor, only if this person will provide a username and a password. So we must have a page for authentication which looks like the page from fig. 2.

Fig. 2

The authentication process takes the username and password provided by visitor and compare with usernames and passwords stored in the database. Usually there is a table which contains this king of information's, this table is created with private access permissions. If the authentication process finds a valid user, the public visitors will become a private visitor.

Because all the process have to function without any interventions, a page for recording the data for users, have to be created. Through this page, any user will provide a name, an address, a username, a password and any other information, needed.

This page can be like the page presented in fig. 3 (above). This page was created for public access.

fig. 3.

In the following line I will present the code behind this process which help us, to record the informations provided by visitors in table Persoana from database. Because of security reason, I used stored procedures. The code needed for this is presented below.

```csharp
using System;
using System.Data;
using System.Configuration;
using System.Collections;
using System.Data;
using System.Data.SqlClient;
using System.Web;
using System.Web.Configuration;
using System.Web.Security;
using System.Web.UI;
using System.Web.UI.WebControls;
using System.Web.UI.WebControls.WebParts;
using System.Web.UI.HtmlControls;

public partial class InregistrareParticipanti : System.Web.UI.Page
{
    //aceasta clasa se foloseste pentru inregistrarea unui nou participant, si prin urmare acesta inca nu a primit nici un id
    //va fi nevoie sa obtinem un id de pe server in momentul in care se incarca aceasta pagina si sa il utilizam
    // in momentul in care dorim salvarea datelor pe server
    protected SqlConnection con;//conexiunea spre baza de date

    protected void Page_Load(object sender, EventArgs e)
    {
        if (IsPostBack == false)
        {
            con = null;//initializam aceasta conexiune cu null pentru  a evidentia faptul ca s-a eliberat
            string lcidPersoana;  //avem nevoie de 2 variabile atunci cand lucram cu un uniqueidentifier
            System.Guid luidPersoana;

            int lnErori;

            lnErori = 0;
            lcidPersoana = "00000000-0000-0000-0000-000000000000";
            luidPersoana = new System.Guid(lcidPersoana);
            //definim parametri de de definire a conexiunii catre server pentru obtinerea de id
            string                                    ConnectionString                                =
WebConfigurationManager.ConnectionStrings["sesiuneConnectionString"].ConnectionString;
            con = new SqlConnection(ConnectionString); //instantiem pentru prima data obiectul conexiune
            SqlCommand cmd = new SqlCommand("", con);
                //comanda prin care vom apela procedura de pe server de obtinere a id-ului de persoana
            //cream conexiunea catre server
            try
            {
                con.Open();

                cmd.CommandType = CommandType.StoredProcedure;
                cmd.CommandText = "ClientOnline_NewId";//specifica numele procedurii ce urmeaza a fi exeutate
                cmd.Parameters.AddWithValue("@id", "00000000-0000-0000-0000-000000000000");
```

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```csharp
                cmd.Parameters["@id"].SqlDbType = SqlDbType.UniqueIdentifier;
                cmd.Parameters["@id"].Direction = ParameterDirection.Output;
                //verificam daca exista un astfel de utilizator
                cmd.ExecuteNonQuery();

                lcidPersoana   = cmd.Parameters["@id"].Value.ToString();

                if (string.IsNullOrEmpty(lcidPersoana) == false)
                {
                    //stergem din cache vechea valoare pentru idPersoana si o introducem pe cea noua
                    Session.Remove("idPersoana");
                    Session.Add("idPersoana", lcidPersoana);
                }
            }
            catch (Exception eExecutie)
            {
                //capturam erorile ce apar
                lnErori = 1; //marcam faptul ca au aparut erori
            }
            finally
            {
                //conexiunea a reusit , la fel si obtinerea id-ului de persoana
                con.Close();
            }

        }
    }
    protected void btnInregistrare_Click(object sender, EventArgs e)
    {
        //vom face verificarea completarii campurilor si vom trimite datele catre server in vederea inregistrarii  persoanei
        bool llOk;
        string lcTitlu;
        string lcNume;
        string lcPrenume;
        string lcParola;
        string lcConfirmareParola;
        string lcEmail;
        string lcInstitutia;
        string lcAdresa;
        string lcLocalitatea;
        string lcCodPostal;
        string lcJudet;
        string lcTara;
        string lcTelefon;
        string lcMobil;
        bool llStudent;
        bool llPrezenta;
        int lnEroare;
```

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```csharp
lnEroare = 0;
//aceasta procedura adauga nodurile radacina ale arborelui urmand ca in momentul in care utilizatorul
// selecteaza un nod acesta sa fie populat cu copii lui
string lcidPersoana;
System.Guid luidPersoana;
llOk = true; //pp ca totul este OK
txtMesaje.Text = ""; //resetam casuta de mesaje pentru a nu ramane acolo vechile mesaje
//verificam completarea titlului
lcTitlu = txtPrefix.Text.ToString();
if (string.IsNullOrEmpty(lcTitlu) == true)
{
    llOk = false;
    txtMesaje.Text = "Completati campul Titlu/Title ";
}
//verificam completarea numelui
lcNume = txtNume.Text.ToString();
if ( llOk == true )
{
    if (string.IsNullOrEmpty(lcNume) == true)
    {
        llOk = false;
        txtMesaje.Text = "Completati campul Nume/Sure Name ";
    }
}
//verificam completarea prenumelui
//……………………………………………………………………
llStudent = chkStudent.Checked;
llPrezenta = chkPrezenta.Checked;
//verificam completarea telefonului
//daca totul este completat pana in acest moment atunci putem continua cu incercarea de a salva datele pe server
    if (llOk == true)
    {
        //continuam cu salvarea
        if (con == null)
        {
            string                                    ConnectionString                                    =
WebConfigurationManager.ConnectionStrings["sesiuneConnectionString"].ConnectionString;
            con = new SqlConnection(ConnectionString);
        }
        try
        {
            if (con.State == ConnectionState.Closed)
            {
                //daca conexiunea este inchisa atunci o deschidem
                con.Open();
            }
            //definim variabila utilizata pentru executarea comenzii de inserare
            SqlCommand cmd = new SqlCommand("", con);
            lcidPersoana = Session["idPersoana"].ToString();
```
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```csharp
                if             ((lcidPersoana          !=       "00000000-0000-0000-0000-000000000000")         &&
(string.IsNullOrEmpty(lcidPersoana) == false))
                {
                    lnEroare = 0; //initial pp ca totul se va desfasura fara probleme
                    luidPersoana = new System.Guid(lcidPersoana);
                    //definim paramteri comenzii
                    cmd.CommandType = CommandType.StoredProcedure;
                    cmd.CommandText = "ClientOnline_InregistrareAutor";
                    //specifica numele procedurii ce urmeaza a fi exeutate
                    cmd.Parameters.AddWithValue("@idPersoana", luidPersoana);
                    cmd.Parameters.AddWithValue("@Prefix", lcTitlu);
                    cmd.Parameters.AddWithValue("@Nume", lcNume);
                    cmd.Parameters.AddWithValue("@Prenume", lcPrenume);
                    cmd.Parameters.AddWithValue("@Parola", lcParola);
                    cmd.Parameters.AddWithValue("@Email", lcEmail);
                    cmd.Parameters.AddWithValue("@Institutia", lcInstitutia);
                    cmd.Parameters.AddWithValue("@xType", llStudent);
                    cmd.Parameters.AddWithValue("@AdresaPostala", lcAdresa);
                    cmd.Parameters.AddWithValue("@Localitatea", lcLocalitatea);
                    cmd.Parameters.AddWithValue("@CodPostal", lcCodPostal);
                    cmd.Parameters.AddWithValue("@Judet", lcJudet);
                    cmd.Parameters.AddWithValue("@Tara", lcTara);
                    cmd.Parameters.AddWithValue("@TelefonFix", lcTelefon);
                    cmd.Parameters.AddWithValue("@Mobil", lcMobil);
                    cmd.Parameters.AddWithValue("@Prezenta", llPrezenta);
                    cmd.Parameters.AddWithValue("@eroare", lnEroare);

                    cmd.Parameters["@idPersoana"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@idPersoana"].SqlDbType = SqlDbType.UniqueIdentifier;
                    cmd.Parameters["@Prefix"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Prefix"].SqlDbType = SqlDbType.Char;
                    cmd.Parameters["@Prefix"].Size = 10;
                    cmd.Parameters["@Nume"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Nume"].SqlDbType = SqlDbType.Char;
                    cmd.Parameters["@Nume"].Size = 50;
                    cmd.Parameters["@Prenume"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Prenume"].SqlDbType = SqlDbType.Char;
                    cmd.Parameters["@Prenume"].Size = 50;
                    cmd.Parameters["@Parola"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Parola"].SqlDbType = SqlDbType.Char;
                    cmd.Parameters["@Parola"].Size = 10;
                    cmd.Parameters["@Email"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Email"].SqlDbType = SqlDbType.NVarChar;
                    cmd.Parameters["@Email"].Size = 100;
                    cmd.Parameters["@Institutia"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@Institutia"].SqlDbType = SqlDbType.NVarChar;
                    cmd.Parameters["@Institutia"].Size = 200;
                    cmd.Parameters["@xType"].Direction = ParameterDirection.Input;
                    cmd.Parameters["@xType"].SqlDbType = SqlDbType.SmallInt;
```

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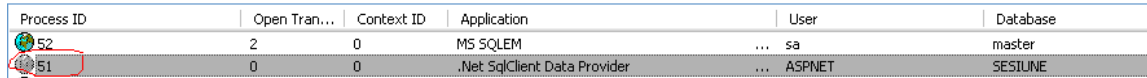
```csharp
                cmd.Parameters["@AdresaPostala"].Direction = ParameterDirection.Input;
                cmd.Parameters["@AdresaPostala"].SqlDbType = SqlDbType.NVarChar;
                cmd.Parameters["@AdresaPostala"].Size = 200;
                cmd.Parameters["@Localitatea"].Direction = ParameterDirection.Input;
                cmd.Parameters["@Localitatea"].SqlDbType = SqlDbType.NVarChar;
                cmd.Parameters["@Localitatea"].Size = 100;
                cmd.Parameters["@CodPostal"].Direction = ParameterDirection.Input;
                cmd.Parameters["@CodPostal"].SqlDbType = SqlDbType.NVarChar;
                cmd.Parameters["@CodPostal"].Size = 20;
                cmd.Parameters["@Judet"].Direction = ParameterDirection.Input;
                cmd.Parameters["@Judet"].SqlDbType = SqlDbType.NVarChar;
                cmd.Parameters["@Judet"].Size = 100;
                cmd.Parameters["@Tara"].Direction = ParameterDirection.Input;
                cmd.Parameters["@Tara"].SqlDbType = SqlDbType.NVarChar;
                cmd.Parameters["@Tara"].Size = 100;
                cmd.Parameters["@TelefonFix"].Direction = ParameterDirection.Input;
                cmd.Parameters["@TelefonFix"].SqlDbType = SqlDbType.Char;
                cmd.Parameters["@TelefonFix"].Size = 20;
                cmd.Parameters["@Mobil"].Direction = ParameterDirection.Input;
                cmd.Parameters["@Mobil"].SqlDbType = SqlDbType.Char;
                cmd.Parameters["@Mobil"].Size = 20;
                cmd.Parameters["@Prezenta"].Direction = ParameterDirection.Input;
                cmd.Parameters["@Prezenta"].SqlDbType = SqlDbType.Bit;
                cmd.Parameters["@eroare"].Direction = ParameterDirection.Output;
                cmd.Parameters["@eroare"].SqlDbType = SqlDbType.SmallInt;
                //verificam daca exista un astfel de utilizator
                cmd.ExecuteNonQuery();
                lnEroare = int.Parse(cmd.Parameters["@eroare"].Value.ToString());
                if (lnEroare == 1)
                {
                    txtMesaje.Text = "Exista deja o persoana inregistrata cu aceasta adresa de email!";
                    llOk = false;
                }
            }
            else
            {
                txtMesaje.Text = "Nu s-a putut aloca un nou id pentru aceasta persoana!";
            }
        }
        catch (Exception eExecutie)
        {
            txtMesaje.Text = eExecutie.Message;
        }
        finally {
            //finalizarea se termina cu inchiderea conexiunii catre server
            con.Close();
        }
    }
```

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```
            }//sfarsit buton Inregistrare Click
        }
    }
```

Like you see, I manually have created the connection from web application to the database server. The data is first verified, and only after these validations I will try to save it in the database. A very important improvement is provided by the connection pooling mechanism which decides how many connections will be made to the database, or if an available connection will be used for another user. I have opened two web pages, in two different browsers, one after the other without closing them. In the image above, at a specified moment in time there is only one, even if I closed it in my code. There is latency.

Process ID	Open Tran...	Context ID	Application	User	Database
52	2	0	MS SQLEM	... sa	master
51	0	0	.Net SqlClient Data Provider	... ASPNET	SESIUNE

Fig. 4

CONNECTION BETWEEN BUSINESS ARCHITECTURE AND SOFTWARE ARCHITECTURE

Fratila Laurentiu Catalin

Academy of Economic Studies, Bucharest, Romania

ABSTRACT

A business model can be build as the support of developing software application designed to business purposes. Some problems may appear because modelling the intricacies of the business context and modelling the software supposes the appeal to the different concepts and techniques, programming languages that make their integration difficult. The goal of the paper is to create the software system that fits the best the business software; the paper presents various related topics. We are focused on the principles that a software application must take into account, to make a connection between business architecture and software architecture.

KEY WORDS: Business modelling, software modelling, principles of modelling, management information systems, stages in analysis and modelling

INTRODUCTION

A business model can be the base for realize an applicable software for a proper business. Apparently simple, the process to pass business model to software model can generate some problems, due to the design of a business and the design of a software suppose different languages, different concepts, that made difficult the integration of these models.

In the same time, we can not speak about a biunique relation between two types of design or models. Those, there are important elements of business model that are not represented in the afferent software model because the proper activities are not developed. Some activities are roll on manually, not implying using computers and not existing proper informatics procedures. On the other hand, there are detailed or particular elements that are parts in software architecture that can not be represented in business architecture.

1. CHARACTERISTICS OF BUSINESS ARCHITECTURE AND SOFTWARE ARCHITECTURE

The design of a business has a strong extern character. In addressed to clients, contains objective of business, and implies human resources and non-technical resources.

The design of software refers to internal parts of system and emphasis technical aspects.

How can we characterize the business modelling and software modelling?

Business architecture supposes the creation of organized set of elements, with well-defined relations between them, which make a unitary group, defined by functionalities.

Specified elements are functional, non-functional and developed characteristics.

Functional characteristics results from the capacity of system to achieve functions required by users.

Non-functional characteristics refer to the qualitative attributes proper to non-functional objectives (for example performance, reliability, availability, etc).

Developed characteristics refer to the evolution of the system in terms of maintenance, reusing, cost and integrity.

Software architecture implies activities and proper instructions. Activities have a specific evolution, which suppose an order and synchronization in time, with evaluate results and validation of each activity.

Software modeling contain major activities:

- analisys;
- design;
- implementation;
- distribution.

Analisys have different forms:

- analisys of the requirements: refers directly to the requirements of the system, results from the architecture of the business;

- properly analisys: create a model for a optimal solution, which can be evaluate by the final users and have an important role for the process of realization.

Design can be made in different forms:

- design of architecture: define a based structure and a set of rules which create basis of detailed models;
- properly design: define a object oriented model, include techical solutions for it functions.

Implementation can have different forms:

- properly implementation: suppose programing od object oriented model using a programing language;
- individual testing: suppose testing of each class or group of classes, to eliminate possible errors;
- integrally testing: suppose testing of whole system from the point of view of external user. This stage implies final validation of a new created system, too.

Distribution is realized by takeover of software application by the client, including all sub-activities: installing, testing, exploitation, assistence on the contractual period, maintenance and proper updating.

2. PRINCIPLES TO REALIZE ARCHITECTURE OF SOFTWARE APPLICATIONS

To realize a high qualitative architecture of software application, it must look up to the following principles:

- to realize the system like a compact group of well-defined subsystems, with clear and explicit interfaces. Each functionality must be developed inside a system;
- to make individual developement for each system;
- to create simple, unidirectional and numerical decrease dependencies between subsystems and to eliminate mutual dependencies;
- to create clear and simple mechanisms for communiction between subsystems;
- to sincronize performing of paralel tasks in the general frame defined by the system and subsystem;
- to choose technical solutions with properly interfaces, that allow easy update;
- to facilitate visualization and assimilation.

To pass from the business architecture to software architecture is not a simple process, which can be automatically performed. It is not fixed a correspondence process or a properly algorithm. The differences between this architectures/models make this process difficult.

3. PRINCIPLES TO REALIZE BUSINESS ARCHITECTURE

To realize a high qualitative architecture of business, it must look up to the following principles:

- to identify information systems, which served in the best way to accomplish the business;
- to determine functional requirements;
- to determine non-functional requirements;
- like a base element in achieve stages of analisys and design from software modeling;
- to identify proper components.

4. CONNECTIONS BETWEEN BUSINESS ARCHITECTURE AND SOFTWARE ARCHITECTURE

The identification of information systems suppose the selection of those information systems which are adapted to the business requirements. These information systems can occur under one of the three forms: traditional, standard and new.

Traditional information systems are already existing and integrated in business systems. In the same time with the appearance of new requirements or services, these systems must be adapted and developed. Traditional systems represent previous investments and, sometimes, the adaptation of an existing system can determine appearance of positive results with significant decerease of finacial costs, time and human resources.

Standard information systems are systems sold by various specialized suppliers. These systems are typical in function, having the advantage of low acquisition and implementation costs, but have disadvantages that, usually, they are not optimized on the type of business. They are preferred by the small firms at the beginning of activity or having reduced activity.

New information systems are created and developed especially for business. The process is longer and complex, with financial and human costs higher. This alternative is choosing by firms with good activity, which have various and sufficient resources.

The activities of business that must be computerized referred to:

- stock, organize and administration of information;
- processing, conversion and present the information;
- knowing and taking decision;
- hardware and software control.

The changing of one information system by another is not a sudden process, but is made in time, gradual. Especially for financial institution, there is a well determined in time period when both systems function in parallel. After verifying of maintenance and well function in various condition of a new system, it will take the decision of changing of old system, with the transfer of all responsibilities to the new system.

Restrictions of any type or nature have a very important role in selection of an information system; from the internal restriction, generated by limitation in using of resources, to the external restriction, generated by legal rules and regulations that are applicable.

The identification of functional requirements represents the central point of connection between business model and software model. By use cases we can design the behaviour of various actors in the system. The interactions can occur between actors, actors and uses cases and between uses cases. The identification and correct represent of uses case can lead to a good representation of functional requirements of the system. Omission or wrong representation can determine not achievement of functionality, in part or totally and implicit bad/faultily function of system.

The identification of non-functional requirements is not linked, usually, by functionality or a use cases. These requirements represent general properties, they are not specific for a particular system or subsystem, but are applicable to the level of a firm.

It refers to the following aspects: quality, availability, security, using the resources, elements of efficiency and efficaciousness.

The functional and non-functional requirements are described at system and subsystem levels and are included in specification of requirements. They represent a projection of clients' options to the designer.

The business model is a **basic element** in achievement the different stages of analysis and design from software modelling.

Although is not a correlation one-to-one between business model and software model, a big part of business model can be used in analysis and design of software application. Due to the fact that software system management and sustain business, a lot of classes from the business model will be reflected and included in software model. Software model can be used to process different tasks, like identification of classes, attributes and operations, structures and relationships between them and collaboration between classes and objects.

The objects implied in collaboration can be active, reactive or passive objects. The active objects action independently one by another and initiate collaboration with different objects or with themselves.

The reactive objects action at specific events or must be released to begin a collaboration.

The passive objects do not initiate ever collaboration; they have the role to supply information and to execute operations at the requesting of other objects.

The business model is used to **identify the proper components**. The development based on the components is a modern direction which progressively substitute object oriented approach, although are used both forms at this time. The main and determinative element of appearance and developing software based on the components was the bigger requirement of reusing elements. As a result, the components of a business induce software components, and these are less dependently by the used code. A component offers properties, methods, events, by a standard interface, which allow configuration of component and set-up the collaboration with another components.

5. THE ROLE OF MANAGER IN DESIGN AND IMPLEMENTATION OF INFORMATION SYSTEM

The firms must to confront a lot of changes, to achieve their objectives:

- globalization, with a growing competition all over the world;
- needs to reproject the business;
- rapid changing of demographic profile of labour force;
- needts to form strong alliances, to accomplish requirements of clients and offers of suppliers.

Due to this transformations, it is necessary to use efficiently infomation technology. It is not enough to exist a strong link between technology and strategy. Managers must passed the barrier enforced by organizational structure, attitude of employees against to the new technology and to the changeability, so that information technology become a catalyser for changing – changing that will create new product and services for the firm.

To effective apply information technology, manager must:

– to understand techology and to be capable to view their applications, that having an important role in solving their business problems;
– to consider information system important to bring up-to-date department or operation, but in the some time, important to change fundamental processess of working and relationaships with clients and suplliers for the firm;
– to assure that the information technology is viewed especially from the perspective of coordination of strategic business plan of the firm, rather the technical perspective.

This last aspect create a major challenge for management: constitute a efficiently working partnership between those persons who settle business strategies and those persons who coordinate information technology. As a result, can occur new executive position, like CIO (Chief Information Officer), to coordinate strategical planning and information technology planning, to develop coordination and communication between different critical departments of the firm.

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COMPARATIVE ANALYSIS OF THE MAIN ECONOMICS INDICATORS OF THE ROMANIAN AGRICULTURE IN EUROPEAN CONTEXT

Gabor Manuela Rozalia

Universitatea "Petru Maior", TG. Mureş, rozalia_gabor@yahoo.com

Romania, with its new status as a Member State of the European Union will be able to access, its specific financing forms, beginning with 1 January 2007. Agriculture is one of the economic branches whose financing requirement is stringent as this sector though it has interest (and with tradition across Europe) for Romanian economy, it has not received political and economic actions in order to really sustain its development. The agricultural sector may provide Romania a real competitive advantage across Europe, Romania being alongside countries as France, Germany, one of the countries with a high agricultural potential. The paper suggests an analysis concerning the development of the main indicators related to agricultural sector in Romania, comapred to the EU's countries and implicitly submitting some solutions for economic recovery in this sector of major importance for both Romania and the European Union.

Key words: agricultural sectors, statistics indicators, comparative analysis

Introducere

Comperative with the economics indicators wich characterize the agricultural sector in European Union, at present, Romanian agriculture has certain *characteristics* related to:

- real absorption capability of structural funds of this sector;
- work force in agriculture is aged;
- Romania has a high degree of enployment in the agricultural sector compared to the European Union
- arable in operation is structured in a very high number of small farms;
- infrastructure and outfit with farm equipment is minimum directly resulting a low productivity of this sector;
- livestocks, production of main produce per capita as well as most vegetal production have a downward trend in 1990 – 2005;
- lack of Romanian produce competitiveness internationally;
- lack of a coherent national agricultural policy, etc.

Comparative analysis of the main economics indicators of the agricultural sector with the EU's countries

In this section, we present a brief analysis (carried out based on the statistics of Eurostat and international statistics) of the main economic indicator development characterizing the development of agriculture in Romania compared to that of the EU's Member States, indicators that relate to:

a. Weight of enployment in Romania and EU in 2005 (%)
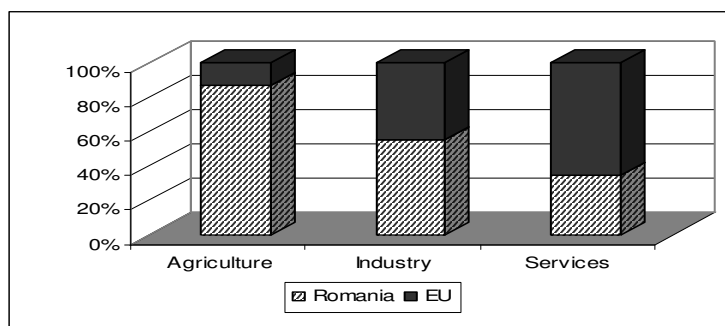
Figure no. 1 – Weight of enployment in Romania and EU in 2005 (%)

Compared to the European Union, Romania (figure no. 1) has a high degree of employment in the agricultural sector (32.2 % compared to EU where it is only 4.9 %), level directly reflected in the economic growth level compared to the EU's Member States where services have the highest share (70.3 % in EU's Member States compared to only 37. 5 % in Romania).

b. Enployment, by main activity of national economy
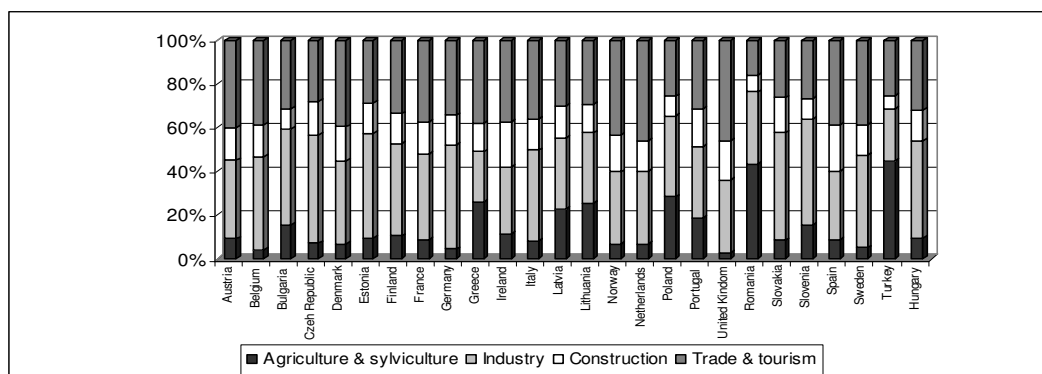
Figure no. 2 - Enployment, by main activity of national economy

Weight of the number of employees on the main activity sectors of the national economy in Romania (figure no. 2) compared to EU's Member States, ranks our country, as regards the weight of population working in agriculture, to the highest end (32.2 %) alongside Turkey (33.8 %) also proving Romania's low economic growth. As a result, Romania may access structural funds in order to regulate the occupation rate on activity sectors, one of actions being one of the basic objectives of EAOGF, early retiring schemes respectively.

c. Agricultural labour force by gender
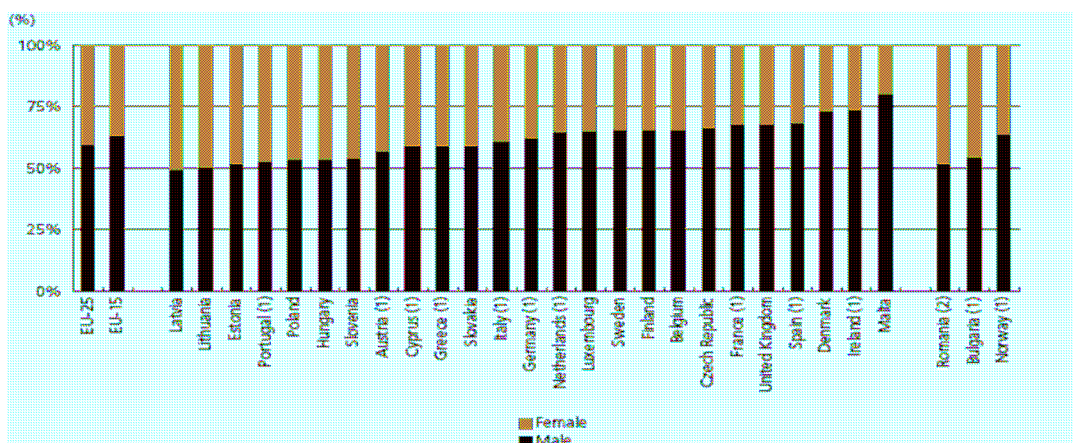
Regular farm labour force includes everyone (over the legal age limit) having provided agricultural work on and for the holding during the last 12 months; every member of the holder's family working on the holdingare taken as regular labour force (holder included) and non – family regularly employed labour force.

(Source: "EUROPE IN FIGURE – Eurostat yearbook 2006 – 7, p. 288)

Figure no. 3 – Agricultural labour force by gender, 2005

In Romania (figure no. 3), labour in agriculture on gender allots employees in relatively equal proportions between women and men, a high share of women working in agriculture is present in countries such as: Latvia, Lithuania, Estonia, Portugal, Poland, Hungary, Bulgaria, compared to other countries in the European Union where weight is dominated by men, the highest level being in Ireland (about 75 %), Denmark, Spain, United Kingdom, France, the Czech Republic.

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d. Contribution of major activities to gross value added
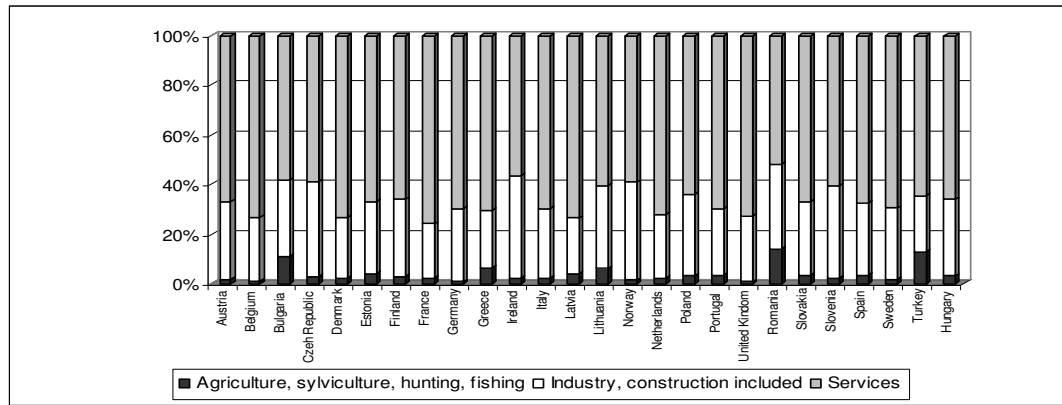
Figure no. 4 - Contribution of major activities to gross value added, in 2004

As regards the contribution of main activities of national economy when making the gross added value (figure no. 4), Romania has the highest weight of agriculture to the gross added value (with a percentage of 13.9 %), close value have Bulgaria (11.1 %) and Turkey (12.9 %). At the other end, United Kingdom is present with only 1 %, and from the countries with a high agricultural potential: Germany – 1.1 %, France – 2.5 %, Italy – 2.6 % and Spain – 3.5 %, gaps being obvious.

e. Agricultural holdings with the another gainful activity
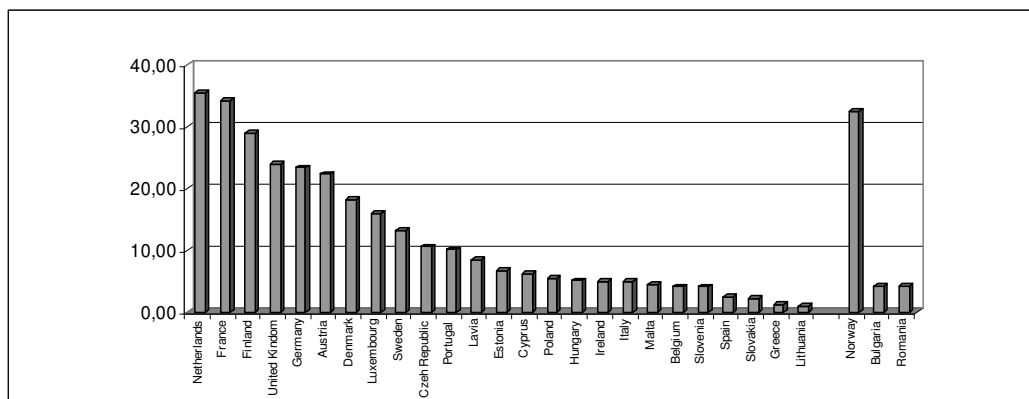
Other gainful activity: tourism, handicrafts, processing farm products, aquaculture, reneweble energy production and contractual work

(Source: "EUROPE IN FIGURE – Eurostat yearbook 2006 – 7", p. 288)

Figure no. 5 – Agricultural holdings with another gainful activity, 2005

As regards the number of firms in Romania (figure no. 5) that, apart their agricultural activity they also carry out other activities, complementary to agriculture (for example: tourism, produce processing etc.), their number is quite low, up tp five thousand firms, but even so, Romania is not on the last position, the highest number of such kind of firms is present in: Netherlands, France, Finland, United Kingdom, Germany, Denmark.

f. Income from agricultural activity
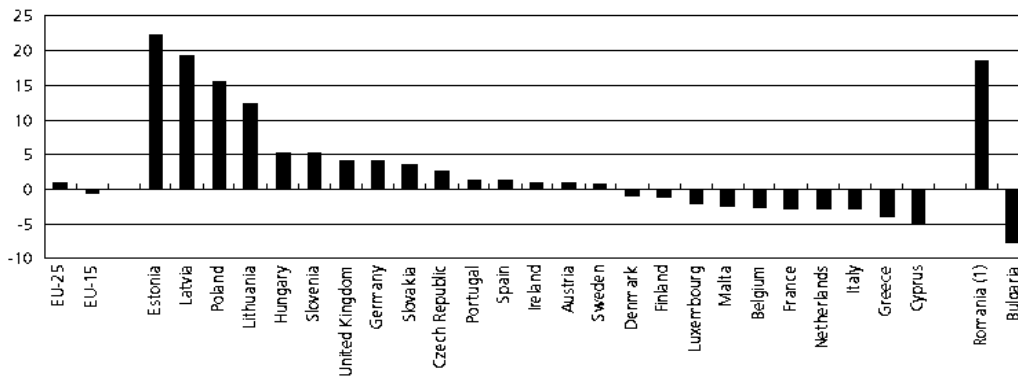
Average annual growth rate over the period 2000 – 04

(Source: "EUROPE IN FIGURE – Eurostat yearbook 2006 – 7, p. 294)

Figure 6 – Income from agricultural activity, 2000–2005 (average annual growth rates, %)

As illustrated in Figure no. 6, income from agriculture, based on the annual growth rate in 2000 – 2004 places Romania among the countries with the highest level, such as Estonia, Latvia and Poland.

g. Utilised agricultural area in total land
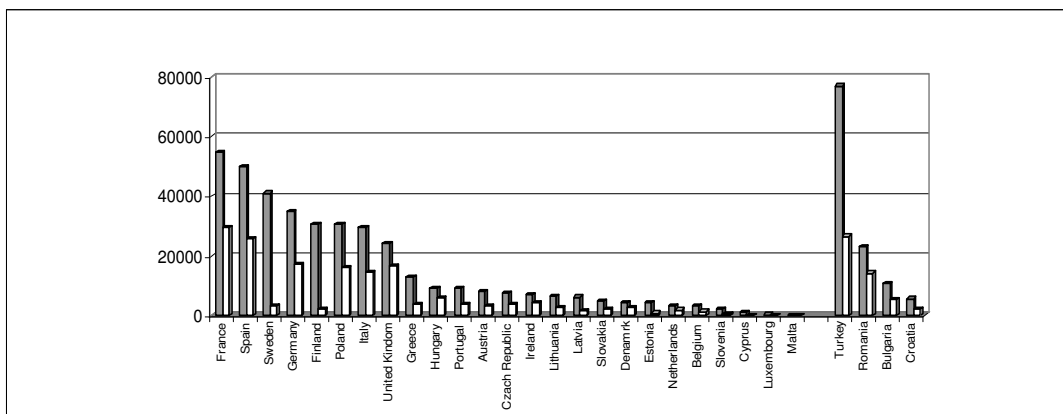
(Source of the data: "Europe in figure - Eurostat Yearbook 2006 -7, Agriculture, forestry, fisheries")

Figure no. 7 – Utilised agricultural area in total area

The weight of agricultural area used in total agricultural area (figure no.7) places Romania on top, with 62.29 %, a high level is also present in countries such as: United Kingdom – 69.6 %, Denmark – 63.96 %, Ireland – 62.52 %, Hungary – 65.44 %. At the other end, there are countries such as : Turkey – 34.48 %, Latvia -27.84 %, Estonia – 18.16 %.

h. Structure of arable land in utilised agricultural area
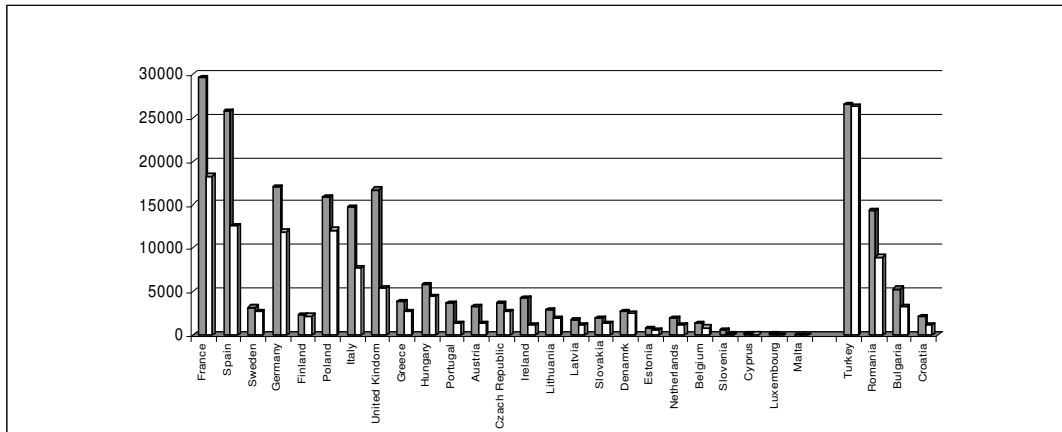
(Source of the data: "Europe in figure - Eurostat Yearbook 2006 -7, Agriculture, forestry, fisheries")

Figure no. 8 – Structure of arable land in utilised agricultural area

The structure of arable in total used agricultural area (figure no. 8) places Romania on a relatively good place, with a percentage of 63.22 %, surpassed by countries such as: Turkey – 99.25 %, Denmark – 91.48 %, Finland – 98.54 %, Sweden – 89.94 %, Poland – 75.98 %.
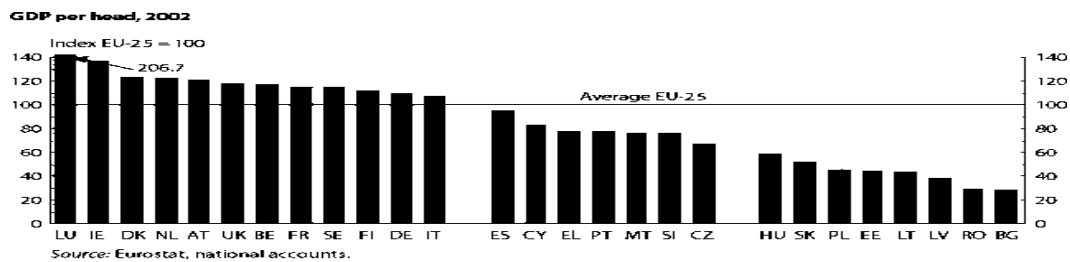
Figure no. 9 – GDP per head in 2002

In conclusion, illustrated figures and graphics tell their own story : Romania, with a low GDP per capita much lower than the average GDP in EU's Member States (level illustrated in figure no. 9) is much lower than agriculture efficiency in the European Union, but there is the opportunity of improving these indicators through a coherent agricultural policy and particularly by increasing the absorption capacity of the European structural funds, funds that are a significant financial source of Romania's agriculture.

Conclusions

Romania is the second major agricultural producer in Central and Eastern Europe, after Poland. It has the advantage of having a significant agricultural area, 14.8 million hectares respectively. Both soil and climate in Romania fosters an efficient agricultural exploitation. As Romanian farmers will benefit by a similar community support, our country may show major advantages compared to EU for a number of produce. However, in the short term, a significant restriction for Romanian agriculture in competition with community farmers is the significant tehnological gap, that can be recovered only by capital investments.

However, a positive effect of the major lack of real and moneyed capital in Romanian agriculture, was represented by the development potential of environmentally-friendly agriculture share (*organic farming*), thus meeting the trends recorded in the EU. However, in this regard, Romania did not exploit its advantage fully. Although ecological produce is made in the country, they have not been certified nationally for a long time, being exported under foreign certification.

Another potential advantage of Romania, starting from the traditional and non-intensive methods used, is maintaining the rural landscape and traditional character in many areas, and this may be of help to rural evelopment, especially through rural tourism.

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GENDER AND GENERATION STUDIES – A NEW DIRECTION OF STATISTICAL ANALYSIS ON POPULATION

Ghiţă Simona
ASE Bucureşti, simo_ghita@yahoo.com

Voineagu Vergil
ASE Bucureşti

Şerban Radu
ASE Bucureşti

Boboc Cristina
ASE Bucureşti

Abstract

Acording to statistical data, demographic dynamics in last decades were not optimistic ones, they worry both the demographs and the analysts in economical-social domains, as well as the political decidents and the development programs initiators. In the XX-th century, world population hadn't decreased, but it became older. The ageing demographic process tend to become more significant, with negative consequences on every side of economical social life, and on every country. But these tendencies are more powerful in less developed countries, than in well developed countries. The gender discrepancies in resource allocation (in education, health, nutrition, public life etc.) have a major significance because of their connection with the livind standard, the productivity, the economic growth.

Key words: demographic dynamics, gender discrepancies, economic growth

Since 1975, during the International Conference „World's Women Year" in Mexic, the Governments admitted the importance of the gender statistics and the women's role in the planning development process. With this ocasion, they reiterated the statistic data relevance about women, at the second Conference, in Copenhaga (1980). In 1985 the participant countries at The Third World's Women Conference (Nairobi) decided to create, develope, improve and reorganize their national informational systems, in order to provide gender-statistics for solving the specific gender problems.

In 1995, at The Fourth International Women Conference in Beijing was adopted an action-plan, that established the necessity of organizing the national, regional and international statistic-services system, capable of providing data disaggregated by sex and age. More recently, it was adopted a document „Women in 2000 year: gender equality, development and peace for the XXI-st century". On this ocasion, the Governments promised to create national offices of statistics, with financial and institutional support, for collecting, computing and diseminating sex and age - disaggregated data.

The „gender" concept refers to the social-created differences, to the atributes and opportunities associated with the fact of being a man or a woman, and also to the social interactions and relations between men and women. The gender determines what is expected, valuable, permitted to a woman or a man, in a certain context. In most of the societies there are differences and inequalities between women and men, concerning their roles and responsabilities, their actions, resources – control and access, opportunities in decision-making process.

Gender-equality means equal opportunities, rights and responsabilities for women and men, girls and boys. The equality doesn't mean that men and women are identical, but that one person's opportunities, rights and responsabilities do not depend on the fact that someone was born as a woman or a man. This implies that there are taken into consideration the interests, the priorities of both men and women.

Gender statistics reflect adequately the differences and inequities concerning the women and men situation, in all social-life sectors. To provide gender statistics, the individual data have to be disaggregated on sex and other variables, to reflect those differences or inequalities; also, the collected data must reveal aspects that affect one person of a certain gender much more than one person of the other gender, or they have to refer to gender-relations between men and women. Gender statistics allow a systematic evaluation of the gender-specific problems or inequalities between men and women.

Gender discrepancies reflected in statistical indicators

Despite the progress made in the last decades in most domains of the economical-social life, there still remain significant gender discrepancies in many aspects, and in most of the countries in the world. Though, these differencies are more incisive in less-developed countries than in more developed ones. Such

discrepancies refers to the resource allocation (in education, health, public life, nutrition etc.) and they have a major importance because of their strong relation with the living level, the labor productivity and with the economic growth. This intersexual inequity model starts at young age-groups, when boys get a more proper education than the girls.

Europe is not an exception from these tendencies. Demographic changes in the last years, and, above all, the fertility rate decreasing have major effects on economical and social life. The low level of fertility in the last decade is below the one needed for assuring the generation-replacement. Significant changes of demographical and family behaviour appeared in all the European Union's member-countries. Because of the biological differencies, it is presumed that girls have lower mortality rates in childhood and a higher life expectancy than the boys. This biological advantage is diminished, though, by nutrition inequalities and medical services inequities, by an unproper care of the pregnant women; due to all these, the illness rates and the mortality rates in women's case are higher than in men's case, especially during childhood and the reproductive period. In more developed countries, with a higher income, life expectancy for women is higher than for men, with 4-8 years (in average); this difference is lower in low-income countries (2-3 years) (Graphic no. 1).
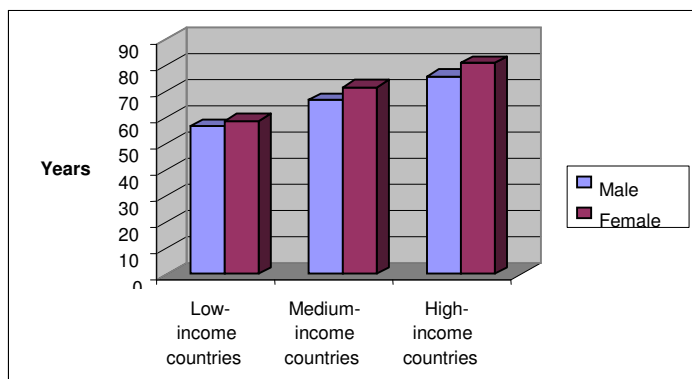
Graphic no. 1. Life expectancy at birth in 2004, for groups of countries by income-size

Data source: World Bank's population database

In territorial dimension, life expectancy at birth was higher in Western Europe (76 years – male, 82 years – female) and lower in Sub-saharian Africa (45 years-male, 46 years-female).

Life expectancy at birth for males and females significantly differs from one country to another: in 2005, for males, the statistical indicator had minimal values in Zambia (36 years), Zimbabwe (39 years), Rwanda (39 years) and maximum values in Switzerland and Japan (79 years), in Sweden, Hong-Kong (78 years). Lower life expectancy countries for males also were Botswana (38 years), Burundi, Central African Republic, Etiopia (41 years); higher life expectancy countries for males were Australia, Israel, Italy, New Zealand, Norway (78 years).

For female population, life expectancy is, anyway, higher than for male-population; its minimal values were registered in Botswana (38 years), Malawi (38 years), Zambia (37 years) and maximum values – in Japan (86 years), Spain and France (84 years), Australia, Canada, China, Italy, Switzerland (83 years). At present, in Romania the life expectancy at birth is 68,19 years (for males) and 75,47 years (for females). Considering the dynamics of the indicator in Romania, we can point out that, after 1990's, it had a similar evolution for males and females, although permanently its values were higher for female-population than for male-population: life expectancy decreased slowly until 1998 and, after that, it increased continuously, reaching in 2005, the values mentioned above (graphic no. 2).
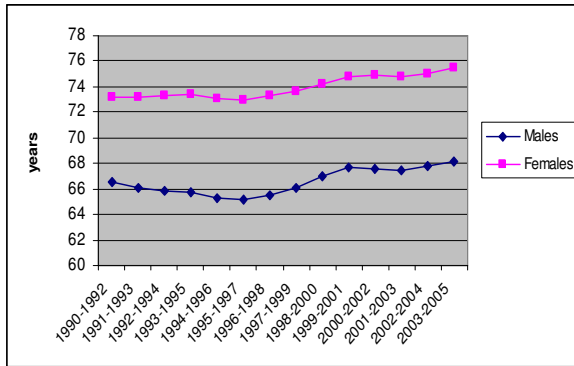
Graphic no 2. Life expectancy evolution in Romania, in 1990-2005
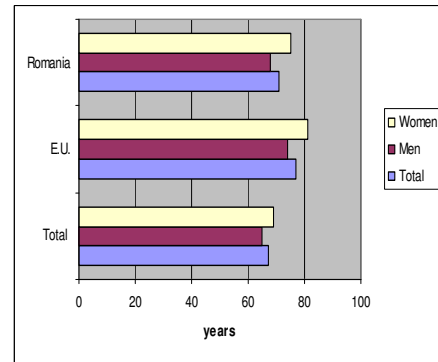
Graphic no. 3. Life expectancy at birth period in 2005

Compared to the European Union's average, life expectancy in Romania had lower values, both on total and on genders (graphic no. 3).

Using the Student test for independent samples, we tested the existence of significant differences between the indicator's average values for males and females. For an absolute value of the test (of 24,5211), we can conclude, with a very high probability (almost 100%, as the significance level is near to zero), that there are significant differences between the life expectancy values for men and for women. The data were computed using the informatic specialized program STATISTICA for Windows.

Other important statistical indicators, that reflect the discrepancies between the two genders, are mortality rate and infantile mortality rate. In Romania both indicators have high values, pointing to a disadvantaged situation our country is in. Infantile mortality rate values for females are lower than those for males, both on total and on age-groups. Mortality rate had similar evolution in our country, in 1990-2005 period, starting with a slow increase at the beginning of the period (until 1996), followed by a decrease until 2000. In the last years the indicator had again increasing values (in 2005 the mortality rate was 13,1 deceased per 1000 inhabitants – for males, and 11,2 deceased per 1000 inhabitants – for females).

We tested the existence of a significant difference between the average mortality rate for men and women; the t-test value was 9,752, concluding that there is such a significant difference, guaranteed with a probability level of 99,999998% (almost 100%).

In some countries, high values of maternal mortality rate represents a major death cause among women at fertile age. In well developed countries, most of the pregnant women are in good medical care, during the pregnancy time, ant at giving birth time, while in developing countries and in less developed ones, about 8 million pregnant women confronts serious complications every year and over half of million of them – die. This fact is reflected in high differences between maternal mortality rates in high-income countries and in low-income countries. In 1985-2004 period, this indicator varied in a wide range values, from 1 deceased per 100.000 living births (Greece) to 1600 deceased per 100.000 living births (Afganistan). In 2000 year the maternal mortality rate was only 9 deceased per 100.000 living births in most developed european countries, 689 deceased per 100.000 living births in low-income countries and 916 deceased per 100.000 living births in Sub-Saharian Africa.

Women's participation level in economical life is a major statistical indicator for reflecting the economic growth and the family wellfare. A more restrictive access to education and vocational training, housing unpayed activities, discrepancies on labor market – all these limit the female employment rate in payed economic activities, causing a decrease of labor productivity and of wages. When women are employed in payed-activities, they usually are concentrated in non-agricultural sector. In less developed countries the women proportion in the total labor force of agriculture has high values. Women are more likely to become unpayed familial workers than men, while men tend to become employers or self-employed workers. The causes for the appearance of such phenomena are: the restricted acces of women to credit market, to capital, to education, to a proper training, necessary for a good start of a business. Also, women confront with cultural barriers, which don't allow them to work on their own or to supervise other employees. Because of their domestic responsabilities, women's participation to economic activities is restricted.

Employment rate in European Union (average for 25 countries: 63,8%) was, in 2005 greater than in Romania (57,7%). Both in European Union and in Romania, the employment rate was lower for women than for men (51,5% in Romania, compared to 56,3% in E.U. – for females). (graphic no. 5).

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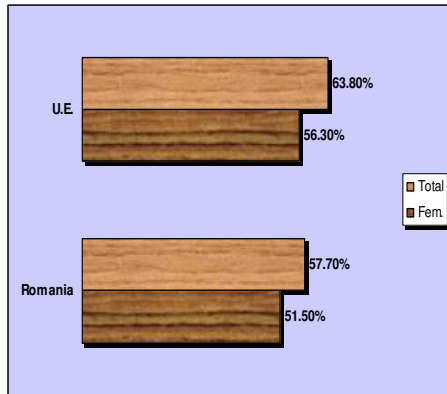
Graphic no. 5. Employment rate in Romania European Union in 2005 (%)
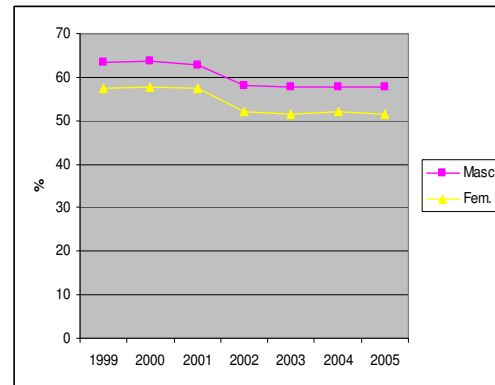
Graphic no. 6. Employment rate in Romania and during 1999-2005 period

In our country, between 1999 and 2005 the occupational level decreased continuously, in absolute and in relative figures. In 1999, in Romania, the employment rate was 63,5% and decreased at 57,7% in 2005. The employment rate dynamics were similar for males and females, but constantly, on the entire period, the employment rate for women had lower values than for men (graphic no. 6).

We used t-test for verifying if there are significant differences between employment rates for men and women. The t-test value was 7,0517, concluding, with a very high probability level (almost 100%) that the average employment rate for females differs significantly to the average employment rate for males (significance level close to zero).

The disadvantaged women's situation is reflected by their participation rate in decision-making process, although, in the last period, this situation gets better. Women are less represented in Parliament, Government and other institutions with decisional power. In 2004 in entire world 16% of all parliamentarians were women, compared to only 9% - in 1987. Without a proper representation of women in Parliament and in governmental institutions, they won't be able to have a major influence in adopting political strategies. In 2004 only 6% of the Parliamentary seats were women, in Middle East and North Africa, while in European developing countries – 22%. In Romania, the women's percentage was 11%.

Between the last two population census, Romania lost almost one million inhabitants and its population still decreasing. The main characteristics of demographic evolution in Romania, in the last years were: decreasing in population number, low fertility rate, demographic ageing process, high level of external migration, of general mortality rate and of infantile mortality rate. Because of these, Romania decided to join the Gender Generation Programme, initiated by the Population Unit of Economic Commission for Europe, of United Nations. This is a transnational, multidisciplinary, and prospective-longitudinal project, with the following objectives:

– producing the necessary information for studying the family dynamics and the family relations, for defining and implementing the policies and supporting family programs;
– finding answers to some fundamental research questions regarding the decreasing fertility level and the ways that the Government can support the families.

The project will provide information on children, partners, parents, work and every day- life. Statistical data will be helpful for studying the influence factors of creating a family, adopting the decision of having children, the relations between younger and older generations. Although national official statistics provide data revealing the existence of some inequities between men and women in different sectors of economical-social life, there still are necessary supplementary steps in elaborating an unitary, comparable and compatible methodology for all countries, in studying the gender-specific problems of social-demographic phenomena.

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LABOUR PRODUCTIVITY DISPARITIES IN THE EUROPEAN UNION

Goschin Zizi

Academy of Economic Studies, 15-17 Calea Dorobantilor, Bucharest, Phone: 0765505869, E-mail: zizigoschin@yahoo.com

Danciu Aniela

Academy of Economic Studies, 15-17 Calea Dorobantilor, Bucharest, Phone: 0745068543, E-mail: anielaco@hotmail.com

Abstract

Productivity is a key factor for the development of any economy and labour productivity is usually measured to identify its contribution to the growth of income per capita; it is also useful in cross-country comparisons for explaining persistent disparities of economic growth. There are various statistical indicators for measuring labour productivity; Eurostat is calculating three different indicators: GDP per person employed, GDP per hour worked and real unit labour cost growth. The paper investigates the patterns of labour productivity disparities in the European Union, both at national and regional level, from the standpoint of these three statistical indicators.

Key words: labour productivity indicators, disparities, European Union

Introduction

Productivity is a key factor for any economy, as higher productivity is leading to increased real income, improved living standards and is generally believed to generate significant economic growth. Labour productivity is usually measured to identify its contribution to the growth of income per capita and is useful in cross-country comparisons for explaining persistent disparities of economic growth.

Labour productivity relates a measure of output to labour, as a single measure of input. Both the input and the output can be expressed in different ways, thus generating various statistical indicators of labour productivity. **Eurostat** is calculating and three different indicators of labour productivity: GDP per person employed, GDP per hour worked and real unit labour cost growth.

When used in comparisons across countries the measurement of labour productivity requires the expression of output and input into values at common prices and common currency. The conversion from national prices to euro in Purchasing Power Standards (PPS) values eliminates price level differences between countries.

Labour productivity indicators

1. GDP per person employed is a statistical indicator which expresses the overall labour productivity of a country and enables cross-country comparisons. GDP at market prices, including taxes and subsidies on production and imports, is the final result of the production activity of the resident economic units. For international comparisons GDP is evaluated in euro at Purchasing Power Standards (PPS) by dividing GDP expressed in national prices to the Purchasing Power Parities (PPP). These conversion factors (PPP) are evaluated as a weighted average of relative price ratios in respect to a representative basket of goods and services. The average PPP of one euro is fixed equal to one PPS.

Table 1 shows labour productivity levels in UE member countries, United States and Japan, with respect to EU average (EU-25=100).

Table 1. Labour productivity indicators

Country	GDP in PPS per person employed (EU-25=100)			GDP in PPS per hour worked (EU-15=100)		Unit labour cost growth	
	1999	**2005**	**2007**[*]	**1999**	**2004**	**1999**	**2005**
EU-25	100	100	100	…	…	0.2	- 0.7
EU-15	108,1	106,0	105,5	100	100	0.2	- 0.4
Belgium	124,9	128,0	127,4	124,3	128,5	1.0	- 0.2

Czech Republic	58,3	65,9	69,7	45,0	50,2	0.4	- 0.9
Denmark	103,7	105,8	107,8	103,5	102,6	0.5	- 1.6
Germany	103,1	101,5	100,5	106,3	105,2	0.1	- 1.7
Estonia	39,2	58,6	65,2	…	40,2	4.7	- 3.8
Greece	86,8	98,5	99,6	61,7	71,0	…	0.4
Spain	100,2	97,3	95,2	88,9	88,3	- 0.7	-1.8
France	122,9	119,1	118,8	115,8	117,7	1.1	0.0
Ireland	119,1	127,4	129,3	108,1	118,8	- 3.6	0.6
Italy	122,5	108,1	106,5	99,3	92,0	-0.3	0.6
Cyprus	74,8	75,6	76,8	…	…	6.3	-1.2
Latvia	35,6	46,3	51,5	28,3	34,3	- 3.4	-3.1
Lithuania	38,3	53,2	57,5	34,0	41,7	2.8	-2.3
Luxembourg	160,3	160,9	160,4	49,9	153,4	- 4.2	-1.9
Hungary	59,3	69,8	73,3	…	…	- 4.0	0.1
Malta	…	80,5	80,3	…	69,5	- 0.7	-2.2
Netherlands	104,0	107,8	107,6	114,0	116,8	- 0.4	-2.0
Austria	…	…	109,6	98,7	96,4	…	…
Poland	55,4	63,0	54,1	44,7	47,6	- 1.5	-3.2
Portugal	71,9	65,5	64,5	65,1	59,2	7.0	0.2
Slovenia	70,0	76,9	80,1	60,1	66,3	- 2.8	0.1
Slovakia	51,7	62,1	66,7	46,0	52,8	- 3.7	-1.1
Finland	110,0	108,4	109,6	96,9	96,5	- 0.1	1.4
Sweden	106,6	104,4	105,3	100,4	102,1	- 1.9	0.3
United Kingdom	102,5	106,6	107,9	93,0	97,7	0.4	1.7
Bulgaria	29,4	32,9	34,9	…	…	- 2.2	1.7
Romania	28,7	39,2	42,0	…	…	- 7.6	-1.6
United States	133,3	135,3	136,4	110,6	115,2	0.4	0.3
Japan	90,6	92,5	93,8	76,9	79,2	- 0.3	…

Note:(*) forecast, (…)not available

Source: Eurostat

Bulgaria and Romania have the lowest labour productivity levels: 33,8%, respectively 39,2% of the EU-25 average in 2005. Although the indicator is situated on an upward trend in 1999-2005 period and the forecast for 2007 is optimistic. Among EU members, labour productivity record level belongs to Luxembourg (160,9% in 2005), followed by Belgium (128%) and Ireland (127,4%).

2. **GDP in PPS per hour worked** is measured as a ratio between GDP in euro (in Purchasing Power Standards) and the aggregate number of hours actually worked by the persons employed during the

accounting period. Total hours worked is the preferred expression of labour input because it answers the problems raised by the differences between full and part-time employment.

Table 1 shows the differences between EU members, as well as the position of United States and Japan regarding this statistical indicator. It seems that the hierarchy of the countries relative to EU average isn't significantly changed as compared to the previous indicator. There isn't available any information for Romania because the lack of statistical data regarding total hours worked.

3. Unit labour cost growth is obtained as the growth rate of the ratio: compensation per employee divided by GDP per total employment. This indicator expresses the relation between remuneration (compensation per employee shows how much the work is paid) and labour productivity (GDP per worker measure the value produced per employee). As PPPs and related statistical indicators are constructed primarily for territorial comparisons, they are not suitable for time comparisons and are not being used to express national growth rates. That is why the figures in national currency for compensation of employees and GDP are converted into euro using annual average exchange rates.

Table 1 shows for most of the EU members (Romania included), and also for the EU average, a significant reduction of the real labour cost growth, as the productivity raised faster than remuneration of the employees. It should be taken into account that remuneration refers to employed labour only, although GDP per employment refers to all labour (self-employed included).

Regional labour productivity disparities

Labour productivity disparities between countries are far lower then the regional ones, as figure 1 indicates. While in the Southern and in Eastern Ireland, in Ile de France, Luxembourg and Brussels, labour productivity surpasses 80000 euro/worker, in Letonia, in all Bulgarian and Romanian regions, except for Bucharest, productivity level is less than 10000 euro/worker. Even within the same country can be important differences between regions, e.g. an interregional   distance of 33000 euro in Germany and 36000 euro in France (figure 2).

Fig. 1. Regional distribution of labour productivity (GDP per worker in PPS) in 2003
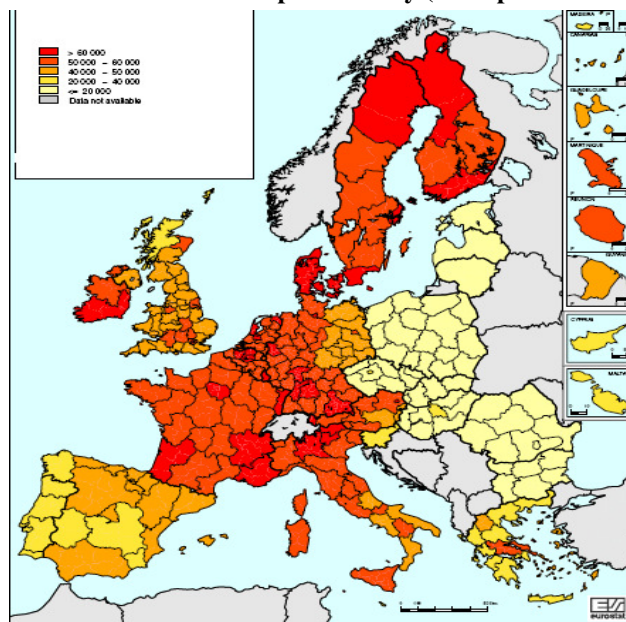
Source: Eurostat

Figure 1 illustrates sharply contrasting regional values of labour productivity for EU member countries. Labour productivity in the regions of the new member states is (with few exceptions) below 20000 euro per person employed. As usually, Bulgaria and Romania are the laggards, the North-East development region of Romania getting the worst position in EU.

Labour productivity has strongly risen in the 1998-2003 period in the regions of the new member states, significantly reducing the gap to the old EU members. Statistical data show a correlation of -0,60 between the growth rates and the initial level of labour productivity; this means that the lower was the labour

productivity in 1998, the stronger was the productivity growth in the following years. Unfortunately, eastern Romania made an exception from that trend, having a drop in labour productivity in this period.

Fig. 2. Labour productivity country average and regional minima and maxima in 2003
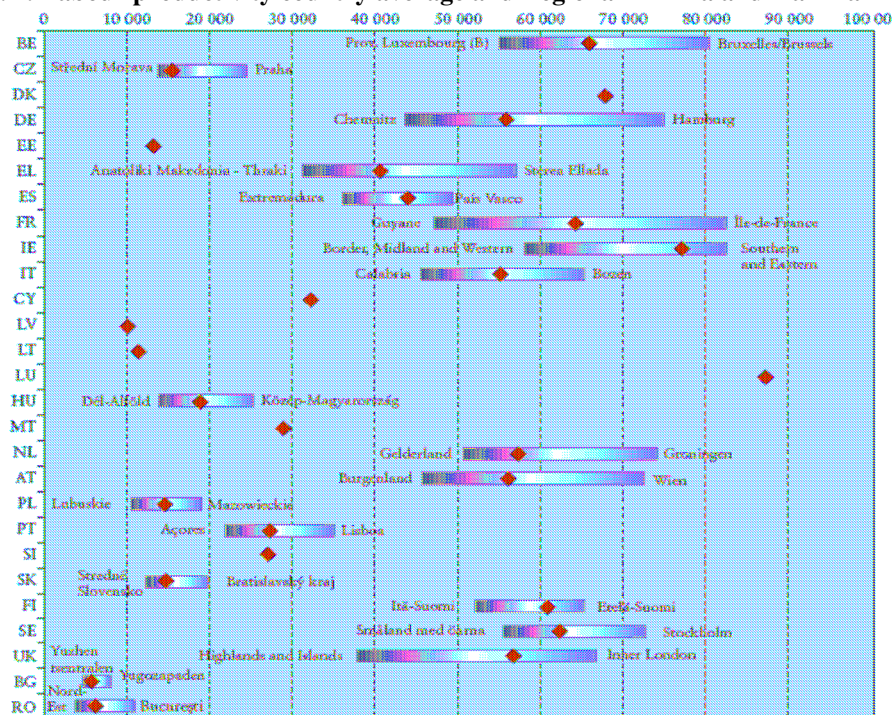
◆ National average

Source: Eurostat

The calculations of labour productivity per person employed do not take into account the differing lengths of working time and the extent of part-time employment. In many cases, full-time jobs have been replaced by several part-time ones, which mean that more people are employed, so labour productivity measured as GDP/persons employed is lower. Because of a higher proportion of part-time work, fewer than 35 hours a week are worked in all regions of the Netherlands and in some regions of Germany, but more than 40 hours a week are worked in all regions of Greece, in eastern Romania, in northern Bulgaria, in all regions of the Czech Republic, in Slovenia etc.

The correlation of the working week duration with labour productivity is at -0.58, so in regions with low productivity the number of working hours tends to be bigger. As a result, when labour productivity is calculated on the basis of the number of working hours, the productivity divide between Europe's regions is magnified.

The highest labour productivity is in Groningen, at 52.6 euro per hour, while the lowest productivity is to be found in North-East in Romania, at 1.9 euro per hour (only 4% of top-performing Groningen's figure).

Concluding remarks

- Labour productivity is an useful economic indicator connected to an important production factor and easy to use. Difficulties in productivity measurement are derived from its qualitative, hard to evaluate aspects, such as creativity and better management.
- A wide array of labour productivity measurements have been developed, GDP per hour worked being the best so far. Calculations of labour productivity based on the number of hours worked are more accurate than the ones using the number of the persons employed.
- International productivity comparisons have many difficult problems to solve: national differences between countries in the measurement of working hours, national prices and currencies, quality of output measure etc.

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- There are big differences in labour productivity between Europe's regions, but there is a strong trend towards the reduction of the discrepancies owing to a faster productivity growth in the regions where it is low.
- Labour productivity is still very low in Romania compared to EU-15 member countries and represents only 39,2% from EU-25 in 2005. It is though encouraging that it had been on an upward trend in 1999-2005 period, and the forecast for 2007 is good.

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SUBSTANTIATION MODELS OF MANAGERIAL DECISIONS IN ORGANIZATIONS

Gruiescu Mihaela

American – Romanian University Bucharest

Dobre Octavia Elena

Abstract: Vroom's model has a big importance for managerial practice because allows the improvement of decision's quality and the growth of employee's implications for their installation.

Vroom offers a descriptive model that permits the understanding of how a person comes to a decision about his career through the increase of the benefits of a decision. Also, there could be certain doubts about the applicability of this theory, the message is clear: in many cases the individual try to choose the most adequate option for himself.

Keywords: decisions, organizations, compensatory models

V. H. Vroom and Ph. W. Yetton were the first ones who offered to the managers a series of directory lines which permit them to find what are the conditions regarding the involving of the employees in the process of taking decisions. The Yetton-Vroom model identifies five managerial styles of base, each of them involving in a different degree the employees' participation. The letters (characters) represents the biggest continuity, the group decisions (G):

A_1 The manager resolves the problem or takes the decision alone, on basis of information which are available in that moment.

A_{11} The manager obtains the necessary information from the employees and after that decides alone what solution he has to adopt. He may choose not to tell to the employees what the matter is when he asks information, their role being to give information and not to generate or estimate alternatives.

C_1 The manager can share the problem with different employees, discussing their ideas and their suggestions one by one, without gathering them. The decision reflects or not the employees' ideas.

C_{11} The manager share the problems with the employees gathered like a group, getting their collective ideeas and suggestions. The decision took by the manager may not reflect the influence of employees ideas.

G_{11} The manager share the problems with the employees gathered like a group. They generate and estimate the alternatives together and try to come to a conclusion over a solution. The role of the manager is rather to moderate the discussions; he's not trying to influence the members of the group and to adopt a certain solution and is ready to accept to implement the solution which is supported by the entire group.

For choosing one between the styles of taking decisions, Vroom and Yetton identified three estimation criteria of a single decision's success: the quality of decision, the employees involving in decision's implementation and the necessary period of time for taking a decision. They also identified the development requirement of decisional capacities at employees. The Vroom's model has a big importance for managerial practice, because allows the improvement of decision's quality and the growth of employee's implications for their installation.

There exists a great number of theories that details the way how are taken the decisions. Some of these are somehow descriptive, meanwhile others are rather prescriptive. A very well known example is the said model of expectations elaborated by Vroom (1964). In concordance with this model, the individuals try to take decisions in a way to get the highest compensation. That's why the model is also called the compensatory model. When a person must take a decision is normal to think at much more results that may be important. For each one of these, the person makes an estimation establishing how desirable they are.

In the end, the individual multiplies (aware or unconsciously) the valences of result for each result with the alternative's probability and totalizes these products for all possible results. The summation is named the alternative's desire. In principle, the individual will have to choose the most desired alternative. Even so, the most persons know very well that not all the alternatives (occupations) are open for them. One person who doesn't have talent for mathematics knows very well that will never become an engineer. All persons know very well about the possibilities to achieve their alternatives (occupations). This conviction is called waiting and can be expressed like a chance. If the hope is multiplied with the desire of alternative it can be made an estimation of force or pressure to choose this alternative. Theoretically, the individual should choose the alternative with the biggest intensity force because this will bring about the highest level of compensation (satisfaction) and it's a possible alternative.

The way how this model is put in practice is illustrated in the next example (Table1).

A boy of 18 years old is hesitating between two occupational options: marketing director or journalist. First he defines all the result that are important for him (see Table 1, results column).Then, he establishes how important is each result for him. He'll do this with a score's help of 5 steps, form very important (+2) at totally not important (-2) (see the Table 1, second column- the valence of results V). After that he calculates the instrumentality for each result and makes the summation of products for the marketing director. This shows his desire for choosing the profession of marketing director. The same is for the journalist profession. In his boy's case, it's obvious that the desire for marketing director is much strong than journalist (+ 22 to +3). In his case he should choose for marketing director.

Beside first part of taking a decision he is aware about the possibility to reach to each of these professions (see Table 1). If he multiplies the desire with the hope, he obtains a measure of force for each profession. In his case, the force for marketing director is 17,6 and for journalist is only 1,5.

This means that, in his case, the option of marketing director will represent the best choice.

Table 1: Model "Choosing an occupation" by Vroom:

Result	Valence of result	Instrumentality at „marketing director"		Instrumentality at "journalist"	
	V	I_a	$V \times I_a$	I_z	$V \times I_z$
Interesting work	+2	3	+6	3	+6
The stress of work	+2	4	+8	1	+2
Liberty	-1	2	-2	4	-4
Chances of promotion	+1	2	+2	2	+2
The security of job	+2	3	+6	0	0
Travels	0	2	0	1	0
Big salary	-1	1	-1	4	-4
Nice office	+1	3	+3	1	+1
Total = "*Desire*"			+22		+3

The expectations for marketing director = 0,80 and for journalist = 0,50.

| 17,6 | Journalist | 1,5 |
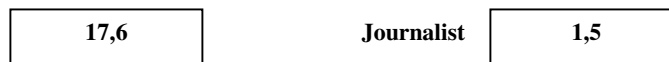
The compensatory model (Vroom 1964) is an interesting way to help the students to understand how to make a choice. But, it's still more interesting because it can help students to develop a better understanding of their hopes, convictions, values, interests etc. By results' examination that a person desires is to build a certain framework which permits the student to develop a better understanding of what he really wants. Thinking at the realism's conviction of a certain option (the chance to practice that profession) the student can develop a much mature vision over the possible alternatives. Especially, this is bound of the exploration of occupations and results that can be reached in career.

Also the model of Vroom is a descriptive one; it was used by other authors to elaborate a prescriptive model. The most descriptive approaches are bounded by the computed orientation. Many programmes work with a pre-established analysis of occupations (made by experts) and match the student's profile with that. The student's profile is created either by a student through the preferences' indication or by answers to a questionnaire. Also the students have the possibility to explore the occupations on the computer, thy can make something without the computer, and the computer programme controls in a certain measure the correlation process. This alters from a very detailed control made by a student over the whole process to the missing of any control, with the exception of the answers at a pre-established questionnaire.

The advantages of the theories regarding the process of taking a decision are very big. Even so, it can be very easy to use them in a wrong way and transformed in prescriptive approaches.

There also exists certain doubt regarding the model's reality. We have the problem if we always take decisions in a logical way and if we always try to obtain maximum results. It can be possible that compensatory model (the expectations) to be appropriate for certain persons and situations, but without doubt, can't cover all the cases of taking decisions. There also are rival theories. For example, we find the models of *unprogrammed decisions* that consider the element of decision as being less rational than in expectations' theories case. In concordance with this opinion, those who take decisions are initially attracted by an alternative based on only a single critical value or two (but not on a long set of values) and, after that, they enter in a perceptible distortion of rational observations in advantage of principal options which they implicitly chose.

Vroom offers a descriptive model which permits the understanding of how a person comes to a decision about his career through the increase of the benefits of a decision. Also, there could be certain doubts about the applicability of this theory, the message is clear: in many cases the individual try to choose the most adequate option for himself.

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INFLATIONIST PHENOMENON FROM ROMANIA DURING 1996 – 2006 PERIOD

Harja Eugenia

University from Bacău, home address: Decebal street, building 21, A entrance, apt. 8, Bacău, zip code 600283, phone 0744593260, e-mail: eugenia_harja@yahoo.fr

In present analysis some theoretical aspects concerning inflation phenomenon signification, the modality in which this is measured in Romania have been presented for the beginning. The main part of the research I wanted to be a concrete analysis of inflation's evolution in Romania anterior to October 1990, the moment of prices liberalization and up to the end of 2006, moment in which Romania was integrated in European Union. The analysis based on data's published by official statistics at the end of every year, but also on personal calculations realized with the purpose of obtaining a detailed CPI on main food goods subgroups, non-food and services, highlighting thus a large series of differences between the products' prices and services dynamics belonging to the same group. The newness consists especially in this calculation, even though in some extent are damaged by the indexes decimals' garbling, that come to highlight some CPI's particularities in the structure, unmentioned so far but on a yearly level.

Inflation represents a continuous, durable, generalized and self-sustained rise of prices from economy, under the conditions of purchase power's decrease of national currency. The main characteristics of the inflation are: continuous rise of prices, currency mass rise, external commerce balance's deficit rise, unemployment's rise, the population living standards decrease, salaries conflicts frequency for salaries rise, inefficient enterprising bankruptcy, wealth transfer from creditors to debtors. Out of this, inflation may easily be considered the most severe "disease" of a national economy, damaging the economical life as well as social and politic ones. Due to the fact that main manifestation of inflation consists of generalized rise of the process from economy, world-wide it is measured through inflation rate starting with the calculation of a Consumer Price Index (CPI). The inflation rate is calculated subtracting 100 from CPI (%), and shows the percentage that goods' prices and services' tariffs that are included in population's consumption in a certain period rose.

CPI is a measuring instrument that allows us to measure between two given time periods, the average prices variation of purchased goods and of services' tariffs used by people in Romania.

Immediately after December 1989 population's demands increased based on salaries rise, but under the conditions of interior production's decrease. This demand was covered through an increased importation, aspect that lead to a deficit of exterior commerce balance, meaning external debts' rise. In this period, prices continued to be hold under control, having the advantage of existent resources and by the fact that Romania did not have any external duty at that moment. Unfortunately, instead of taking advantage of this situation, and a rising of economical policy to be applied under the market's economical conditions, where demand meets the offer, the satisfying of population requests has been placed forward in order to exclude any revolutionary manifestation from their side. From this reason, in January-October 1990 prices were maintained constantly, a CPI statistically calculated not being registered.

Together with prices liberalization at the 1st of November 1990 a monthly CPI started to be calculated. From that moment on, prices, that were kept constantly until then, started to rise worrisome, population dealing with new aspects, with the fear that their salary allows less and less products and services to be purchased. Thus, in only two months from prices liberalization, inflation rate was 37,7%, a real explosion of prices following the moment.

1991-1993 period is characterized by a hyperinflation in Romania: prices at the end of 1992 were more than 3.2 higher than at the end of 1990, and again at the end of 1992 to be almost tripled, at the end of 1993 to be 3.56 times higher. In other words, during three years, prizes rose in Romania 34 times, under the conditions of a pronounced industrial and agricultural production decrease, of dramatic GIP decrease, and of budgetary deficit rise, of unemployment rate's increase. It is the "darkest" period of Romanian economy, period when all negative factors have damaged the economic state, lot of years being necessary to retrieve these negative effects and to reach the prior condition. In the first two graphics yearly evolution of inflation rate can be followed as well as inflation's rate evolution at the end of the year (December as against the anterior December), both reaching their summit in 1993.

Inflation at full tilt continues during 1994 also, even though the disinflation process is evident. A stabilization of prices to a 61,7% rate at the end of the year has bees succeeded, but on the background of an unemployment rate of almost 11%. Practically, this period after 1989 can be characterized in Romania at least by the following general aspects: decentralizing of the economy, centralized back then, private economic sectors, completed afterwards with a disorganization at a microeconomic level; increase and

maintenance of a high level of unemployment, included between 7-11%; continuous production's decrease without the possibility of reaching the situation before 1990; the loss in the first years of external market with tradition for our country and a difficult rehabilitation in the following periods, in the some time with am exaggerated increase of importation and with a market's invasion of cheep goods and inadequate qualitatively; the increase of budgetary deficit and of country's external debts; the rise of salaries' pressure by unions systems that ask permanently for salaries' rise under the conditions of a less and less performance economy, these involving the inflationist snail and leading finally to real population salaries' decrease; firms' decapitalizing under the inflation's conditions; underground economy's rise through a higher level of tax avoidance.

If up to 1995 National Bank of Romania practiced a restrictive policy concerning credits, through a very high interest, starting with 1995 it reoriented its credits policy by interest's decrease. This aspect lead on short term to enterprising debts degree increase, to a labor places rise and immediately to an unemployment's rate decrease, the inflation rate coming back in two years to two ciphers. After the election from 1996 a new approach of economical policy is brought in, respectively with budgetary incomes emanated from external loaning, as well as from actives selling, leading towards the end of 1997 to a new inflation rate of 3 numbers, respectively to an increase of 2.5 times of prices during one year period. During 1998-1999 a credit limitation policy is brought into economy, as well as new facilities for direct investments in Romania, leading to an obvious process of disinflation, inflation's rate maintaining at the level of two ciphers. Starting with 2000 we deal with another type of fiscal policy, one that encourages both profits reinvestment and exports. In the some time, a reorganization of mining and quarrying system as well as energetic one takes place, diminishing the loses from economy and the existent budgetary deficit. All these measures impose by country's preparation for adhesion to European Union together with the fiscal and currency ones, leaded to inflation's rate decrease up to one level cipher during one year time, starting with 2004. Starting with 2000, inflation's rate calculated as yearly average is easily placed over the inflation's rate at the end of the year, due to high prices rises registered in the first part of the year.

Fig. 1 Inflation rate's evolution in Romania at the end of the year (%)
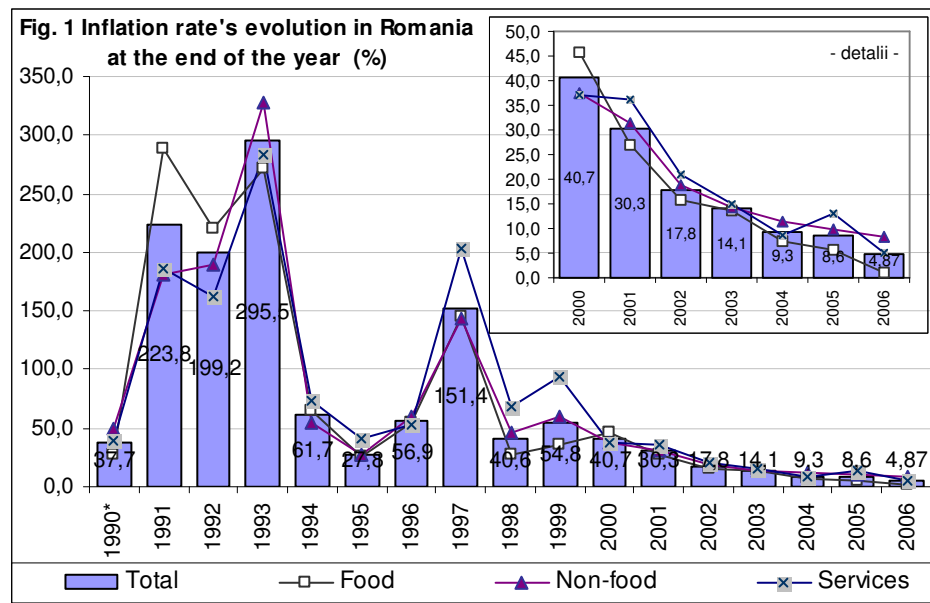
From the graphic is evident that year 2006 brings the lowest inflation, the inflation's rate at the end of the year does not cross 5%, and the yearly average is 6,56%, an unmet level from 1990. The real economic rise process is highlighted by constant positive dynamic in the past years of production as well as GIP, in parallel with a high diminished unemployment, with a real salary rise and national currency estimation. Thus, for instance, in December 2006, net average salary reached and surpassed for the first time in the 17 years the purchase power of the salary that existed before prices liberalization, October 1990. Further on, I held forth to analyze the discrepancies between the prizes rises existing at the main products subgroups, at the end of the observed period.

Thus, if **the CPI in December 2006** shown an average rise of prizes on a total of **2.864 times, as against October 1990**, on the three main subgroups of goods the rises have been different: food products prizes rose with 2,210 times being situated under the average with 23% while non-food's medium prizes rose in

the some span with 3.029 times (+6%), and the rendering services' tariffs rose with 5.029 times, what represents a rise of 1,76 times higher than the total CPI.

Fig. 2 Consumer Prices Indexes' evolution (C.P.I.) from Romania from their liberalization up to the end of 2006 (12.1996/10.1990) (în quotients)
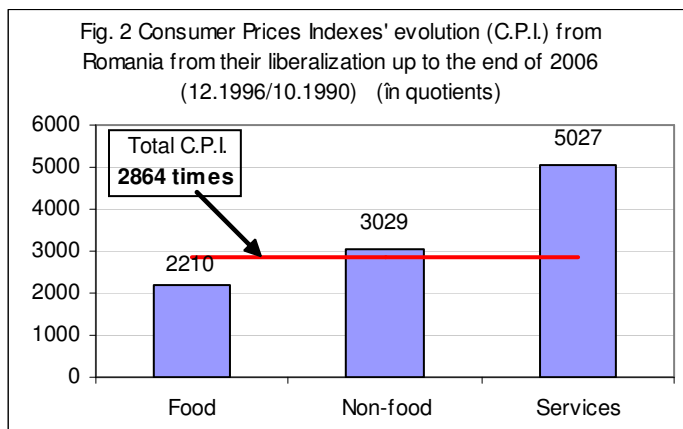
In the framework of **food goods group**, the highest rises were facing "loaf products", of 5.428 times (2,5 times as against total CPI and respectively 1,9 times as against the group average). These were close followed by "fish and fish products" group with 4,067 times (1,8 times as against the total CPI and 1,4 times more than subgroup average), by "milk and diary products" with raises of prizes of 3.053 times, flour with 2,829 times, maize flour with 2,669 times etc. main subgroups dynamics was calculated and may be observed in the following graphic, the rises being ordered decreasingly. The lowest prizes rises have been met with cocoa and coffee, products that are not subscribed to main necessities. At the some category is subscribed the alcoholic drinks group, where the prizes rise was with 39% under the group average.

In the framework of **non-food goods group**, the highest rises have been registered at "electric energy, gas and central heating", damaging in a great extent incomes and spending population's budget, also given by the important weight in total consumption of these expenses, (9,64% in 2004 for instance). These increased with 6,685 times in the analyzed period what means an increase of 2,2 times higher than the total CPI and a 2,3 times more than group average. The lowest rises, as the following graphic presents, have been registered at the "clothing, haberdashery, mercery, passementrie trimmings", these rise being with   - 43% as against the group average.

In the framework of **rendering services group**, the highest rises were registered at "water, sewrage, sanitation", services that population's households incurre compulsory, being necessary for living and occupying also an important weight in their expenses (2,34% in 2004). These prizes rose with almost 2,8 times more than the total CPI and with 4,9 more than group's services average. With the some important rises hotels units accommodation costs have been finalized under the conditions that the effort sustained for the accommodation qualitatively increase was not felt at the some level. The lowest rises at services has been observed at "making and repairing clothing and footwear" group, services required less and less in the latest years due to confections and footwear's cheap and low quality that exist on the importing market.

Fig. 3 Consumer Prices Indexes' evolution (C.P.I.) from Romania from their liberalization up to the end of 2006 (12.1996/10.1990) for food goods

Category	CPI quotient
Cocoa and coffee	831
Vegetables and tinned vegetables	1275
Fruits and tinned fruits	1541
Edible oil, bacon, fats	1705
Alcoholic beverages	1744
Bread	2065
Sugar, confectioneries and honey	2279
Other food goods	2325
Bakery specialties	2619
Meat, tinned meat and meat products	2632
Maize flour	2669
Eggs	2824
Flour	2829
Milk and diary products	3053
Fish and tinned fish	4067
Loaf bread	5428

C.P.I. Food goods **2210 times**

Fig. 4 Consumer Prices Indexes' evolution (C.P.I.) from Romania from their liberalization up to the end of 2006 (12.1996/10.1990) for non-food goods

Category	CPI quotient
Clothing, haberdashery, mercery,	1549
Cultural and sports products	1626
Hygiene, cosmetics and medical articles	1814
Household appliances, furniture	1881
Chemicals	2054
Footwear	2161
Fuels	2903
Tobacco, cigarettes	3527
Other non-food goods	3528
Electric energy, gas, and central heating	6685

C.P.I Non-food goods **3029 times**

819

Fig. 5 Consumer Prices Indexes' evolution (C.P.I.) from Romania from their liberalization up to the end of 2006 (12.1996/10.1990) for services

Category	CPI quotient
Making and repairing clothing and footwear	1873
Motor and electronic repairs and photo works	2911
Interurban transport	3569
Restaurants, cafes, canteens	3692
Cinemas, theatres, museums, expenditures for education and tourism	3712
Hygiene and cosmetics	3928
Medical care	4193
Mail and telecommunications	4412
Urban transport	5835
Other services	11893
Payment of accommodation in hotel units	13841
Water sewerage, sanitation	14024

C.P.I. services 5027 times

Data sources: own calculation realized according to "Prices Statistical Bulletin" N.I.S., collection

As it could be observed from the last three graphics presented, behind the three main groups' CPI important differences are hiding, differences that reach even up to 7 times inequalities of the registered dynamics. It would be important that the main prizes rises to become felt at the products and services that are placed on a lower importance in population consume, aspect not reached yet.

As it was shown so far, CPI is one of the fundamental macroeconomics indicators, its dimension reflecting at the end economy's performance and not on the last position, population's living standards. Because of the importance that inflation reducing has and also its maintenance at a lower level as possible, aniiflationist measures have to constitute a permanent objective of all governments that rule the country for a certain period, representing finally an indicator that shows the performance degree of that government.

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DIGITAL DIVIDE – AN IMPORTANT ELEMENT IN FOSTERING ECONOMIC DEVELOPMENT OF ROMANIA

Hincu Daniela

Academy of Economic Studies, Bucharest, Piata Romana, nr. 6, sector 1, tel: 0744.323.700

Fratila Laurentiu

Academy of Economic Studies, Bucharest, Piata Romana, nr. 6, sector 1, tel: 0765.507.791

*Summary: **Digital divide** refers to the social and economical differences between comunities that have access or not to computers and Internet. It is related to e-readiness evaluation (made by The Economist Intelligence Unit); in the same time, it takes into account the capabilities of a community or a region to use its ITC services (technologies for communication and information), as they are developed by acces to different levels of education and technical studies, although the differences between groups that have access or not to useful and quality digital information.*

Globally, the difference is especially determined by variety of information and communication technologies available for certain segments of society, not necessary by the size or distance to the final user. Referred to Internet, the access is one of aspects, another aspects beeing the quality of connexion and of auxiliar services and the performances of computers.

Keywords: digital divide, information technology and communication, Internet, SWOT analysis, Digital Accces Index

1. General presentation of IT sector in Romania

The phenomenon of Digital divide is placed in strong connection with the theory of information society. With this characteristics, the researcher measure how certain segments of population can parICTipate to create and to develop information society.

We can discuss about this phenomenon on two plans, international and national. The international plan refers to the difference between the level of computerizing and infrastructure of communication for developed countries and developing countries. On the national plan, these differences can be ascertained to the social categories, depending on the provenance (rural/urban environment), sex or difference on the ethnic criteria.

Romania, as developing country, confront the problem of digital divide. Since 1989, Romania known a huge economic delay reported to USA and EU. These delay was generated by the restriction enforced by capitalist countries to the communist countries, which had as results limitation their access to the modern technologies. Beginning with 1990, Romania have access to these technologies, but the process was slowly, due to the low interest/concerment of state in developing communication infrastructure and low economic capacity of private sector.

Therewith, the speed of update of IT technologies corroborated with low demand of IT services, made that infrastructure developed slowly, the absence of clients maintain costs to high level, sometimes approachable barely to the great companies. The economic growth of companies determine increase of demand, in the same time with development of IT sector. So, increase number of clients, offer diversify and costs decrease. After 1996, occur an increase of IT sector, and, after 2000, we can speak about technological line-up of IT sector to the world requirements.

In the last years, Romanian economiy have reported a sustenable growing (Table 1):

Table 1

Indicator	2005	2006
GIP (bill. RON)	287,2	337,9
Real growing %	4,1	7,0
- Gross value added in telecommunication - %	8	8,5

Source: Year 2005, INS and year 2006 CNP

The sector of communication represents one of the most dynamic and gainful sector, having a high rate of income (approx. 60%). The percent of private sector is major, over 90%, both registered capital and turnover, product and gross value added.

Earnings registered in the field of communication have an increase evolution (Table 2). The sector developed from the point of view of human resources, by growing of number of employees and their revenues.

Table 2

Earnings	2005		2006	
	mil. RON	growing %	mil. RON	growing %
Earnings from telecommunication	14576	121	17160	117,7

Source: year 2005 calculate by CNP based on centralized balance sheet of Ministry of Finance, estimation CNP for year 2006

2. The access to Internet

Number of suppliers of services to access to Internet kjnown a significant growing (Table 3):

Table 3

Suppliers	2003	2004	2005	2006
Operational suppliers	233	515	981	1154
Large broadband suppliers	110	242	600	828

Source: The National Regulatory Authority for Communications and Information Technology – ANRCTI, 2006

Fig. 1. Structure of number Internet access connection, itemised support
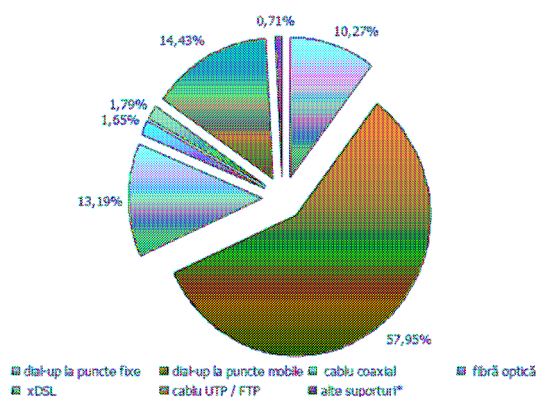
Source: ANRCTI, 2006

There is a big value for dial-up connections to the mobile points (57.95%), determined by connections using CDMA/GPRS technologies, for subscriptions to mobile phone services. The New xDML technology

occurs at the beginning of 2005, have the biggest growing potential, because 51.17% from properties fulfill technical conditions to install it.

Fig. 2. Semestral evolution of Internet access connections according to the used bandwidth.
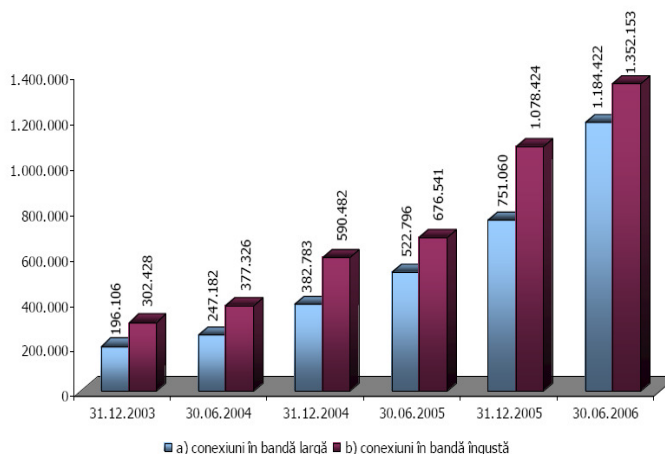
Source: ANRCTI, 2006

There is a growing of broadband connections, reported to the narrowband connections. This fact is generating by increase of connection with dedicated access to Internet.

3. SWOT analysis of Romanian IT market

Is difficult to make a quantitative analysis of Romanian IT market, because the figures changing fastest. This is the reason that we take into account a qualitative analysis described though:

○ **Strengths:**
  – diversification of economic activities and needs to use means of information and communication very fast and surely;
  – development of some financial-monetary activities which require technological equipments and varied channels of communication, with a high qualitative level;
  – strength of private sector of SME and their capacity to invest in new technologies;
  – existence of a great number of specialists in IT; from the point of view of criteria – number of IT specialists per 100 inhabitants, Romania take the first place in Europe and the sixth place in the world;
  – Policy to encourage the investments, using non-taxation of reinvesting income.

○ **Weakness:**
  – old phone network, with the lines that do not allow sureness in function, in bad atmospheric condition (rain, snowfall, etc);
  – the expenses IT/GIP and per capita have low values if make a reference with media of UE-15 and even media of new UE members;
  – insufficiently develop of proper infrastructure for Information Society (hardware, software, means for communication);
  – big tariffs to access ICT infrastructure;
  – rate to develop of Internet and material base (especially in the pre-university education system) are lower, in comparison with UE-15 media;
  – the major differences between urban and rural environment and between regions to access ICT infrastructure;
  – insufficiently using of new information technology and communication in business environment;
  – insufficiently development of some services, like e-commerce or e-banking;
  – Romanian IT export is still in primary stage;
  – most of Romanian IT product have low value added;
  – Low salary in IT, comparative with world market, which determines Romanian specialists to migrate in UE or USA.

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○ **Opportunities:**

- connect to international economic life;
- needs to assure a high performance for a communication system at national and international level;
- diversify activities of IT companies; these will offer traditional activities, like distribution, resell, retail for components and systems, but, new services, like installing, configuration, maintenance, networking and integration and delivery of complete hardware-software solutions;
- opening Romanian communication market beginning 2002, that have as result over 1850 authorized suppliers for networking and communication services in 2006;
- foundation based on costs of tariffs to interconnect mobile network Orange Romania and Vodafone Romania;
- regulation portability fixed and mobile numbers;
- developing of national program to install tele-centers, due to phone and Internet services become available in rural regions, too;
- Fiscal measures, like reduced tax-salary for some categories of programmers.

○ **Restrictions:**

- high level of costs for some IT services, especially communication services on the secure channels;
- policy for salaries, with excessive taxation, that make costs with labor force to become very high, and, in the same time, the real income to be less than salary on international IT market.

At international level, is used an indicator *Digital Access Index* – DAI - that measures ability of a person to access and to use ICT (Information and Communication Technology). It contains eight variables organized into five categories. Each variable is converted to an indicator with a value between zero and one by dividing it by the maximum value or "goalpost". Each indicator is then weighted within its category (Table 4). Each country belongs to one of categories: high, medium and low.

Table 4

Category	Variable	Goal-post	Weight	Index value
Infrastructure	Fixed telephone subscribers per 100 inhabitants	60	0,5	
	Mobile cellular subscribers per 100 inhabitants	100	0,5	
Affordability	Internet access price as Percentage of per capita income	100	1	
Knowledge	Adult literacy	100	0.66	
	Combined primary, secondary and tertiary school enrolment level	100	0,34	
Quality	International Internet bandwidth (bits) per capita	10000	0,5	
	Broadband subscribers per 100 inhabitants	30	0,5	
Usage	Internet users per 100 inhabitants	85	1	

Based on this index, the countries from Western Europe and USA have high DAI (values between 0,85-0,70), the countries from Central Europe have upper DAI (values between 0,69-0,50), Romania have medium DAI 0,48 (values between 0,49-0,37), and the countries from Africa and ASIA low-developed have low DAI (values between 0,29-0,10).

4. Conclusion

To create an economic and social environment able to stimulate the research and development, there is a stringent need of politic and macro-economic stability. This stability is necessary for large companies and to SME to grow, eventually, to invest heavily in the innovative products, in creating added value and to have easy access to international capital market. So, it is necessary to implement public policies oriented to stimulate innovation, like:

- − adopting the permissive policies in the technological domain (giving subsidies to technology transfer mechanisms, encouraging the formation of private-public partnerships, or among units from industry-research-university world, that can help to create standardization rules and IPR regulations for all participants;
- − adopting the reforms to allow open free of telecommunication market, reforms that have as effect a better access of suppliers and clients to the information, but, in the same time, a decrease of the costs and prices;
- − coordinating, from the central authority' level, of a strategy of collaboration between universities, research and industry centers, corroborate with set-up the fiscal facilitation for the companies that invest in research activities;
- − adopting the policies to stimulate entreprenorial innitiative and set-up the fiscal facilitation, to allow investments funds with risk capital to enter on the market, that have as result economic development, especially of SME.

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TESTING EFFICIENCY OF THE STOCK MARKET IN EMERGING ECONOMIES

Lazăr Dorina

Babes-Bolyai University, Faculty of Economics and Business Administration, Teodor Mihali 58-60, 400591 Cluj-Napoca, Romania, Tel: 40 + 0264 41.86.52, E-Mail: dlazar@econ.ubbcluj.ro

Ureche Simina

Babes-Bolyai University, Faculty of Economics and Business Administration, E-Mail: urechesimina@yahoo.com

Abstract

This paper tests weak-form market efficiency of eight emerging markets: Romania, Hungary, Czech Republic, Lithuania, Poland, Slovakia, Slovenia, Turkey. To test for linear dependences in the returns series we employ Ljung-Box test and serial correlation LM test. To test for nonlinear dependences the BDS test and runs test were used; BDS test is applied on the residuals series generated by ARMA models. The used tests determines empirically the presence of linear and nonlinear dependences, for most of the returns series. For the adjusted returns series the main dependences found are nonlinear, while the observed returns series are characterised by linear and nonlinear dependences. Most of these emerging equity markets are not weak-form efficient.

Keywords: Efficient market hypothesis, Emerging markets, Serial Correlation LM test, BDS test

1. Introduction

Testing of the financial markets efficiency is an important issue for investors and policymakers dealing with emerging equity markets. An efficient capital market is necessary and useful for a functioning market economy, inducing an efficient capital assignation within an economy. There for, an efficient capital market is concerning the macroeconomic level as well as the administration of the financial assets portofolio.

The efficient market hypothesis asserts that financial markets are efficient as concerning the information. The current stocks prices reflect all the known information, useful for their prediction. The information channels are efficient as long as the information is spreading rapidly and new information becomes public quickly. These new information will lead to purchasing and selling which will affect the price until it corresponds to the new value of the company. There for, the information will be quickly assimilated to the new stock price. The share price may be at any time a correct estimation of the future share prices, described as a random walk behavior. The presence (or absence) of a random walk has important implications for investors (Worthington and Higgs, 2006).

Depending on the information set available, the financial theory is based on three forms of efficiency, as follows. Weak efficiency holds if the asset price immediately incorporates the information contained in the asset history. Semi-strong efficiency holds if all the public information is incorporated into the asset price. Strong form efficiency holds if all the information, public or private is incorporated into market prices.

The subject of this paper is weak-form market efficiency. In an efficient (weak-form) market stock returns are unpredictable. Testing of this efficiency form is assimilated with tests concerning the predictibility of stock returns. If stock prices are not generated by a random walk process, meaning there are recurrent patterns in asset prices, than the future returns may be predicted by the historical sequence of returns. A useful rating, regarding the predictibility of asset returns, generates the following random walk hypothesis (Campbell et al., 1997):

- − random walk hypothesis (RW1) with independent and identically distributed increments;
- − random walk hypothesis (RW2) with independent but not identically distributed increments;
- − the weakest form of the random walk hypothesis include processes with dependent but uncorrelated increments (RW3).

Tests used in most studies are aplied to RW1 and RW3 hypothesis.

This paper will verify the efficiency of capital market for 8 emerging economies: Romania, Czech Republic, Hungary, Lithuania, Poland, Slovakia, Slovenia, Turkey. A number of recent studies focused on emerging equity markets; the results are different depending on the country and the aplied methodology. Worthington and Higgs (2006) have studied the weak-form market efficiency of twenty-seven emerging markets in different regions. The serial correlation and runs tests conclude that most emerging markets are weak-form inefficient. Kvedaras and Basdevant (2002) have tested the efficiency of financial markets in

the three Baltic States drawing conclusion that that financial markets are, with some turbulence, approaching weak form of efficiency.

The efficiency of capital markets in emerging economies increase over time, as a result of gradual liberalization. Harrison and Paton (2004) examined the evolution of stock market efficiency in the Bucharest Stock Exchange using a GARCH model on daily price data. They found strong evidence of inefficiency in the Bucharest Stock Exchange, the lagged stock price index beeing a significant predictor of the current price index. The level of inefficiency appears to diminish over time. Testing the efficiency of emerging markets should take into account some of the following characteristics: infrequent trading, high volatility, unlinearity of the share price variation (Todea, 2005).

2. Empirical methodology and data

The data used for this study are the market value-weighted equity indices (BET for Romania, cz_px50 - Czech Republic, hu_bux - Hungary, lt_liting - Lithuania, pl_wig - Poland, sk_sax - Slovakia, si_sbi - Slovenia, tr_nati100 – Turkey). The data consist of monthly values of these indices[2]. The time series cover a period of time from december 1995 to february 2007 for all the above mentioned countries, except Romania. Because of the considerably increasing investors interest and trade rate since 2000, a period of time since january 2000 until february 2007 was considered for Romania.

We are considering the continuously compounded return or log-return R_t, defined by:

$$R_t = \ln(1 + r_t) = \ln(c_t / c_{t-1}) = C_t - C_{t-1} \qquad (1)$$

where $C_t = \ln(c_t)$ is the logarithm of the index price observed at time t. The equation of the random walk with drift process is:

$$C_t = \mu + C_{t-1} + \varepsilon_t \qquad \text{or } R_t = \Delta C_t = \mu + \varepsilon_t \qquad (2)$$

where μ is the drift parameter, R_t representing the change in the index and ε_t the random error term. In the RW1 random walk hypothesis the ε_t are independently and identically distributed (IID) with mean 0 and variance σ^2.

To test for serial dependence in the returns R_t the Ljung-Box Q-statistics is used, based on autocorrelation coefficients[3]. The Q-statistic at lag k is a test for the null hypothesis that there is no autocorrelation up to order k. In case of independently and identically distributed returns the Q statistic is asymptotically distributed as a χ^2 variable with degrees of freedom equal to the number of autocorrelations. Thus, this is a test for the strongest form of random walk. Second, we use the serial correlation Lagrange multiplier (LM) test in equation (3), where the returns are represented by a moving average model MA(0). The null hypothesis of the LM test is that there is no serial correlation up to lag order k. The alternative includes both AR(p) and MA(p) error processes; the LM test statistic is asymptotically distributed as a $\chi^2(p)$.

Tests based on autocorrelation coefficients detect only linear autocorrelation. Emerging markets are typically characterized by a non-linear information behavior in stock prices (Todea, 2005).

To detect nonlinear correlations in the returns series we will perform BDS test (Brock, Dechert, Scheinkman and LeBaron, 1996); BDS is a powerful tool for detecting serial dependence in time series. This test is aplied to see if there is any non-linear dependence in the residuals series after the linear ARMA model has been fitted. The test statistic follows asymptotically the normal distribution. Under the BDS test, the null hypothesis is that the increments are independently and identically distributed (RW1 hypotesis), where the alternative hypotesis assumes a variety of possible deviations from independence including non-linear dependence. To define the test, the concept of integral correlation is used, which measures the spatial

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[2] Source: Eurostat and Monthly Bulletins publicated by National Bank of Romania

[3] autocorrelation coefficients define the linear correlationare between two observations of the returns time series R_t at different dates.

correlation among the points. The runs test relies only on the successive returns signs, without interest in their dimension and does not require assumptions about the distribution of the returns. A sequence with too many or too few runs suggests that the sample is not random.

In testing the efficiency of emerging markets, it is necessary to take into account some of their characteristics, like thin trading. Among the consequences of thin trading is the apperance of a serial correlation, studied by Miller, Muthuswamy and Whaley (1994). To remove the impact of this artificial correlation, a correction is aplied to the observed returns. The methodology proposed by Miller, Muthuswamy and Whaley suggests an autoregresive model AR(1) to separate the effect of infrequent trading.

3. Empirical results

Summary statistics concerning logarithmic returns for each of the emerging capital markets considered are provided in table 1.

Table 1. Descriptive Statistics for logarithmic returns in emerging capital markets

Indicele	Romania	Hungary	Poland	Czech Republic	Slovenia	Slovakia	Turkey	Lithuania
Mean	0.0323	0.0207	0.0145	0.0103	0.0109	0.0076	0.0347	0.0059
Std. Dev.	0.0911	0.0777	0.0639	0.0558	0.0538	0.0588	0.1202	0.0780
Skewness	0.4403	-1.1519	-0.1981	-0.2140	-0.2319	0.4838	0.1527	2.4608
Kurtosis	4.0029	10.546	3.2234	3.0915	8.5751	3.6982	4.4192	16.568
JB p-value	0.0273	0.0000	0.5612	0.5856	0.0000	0.0187	0.0027	0.0000

The lowest mean returns is observed in Lithuania, with a value of 0.592% and the highest mean returns are for the turkish index returns (3.479%). The market risk measured using standard deviation is signifiantly higher in Turkey and Romania, these capital markets being characterised by a higher volatility. A negative skewness shows that the lower deviations from the mean are larger than the upper deviations, indicating a greater probability of large deceases than rises. Kurtosis coefficients have values greater than 3, also the Jarque-Bera statistic is significant at 5% level, both indicate much higher distributions than the normal distribution; almost all markets exhibits significant deviations from normality.

Table 2 provides the statistics and p-values (in parentheses) for the tests of serial independence. To compute the adjusted returns, for each market an autoregresive model AR(1) was estimated. The Q-statistic indicates the rejection of the hypothesis according to the first 15 autocorrelation coefficients are significant for Hungary, Poland, Czech Republic, Slovakia, Turkey and Lithuania, if the observed returns are used; for the adjusted returns the autocorrelation coefficients are signifiant only for Lithuania; the results are valid at the 5% level of significance. For Hungary, Poland, Czech Republic, Slovakia and Turkey the initial correlation is artificial, being a statistical illusion brought about by thin trading. LM test points out a linear dependence between the adjusted returns for the hungarian market with a signifiance level of 5%. In conclusion, both tests indicates that thin trading has a significant effect on the efficiency of the studied stock markets.

Table 2. Tests for independence in emerging capital markets: Ljung-Box test, LM test, runs test

Indices	Romania	Hungary	Poland	Czech Republic	Slovenia	Slovakia	Turkey	Lithuania
Q-statistics	20.149 (0.166)	25.434 (0.044)	25.208 (0.047)	30.969 (0.009)	15.635 (0.407)	40.567 (0.000)	35.651 (0.002)	36.631 (0.001)
LM-test	5.51082 (0.0635)	17.7918 (0.0003)	12.0804 (0.0023)	17.2274 (0.0001)	3.8182 (0.1482)	21.2110 (0.0000)	14.3214 (0.0007)	11.4179 (0.0033)
Runs test	0.103 (0.918)	-2.673 (0.008)	-2.793 (0.005)	-2.502 (0.012)	-3.877 (0.000)	-2.931 (0.003)	-2.191 (0.028)	-4.812 (0.000)

Adjusted returns								
Q-statistics	20.819 (0.143)	18.334 (0.246)	13.236 (0.584)	24.525 (0.057)	13.249 (0.583)	11.926 (0.685)	21.960 (0.109)	27.154 (0.028)
LM-test	5.7170 (0.0573)	8.9625 (0.0113)	0.9673 (0.6165)	3.8445 (0.1462)	1.4071 (0.4948)	0.0658 (0.9676)	3.0242 (0.2204)	2.3969 (0.3016)
Runs test	0.523 (0.601)	-0.928 (0.353)	-1.222 (0.222)	-2.020 (0.043)	-2.488 (0.013)	0.267 (0.789)	0.958 (0.338)	-4.291 (0.000)

Notes: Q-statistics is computed for a lag =15. Ljung-Box and LM tests were performed using Eviews 5.1; for the nonparametric runs test it was used SPSS 11.0.

Using the non-parametric runs test the results show that the succesive returns are not independent for all the markets, except Romania. After the correction the test points out that the adjusted returns are dependent for the following markets: Czech Republic, Slovenia, Lithuania, therefore these markets are inefficient. The test statistic has an asymptotic normal distribution. The resulting negative values indicate positive serial correlation.

Table 3. BDS test for nonlinear dependence in returns on emerging markets

Indicele	Romania	Hungary	Poland	Czech Republic	Slovenia	Slovakia	Turkey	Lithuani
BDS test Dimension 2 3 4 5	0.4270 0.2126 0.1801 0.1822	0.0000 0.0001 0.0001 0.0001	0.0052 0.0135 0.0237 0.0246	0.2698 0.0416 0.0225 0.0176	0.0000 0.0000 0.0000 0.0000	0.2151 0.0565 0.0080 0.0035	0.0001 0.0005 0.0001 0.0000	0.0000 0.0000 0.0000 0.0000
Adjusted returns								
Dimension 2 3 4 5	0.3757 0.1317 0.0916 0.1013	0.0033 0.0268 0.0240 0.0086	0.0041 0.0048 0.0063 0.0065	0.0755 0.0094 0.0136 0.0267	0.0250 0.0001 0.0000 0.0000	0.0987 0.0822 0.0204 0.0109	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000

Notes: for BDS test the distance used for testing proximity of the data points was specified as a fraction of pairs, with a value of 0.6. BDS test was aplied using Eviews 5.1.

To each of these returns series, we fit an ARMA(p,q) model. In this way the linear serial correlation was removed from the data or at least diminished. Results of the BDS test are reported in table 3, both for observed indices and indices after corrected for infrequent trading.

All markets are characterised by nonlinear dependences in case of the observed returns, except Romania. When the tests are aplied on the corrected returns results show that the returns are not independent in the following markets: Slovenia, Lithuania, Slovakia, Turkey, Romania and Poland. The results of this study are in accordance with the results in the literature for similar emerging markets (Hseih, 1991; Brooks, 1996), the returns are nonlinearly related in general.

The used tests determines empirically the presence of linear and nonlinear dependences, for most of the returns series. For the adjusted returns series the main dependences found are nonlinear, while the observed

returns series are characterised by linear and nonlinear dependences. Most of these emerging equity markets are not weak-form efficient.

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ÉVALUATIONS ET INDICATEURS DU DÉVELOPPEMENT DURABLE

Lazăr Mirela

Lazăr Cornel

Faculty of Economic Sciences, Petroleum-Gas University of Ploieşti, Ploiesti, B-dul. Bucureşti nr. 39, ROMÂNIA, tel. 0744913435, clazar@upg-ploiesti.ro

Abstract: The sustainable development involves a new point of view with environmental, economic and social components. To measure the sustainability we need indicators. Sustainability indicators help us understand how well a society is performing in terms of sustainable developmnet. They should help us to identify possible direction of changes. The paper emphasizes some aspects concerning the sustainable development and the methods of measuring it with indicators.

Mots-clés: développement durable, indicateurs, évaluation, environnement

Le concept de développement durable

L'émergence du développement durable correspond à un constat très préoccupant dans aux moins trois domaines: la démographie galopante, la dégradation de l'environnement et un mal développement. Dès la fin des années 60, la prise de conscience des problèmes écologique causés par les activités humaines émerge sur la scène publique.

Ces préoccupations sont rapidement doublées de la montée d'un discours très critique envers la société industrielle basé sur la croissance économique. Le même temps, l'augmentation de la population devient problématique. Sur une planète limitée – une population plus de 6,5 milliards – se traduit en plus de besoin en alimentation, en matière première, en eau, en énergie et par dés impacts croissants.

Dans ces conditions, la publication du célèbre rapport "Halte à la croissance" par le Club de Rome en 1972 – qui analysait le rapport entre les limites écologique et la croissance économique – est l'un des tournants décisifs dans l'émergence du développement durable.

La même année les Nations Unies organisaient à Stockholm la première conférence internationale sur l'environnement qui devait aboutir à la création de Programme des Nations Unies pour l'Environnement – PNUE. À cette occasion, le concept "d'écodéveloppement" a mis en avant un modèle de développement respectueux de l'environnement et de l'équité sociale.

Le concept d'écodéveloppement (ou développement écologique) ne connaîtra malheureusement pas le succès escompté du fait notamment d'un contexte mondial tourné vers les préoccupations nées des deux chocs pétroliers de 1973 et 1979.

Les questions reliant environnement et développement reviennent avec la publication en 1987 du rapport "Notre avenir à tous", dit rapport Brundtland [2]. Ce rapport, qui fait la synthèse des travaux engagés au plan international sur l'environnement et développement, donne la définition suivante du développement durable: "un développement qui répond aux besoins des générations présentes sans compromettre la capacité des générations futures de répondre aux leurs ".

Cette nouvelle approche du développement est fondée sur l'équilibre entre croissance économique et écosystèmes. Le développement durable serrent un processus de développement qui concilie l'écologique, l'économique et le social et établit un cercle vertueux [6] ces trois pôles: c'est un développement économiquement efficace, socialement équitable et écologiquement soutenable (fig.1).

Fig.1. Schéma du développement durable
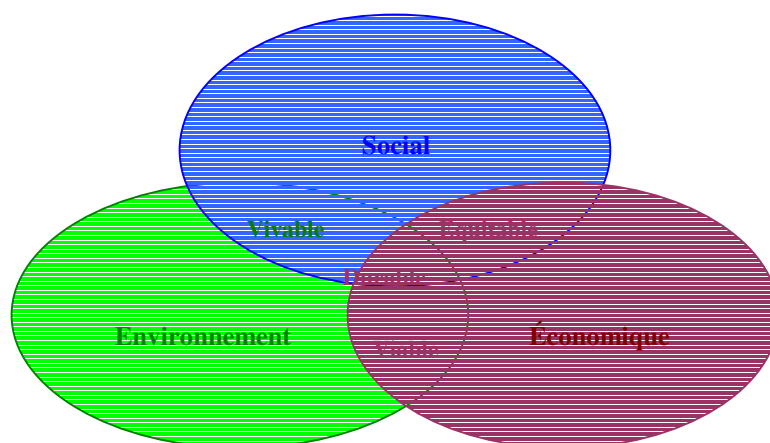
À ces trois pôles s'ajoutent la notion de "bonne gouvernance" qui peut être considérée comme l'exercice des pouvoirs économique, politique et administratif pour gérer les affaires des pays à tous les niveaux.

Une gouvernance cohérente doit permettre des articulations et concertations entre les différents acteurs responsables de mettre en pratique ce nouveau mode de penser le développement.

Le développement durable propose un nouveau regard et une nouvelle manière d'aborder dans leur globalité les problèmes aux quels est confronté l'homme, traités jusque là de façon isolée, c'est-à-dire finalement un changement des relations de l'homme avec le temps et l'espace. La réflexion du "ici et maintenant" doit s'allier avec celle du "demain et là-bas" pour justifier nos choix politiques et techniques.

Le développement durable est donc un virage qui, au-delà de l'environnement se propose de remettre l'homme au centre des préoccupations de la société.

Mesurer le développement durable

Rendre la notion de développement durable opérationnelle dans les politiques publiques implique plusieurs défis importants liés à la mesure de ce concept; en l'absence d'indicateurs ou du cadre quantitatif, il manquera aux politiques en faveur du développement durable des bases solides sur lesquelles elles pourront s'appuyer pour avancer [1].

La nécessité de disposer d'indicateurs fiables et pertinents pour mesurer le développement durable a été reconnue dès la Conférence de Rio et affirmée dans l'Action 21.

Le Rapport Brundtland concluait à la nécessité, entre autres, d'élaborer des indicateurs qui permettent de suivre dans la durée les progrès accomplis au regard de l'objectif consistant sans compromettre la capacité des générations futures de répondre aux leurs.

L'utilisation des indicateurs du développement durable doit permettre aux acteurs et décideurs politiques de [6]:

- prendre conscience, si nécessaire des liens qui unissent les valeurs économiques, environnementales et sociales;
- pour évaluer les implications à long terme des décisions et des comportements actuels;
- pour suivre les progrès accomplis dans la réalisation des objectifs de développement durable en mesurant les conditions de départ et les tendances ultérieures.

Les demandes d'informations sont multiples, évoluent avec le temps et proviennent de nombreuses sources différentes, publiques et privées. Les pays n'aient pas la même vision sur les indicateurs du développement durable. L'une des méthodes de mesure du développement durable les plus courantes consiste à recenser et sélectionner un certain nombre d'indicateurs individuels, pour chacune des trois dimensions – économiques, environnementaux et sociaux.

En autre méthode consiste à développer des indicateurs composites qui sont des indices synthétiques regroupant plusieurs indicateurs individuels, qui permettent de comparer et classer les pays en matière du développement durable.

Les indicateurs composites présentent l'avantage de pouvoir intégrer de grandes quantités d'informations sous une forme facile à comprendre pour le grand public. Ils permettent aussi, de limiter le nombre de statistiques présentées et se prêtent à une comparaison rapide des performances nationales et de communiquer simplement sur les aspects essentiels du développement durable.

Sans insister, nous présenterons quellques idées sur les principaux indicateurs synthétiques:

- L'IDH, ou indicateur de développement humain, utilisé depuis 1990 par le PNUD, combine trois indicateurs de base: l'espérance de vie à la naissance, le revenu (PIB réel) et le niveau d'éducation, lui – même mesuré par le taux d'alphabétisation des adultes combiné au taux fréquentation scolaire des jeunes [1]. L'indicateur comporte une valeur maximale et une valeur minimale pour chaque critère, ce qui permet d'exprimer la position de chaque pays entre 0 et 1.
- Mais l'IDH a fait l'objet de vives critiques: imperfections parfois énormes de certaines données, aboutissant pour quelques pays à des résultats qui heurtent de bon sens; pondérations jugées arbitraires pour obtenir l'indicateur synthétique.
- L'ISEW, ou Index of Sustainable Economic Welfare (l'Indice de bien-être économique durable) est un indice monétaire corrigeant l'indicateur de la consommation des ménages par des facteurs environnementaux et sociaux [5]. Cet indice renforce le constat pessimiste sur la divergence entre la croissance économique et le bien-être. De très loin sur la base de ces indices, les pays producteurs de matières premières et les vieilles puissances industrielles subiraient un relaisser important au profit de pays moins développés. L'ISEW compte aussi notamment des inégalités sociales et la contribution du travail non monétarisé au bien-être individuel.
- Le GPI, ou Genuine Progress Indicator (indicateur de progrès véritable), est dérive de l'ISEW, auquel il apporte quelques modifications. La méthode qui est proposé depuis 1995 par l'institut californien Redifining Progress consiste à partir de la mesure traditionnelle de la consommation des ménages. On y ajoute diverse contribution à la vraie richesse et au bien- être.
- Puis on soustrait la valeur estimée des richesses perdues [3] notamment naturelles (destruction de la couche d'ozone, autres dommages à l'environnement), mais aussi sociale (coût social du chômage, des délits, des accidents de la route).
- L'Indice de bien-être économique et social, des canadiens Osberg et Sharpe, consiste en une moyenne pondérée de quatre indicateurs de base, eux-mêmes synthétiques, portant sur: les flux de consommation au sens large; les stocks de richesses (économique, humaine et environnementale); les inégalités et la pauvreté économique; l'insécurité économique.
- L'indice est également une initiative prometteuse, notamment parce qu'il articule les bases de la compatibilité nationale et celles de certaines statistiques sociales y jouent un rôle très important, nettement plus que les questions environnementales.
- Le HWI, ou Humain Well-Being Index, est un des indicateurs proposés par Prescott-Allen dans son ouvrage "The Wellbeing of Nations" (2001). Il est composé d'indicateurs de base relatifs à la santé (espérance de vie) et à la vie familiale (stabilité de la famille), au revenu et au degré de satisfaction des besoins de base, à la santé de l'économie (inflation, chômage, endettement), au niveau d'éducation et aux moyens politiques et civiques, à l'état de paix de conflit armé, à la criminalité et à l'égalité.

Les indicateurs du développement durable au niveau local

Les collectivités locales ont toujours joué et jouent encore un rôle primordial de développement au sein de leur nation respective. Une véritable ambition de développement durable n'est pas possible au niveau international que si elle est traduite par des actions concrètes au niveau des échelons intérieurs que forment ce tout: par les gouvernements à l'échelle de leurs pays, les collectivités territoriales au niveau des villes et des régions, les entreprises dans leurs sphères d'influences respectives, les individus.

Appliqué aux collectivités, le développement durable contribue à l'attractivité des territoires, constitue un avantage concurrentiel pour les collectivités soucieuses d'un environnement souri et d'un cadre de vie agréable et consiste à promouvoir dans une perspective globale et de long terme des projet très divers contribuant à mieux assurer le développement économique, sociale et de l'environnement.

La notion de développement durable est trop liée aux enjeux et réalités du territoire, aux objectifs politiques fixés et à la nature des compétences des collectivités locales pour qu'il soit possible de bâtir un référentiel uniforme.

Pour aller plus loin, les collectivités locales peuvent mesurer l'amélioration de leurs performances à l'aide d'indicateurs du développement durable [1].

La nécessité de disposer d'indicateurs fiables et pertinents pour guider les processus de développement durable a été reconnue dès la Conférence de Rio.

Elle est affirmée dans des nombreuses sections du document programmatique qui en est issu l'Action 21 (Agenda 21 en anglais). Dans l'Action 21 (le paragraphe 40.4) on trouve la référence la plus explicite aux limites des indicateurs existants et à la nécessité d'en construire de nouveaux pour évaluer la durabilité, au niveau local, provincial, national et international.

Les indicateurs du développement durable au sein des collectivités locales doivent dans certains cas, être suffisamment étoffés et exhaustifs pour structurer les pilotages des politiques mises en œuvre.

Les indicateurs sont d'autant plus différents et hétérogènes que l'on cherche à mesurer la situation du territoire ou l'action de la collectivité, les moyens ou les résultats d'une action, les aspects qualitatifs ou quantitatifs d'une politique (fig. 2).

Fig.2. Schéma d'un programe d'action basé sur IDD
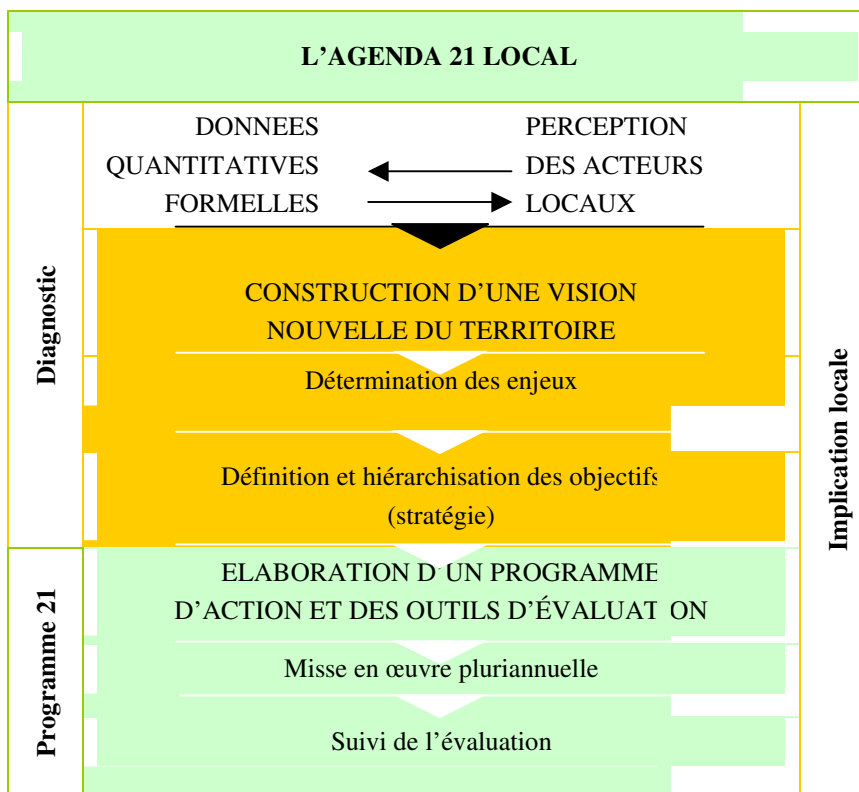
Au-delà de la nécessité pour les décideurs publics et privés de s'appuyer sur des données objectives pour mesurer l'évolution vers de développement durable et définir des orientations, les indicateurs constituent une opportunité d'acquisition de nouvelles connaissances, informations et idées, l'occasion de créer un cadre de réflexion, d'échanges [7]. L'élaboration de systèmes d'évaluation, de suivi, de contrôle et de communication des impacts économiques, environnementaux et sociaux, contribue à construire une culture d'approche systémique et de transparence, inhérente à toute stratégie de développement durable.

En Roumanie, le système d'indicateurs statistiques utilisé au niveau national a été repensé et aligné aux demandes d'information internes et internationales, surtout européennes. On ne peut pas dire le même, sur le système d'indicateurs statistiques utilisés au niveau de la communauté locale (des unités administratives-territoriaux de niveau 2 et 3 conformément à la liste SIRUTA).

L'Institut National de la Statistique gère actuellement un système d'indicateurs au niveau de localité qui s'appelle "La Base de Dates sur les Localités" (BDL). En contenant les indicateurs statistiques, le teneur et le mode de calcul lesquels sont harmonisés avec les normes européennes, en ayant un caractère officiel, unitaire, standardisé, le BDL assure et garantit une analyse économique et sociale des localités dans des conditions comparables de point de vue méthodologique, teritoriel et en dynamique. Malheureusement, le BDL ne contient pas toutes les informations nécessaires pour une caractérisation des localités, surtout de la perspective de développement durable [4].

La multitude des problèmes de l'actuel système d'indicateurs au niveau local, aussi les difficultés en ce qui concerne la valorisation des sources d'informations existantes à ce niveau, met en valeur la nécessité de l'existence d'un nouveau système d'indicateurs, mieux structuré, rigoureusement défini, qui peut caractériser les collectivités locales de point de vue économique et social, qui peut représenter une base réale de données pour les autorités en vue de la consolidation des décisions, des projets et des futures stratégies, pour les investisseurs, les chercheurs, pour le gouvernement etc..

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EXECUTIVE INFORMATION SYSTEMS: DEVELOPMENT LIFECYCLE AND BUILDING BY USING THE BUSINESS INTELIGENCE TOOLS

Lungu Ion

Academy of Economic Studies, Bucharest, Romania, 021319.19.00, e-mail: ionlungu_ase@yahoo.com

Vatuiu Teodora

„Constantin Brâncuşi" University, Tg-Jiu, Romania, 0253218222, e-mail: vatuiu_teodora@yahoo.com

Abstract: The Executive Information Systems (EIS) are designed to improve the quality of strategic level of management in organization through a new type of technology and several techniques for extracting, transforming, processing and presenting data in order to provide strategic information. These technologies are known as Business Intelligence Tools.

This paper presents the development lifecycle, architecture of Executive Information Systems and also the main technologies used for designing and building an EIS.

Keywords: Business Intelligence (BI), EIS, Data Integration, Data Warehouse, Data Mining, OLAP (On-Line Analytical Processing).

1. INTRODUCTION

The Management Information Systems are second level information system, designed to provide information required by managers for planning and decision making. They relay on Operational Information Systems when dealing with primary data, but their main features are the flexibility and the easy to use. They are supposed to supply immediate responses to various data requests, to process collected data to get summary information.

From a modern perspective, the information systems provide support for decision making and the use of the new generation of Decision Support Systems is rapidly expanding. All these information systems, took advantages of data bases, the fourth generation environments and the high technologies of modern computers.

EIS is a subset of a class of technology solutions that also are referred to in the industry as business intelligence (BI) software. The main objective of EIS (Executive Information Systems) is to provide in real time representative information to the high-level management, to support strategic activities such as goal setting, planning and forecasting, and also tracking performance. Another objective of these systems is to gather, analyze, and integrate internal and external data into dynamic profiles of key performance indicators. Based on each executive's information needs, EIS can access both historical and real-time data through ad-hoc queries. EIS users can manage and manipulate multidimensional or cube-like databases. In essence, managers at every level can have a customized view that extracts information from disparate sources and summarizes it into meaningful indicators.

EIS consists in a set of technology solutions that is based on business intelligence (BI) tools. EIS provide a friendly graphical interface and when this is customized for the individual manager, allow users to access corporate data and complements the executive's personal knowledge and provide quantitative diagnostics to monitor the progress of decisions.

In many organizations there are implemented ERP systems for operational and transactional processing for different functional areas such as: financials, inventory, purchase, order management, production. Information from these functional areas within an ERP system is managed by a relational software database such as Oracle Database or Microsoft SQL Server.

Operational levels of management require detailed reports with daily operational activities. But executive levels need information for strategic and tactical decision that often requires reports of aggregated data from ERP and non-ERP application sources.

2. EIS DEVELOPMENT LIFECYCLE

There are some major differences between OLTP systems lifecycle and EIS lifecycle which depends on executive systems characteristics, but the same traditional techniques and stages are used for development: justification, project planning, analysis, design, construction, and deployment (fig. 1).
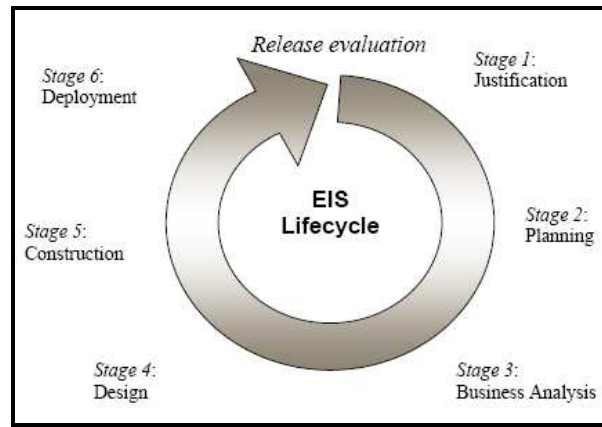
Fig 1. EIS development lifecycle

In these stages there are many steps used for modeling EIS characteristics such as:

- EIS are oriented o business opportunities rather than transactional needs;
- EIS have to implement strategically decisions, not only departmental or operational decisions;
- EIS analysis is focused on business needs. This stage is the most important of the process;
- Development process is cyclical, focused on evaluation and improvement of successive versions, not only building and major delivering of a singular a final version.

3. EIS ARCHITECTURE AND BI TOOLS

EIS systems demand for technology solutions that can extract, analyze, and visualize information from ERP and stand-alone systems in real time and with a friendly and flexible user interface. EIS architecture is common to Decision Support System's architecture and it's structured on three distinct levels: *Management* represented by relational database, data warehouses and other type of data resources; *Model Management,* which is the level of extract, transformation and processing of data; *Data Visualization Tools* that provide a visual drill-down capacity that can help managers examine data graphically and identify complex interrelationships.
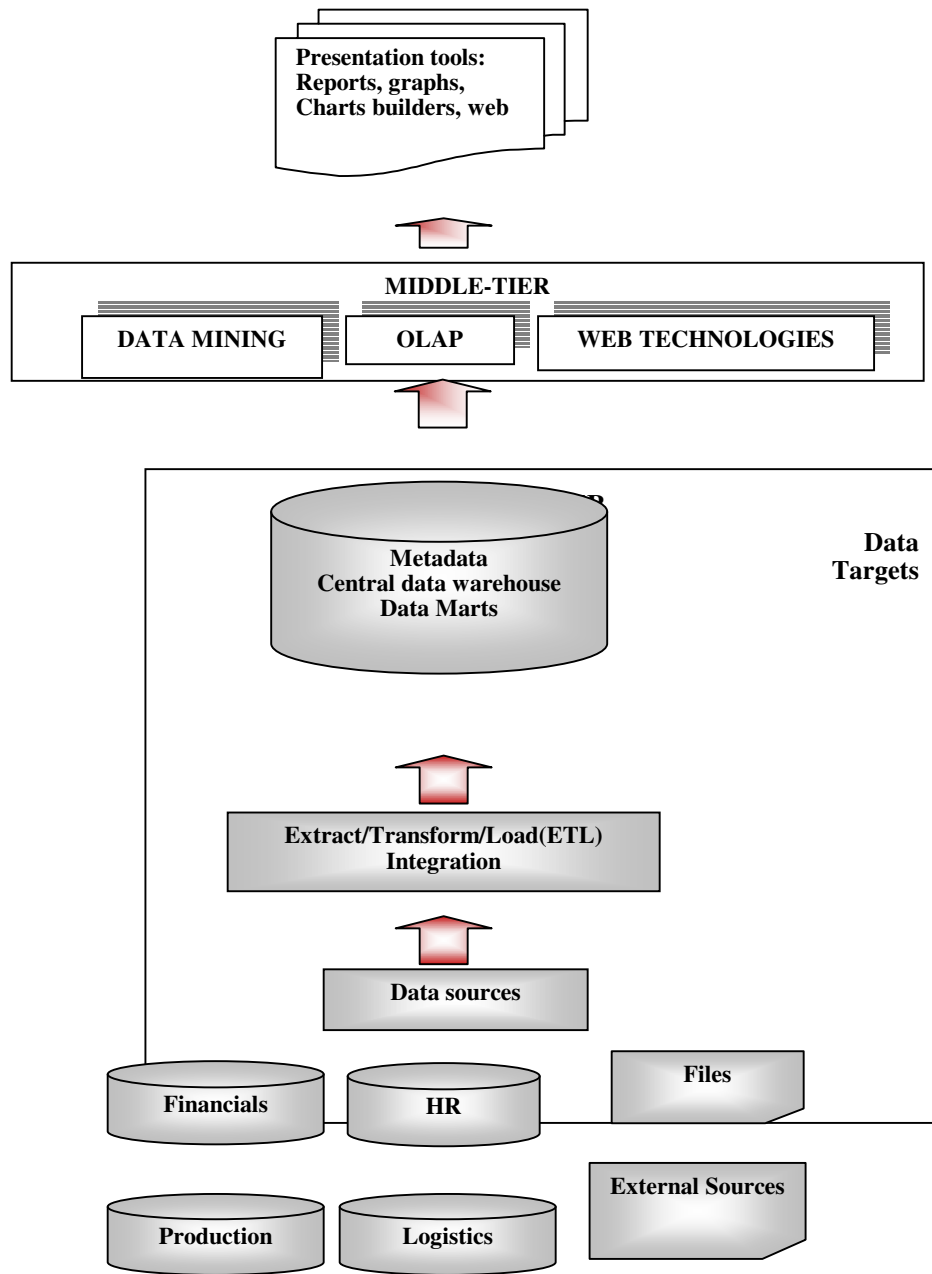
Fig. 2.- A complex EIS arhitecture with three distinct level

A. Data Management Level

This level consists of the data sources' integration through data warehouses. A ***data warehouse*** collects and organizes data from both internal and external sources and makes it available for the purpose of analysis. A data warehouse contains both historical and current data and is optimized for fast query and analysis.

Data are organized in another type of schema which contains fact tables and dimension tables. A fact table is related with dimension tables and contains measure measures and which enable a much easier way in finding data.

Dimension tables are structured on different hierarchical levels of aggregation (e.g. Time dimension can have day, week, month and year as hierarchical levels.)

Data presented in fact tables derived from different type of data sources like relational databases and user files. Data warehouses extract, transform and process data for high-level integration and analysis.

Data warehouse's architecture is different for each individual organization, but in generally it consists of three levels: data sources, ETL process and data marts. All data sources can be integrated into a central source data warehouse from where data are extracted, transformed and loaded through ETL process into a final storage place which can be a central data warehouse or many data marts which are departmental data warehouses.

Although a data warehouse can make it easier and more efficient to use the EIS, it is not required for an EIS to be deployed. Organizations can extract data directly from their host system database for their analysis and reporting purposes, but in a more difficult way.

B. Model Management Level

At this level we can find BI tools for extracting and analyzing data such as OLAP systems, Data mining process and statistical tools.

C. Online Analytical Processing (OLAP)

An OLAP engine is a query generator that provides users with the ability to explore and analyze summary and detailed information from a multi-dimensional database. Traditional relational database systems handle this situation by using multiple queries.

In many cases, the queries become so complex that even the developer finds them difficult to maintain. OLAP overcomes this barrier by enabling users to analyze multi-dimensional data. OLAP systems have typically been implemented using two technologies: ROLAP (Relational OLAP), where data is stored in a RDBMS and MOLAP (Multidimensional OLAP) where dedicated multidimensional DBMS is used. There are also version of HOLAP (Hybrid OLAP) and DOLAP (Desktop OLAP) systems.

Managers can use an OLAP engine for typical operations, like *"slice and dice"* data by various dimensions and then *drill-down* into the source data or *roll-up* to aggregate levels. OLAP provide tools for *forecasting* data and *"what-if"* scenarios and analysis. Bat OLAP can only mark the trends and patterns within the data that was requested. It will not discover hidden relationships or patterns, which requires more powerful tools like data mining.

D. Data Mining

Data mining tools are especially appropriate for large and complex datasets. Through statistical or modeling techniques, data mining tools make it possible to discover hidden trends or rules that are implicit in a large database. Data mining tools can be applied to data from data warehouses or relational databases. Data discovered by these tools must be validated and verified and then to become operational data that can be used in decision process.

E. Data Visualization Tools Level

This level contains tools for presenting and analyzing data from previous levels. There are many graphical tools for building friendly and flexible presentations like: reports, graphics, and charts builders, web pages which can be integrated into an organizational portal or an ERP system interface such as Oracle E-Business Suite. EIS should permit the user the interface to accommodate different degrees of technical knowledge.

CONCLUSIONS

Information Systems are software products intended to store and handle data in an organization. They must meet the informational needs of all levels of management - operational, middle and top and they must be designed accordingly.

Ann EIS should be designed to allow managers who are not trained to use query languages and advanced technologies, a fast, easy, and understandable way to navigate into data and identify trends and patterns.

Developing EIS systems involves time, high-costs and human resources, efforts and an EIS must be capable to provide in real time representative information to the executive management.

Deploying EIS involves many risks: system design, data quality, and technology obsolescence. System design risks stem from poor conceptualization of an enterprise's true business needs before the technology is deployed. Data quality risks relate primarily to whether or not data has been properly cleansed. Technology obsolescence refers to the failure on the part of the vendor to anticipate new technologies. Large budgets and strategic information are involved in deploying EIS systems – this is the reason to establish rigorous criteria for evaluating EIS systems. These criteria are discussed below.

Decisions based on business process EIS should not be viewed only as a data repository or a large set of data. Instead, system's implementation should be concern on conceptualizing new data models, processes, and indicators that form the content of EIS.

EIS should provide extensive understanding of the benchmarks that are useful to evaluate business processes. This feature typically refers to the response time that a system provides to its users. Most responses should range from a few seconds to a maximum of 30 seconds for routine queries. Response times depend on the complexity of the database and the queries being requested.

Flexibility determines whether an EIS solution can continually adapt to changing business conditions after the system has been delivered. An EIS should be able to accommodate changes in any type of business process and functions like personnel, services, and processes, as well as new mandates, laws, and regulations requiring the capture of different types of data.

Integration involves two types of issues: *data integration* and *system integration.* Data integration is the ability to access data from much different type of systems. An EIS will be particularly effective if it can overcome the challenge of information fragmentation, allowing executives to measure features of business processes that involve information from inside and outside of the organization. System integration refers to two things: the ability to extent the EIS software with new capabilities and modules and the system's ability to coexist with other enterprise solutions.

EIS systems have a powerful impact on strategic decisions quality to reduce the time for making decisions. EIS must have the ability to allow managers to view data in different perspective, to drill-down and roll-up to aggregate levels, to navigate and online query data sets in order to discover new factors that affect business process and also to anticipate and forecast changes inside and outside the organization. EIS improve the quality of management in organization through new type of technology and techniques for extracting, transforming, processing and presenting data in order to provide strategic information.

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LE CIBLAGE DE L'INFLATION – ANALYSE THEORIQUE ET EMPIRIQUE

Meşter Ioana Teodora

Universitatea din Oradea, str. Universităţii nr. 1, 410087, Oradea, telefon: 0259 408 410, e-mail: imester@uoradea.ro

Abstract : One of the more interesting developments in central banking in the past dozen years or so has been the increasingly widespread adoption of the monetary policy framework known as inflation targeting.

Inflation targeting, at least in its best-practice form, consists of two parts: a policy framework of constrained discretion and a communication strategy that attempts to focus expectations and explain the policy framework to the public. Together, these two elements promote both price stability and well-anchored inflation expectations; the latter in turn facilitates more effective stabilization of output and employment. Thus, a well-conceived and well-executed strategy of inflation targeting can deliver good results with respect to output and employment as well as inflation.

Although communication plays several important roles in inflation targeting, perhaps the most important is focusing and anchoring expectations. Clearly there are limits to what talk can achieve; ultimately, talk must be backed up by action, in the form of successful policies. Likewise, for a successful and credible central bank, the immediate benefits of adopting a more explicit communication strategy may be modest. Nevertheless, making the investment now in greater transparency about the central bank's objectives, plans, and assessments of the economy could pay increasing dividends in the future.

Mots clées : Ciblage de l'inflation, regles monetaires, politiques monetaires

1. Pourquoi le ciblage de l'inflation ?

Les débats autour de la conduite de la politique monétaire connaissent actuellement un regain d'intérêt. C'est notamment le cas en Europe, où, dans le cadre de l'Union Economique et monétaire, mais aussi à la suite de l'exemple allemand, se sont généralisées un statut d'autonomie pour les banques centrales et l'assignation à ces dernières d'un objectif jugé primordial, à savoir la lutte contre l'inflation.

Parallèlement, la défaveur connue par les politiques strictement monétaristes, après leur triomphe du début des années '80 dans certains pays, de même que la disparition de toute politique administrative de contrôle de l'offre de monnaie dans d'autres pays (l'encadrement du crédit) ont fini par jeter quelque discrédit sur les quantités ou agrégats monétaires en tant qu'objectifs intermédiaire de la politique monétaire. Pour autant, la confrontation entre l'objectif final (inflation) et l'instrument (taux d'intervention sur le marché monétaire) n'est pas devenue directe. Entre les deux se sont immiscées toutes les conjectures qui pourraient être faites sur les anticipations de marchés et sur leur utilisation par les autorités monétaires.

Le résultat de cette situation de fait est que, depuis le début des années '90, plusieurs pays se sont ralliés à une politique de ciblage de l'inflation. La première pays qui a adopté explicitement le ciblage de l'inflation comme politique monétaire est la Nouvelle Zélande en 1990 (avec un niveau initial de 4%), et après, Le Canada (niveau initial 5%) et Le Chili (29%). Le Pérou est le pays avec le niveau le plus élevé (41%), qui a adopté, en 1994, le ciblage d'inflation.

La réussite d'une politique monétaire de ciblage de l'inflation dépende des anticipations de la population en ce qui concerne le taux d'inflation, donc toute réduction des incertitudes améliore les résultats d'une telle politique.

La formulation d'une règle monétaire effectue la jonction entre les deux termes du problème - la maximisation de la fonction d'objectifs de la Banque Centrale sous la contrainte d'un modèle donné de l'économie. Pour pouvoir contrôler et discuter à posteriori les décisions de l'autorité monétaire il faut avoir de références précises.

Le problème de construction d'une règle monétaire revient à déterminer la fonction de réaction de la Banque Centrale qui stabilise mieux les niveaux de l'inflation et d'activité économique. Il s'agit de définir la fonction :

$$i_t = G(L)x_t \tag{1}$$

qui associe une valeur de l'instrument de politique monétaire au vecteur de variables décrivant l'économie, avec :

        i – instrument de la politique monétaire

x – variables décrivant l'état de l'économie

G – vecteur des coefficients de réponse

L - opérateur de retard

En effet, il s'agit de minimiser la fonction de perte inter temporelle :

$$P = E_t \left[\sum_{t=1}^{\infty} \delta^t P_t \right] \text{ avec} \tag{2}$$

$$P_t = \frac{1}{2} \left[\left(\pi_t - \pi^* \right)^2 + \lambda \left(y_t - y^* \right)^2 \right] \tag{3}$$

δ^t – coefficient d'actualisation des pertes

λ – coefficient d'arbitrage entre les variabilités de l'inflation et de la production

π^* – cible d'inflation

π_t – taux effectif de la période t

y^* – taux de croissance d'équilibre

y_t – taux effectif de croissance de la période t

sous la contrainte d'une modélisation de l'équilibre économique:

$$x_t = A(L,c) x_t + B(L,c) i_t + \varepsilon_t \tag{4}$$

A(L,c) – matrice des coefficients des relations estimées entre les variables endogènes du système

B(L,c) – matrice de coefficients d'incidence de la variable de politique monétaire sur l'équilibre économique

c – l'effet des paramètres de la fonction de réponse de la Banque Centrale sur les équations du système (ce qui traduit en effet que les conditions d'exercice de la politique monétaire influencent le comportement des agents économiques)

ε – vecteur de résidus aléatoires

La règle de Taylor modélise le comportement des Banques Centrales qui fixent leur taux d'intérêt selon la relation :

$$i = i_R + \pi_t^e + 0,5 \left(\pi_t - \pi^* \right) + 0,5 \left(y_t - y^* \right) \tag{5}$$

i – taux d'intérêt

π^e – taux d'inflation anticipé

y – taux de croissance

L'application d'une règle de Taylor permet de stabiliser l'inflation et l'activité économique. En effet, la FED, la Banque d'Angleterre et Bundesbank ont adopté avec succès une politique basé sur la règle de Taylor.

On peut dire que la fixation d'une règle monétaire bien choisie équivaut à la définition d'une règle. En effet, sa construction doit suivre les mêmes méthodes que celles utilisées pour la détermination des fonctions de réaction. Mais une stratégie de cible d'inflation ne s'exprime pas par la spécification d'une règle. Ca veut dire que la Banque Centrale ne s'engage pas sur une fonction d'ajustement de ses taux d'intérêt.

La formulation d'une règle monétaire explicite de la forme:

$$i = i_R + \pi^* + f\left(\pi_{t+i}^a - \pi_{t+i}^c\right) \tag{6}$$

avec π_{t+i}^a - taux d'inflation anticipé présentait l'avantage de résoudre le problème de crédibilité.

L'engagement à respecter une certaine fonction de réponse affecte la relation entre la variabilité de l'inflation et la variabilité de la production. En revanche, une fonction implicite est plus souple puisque la Banque Centrale s'engage seulement sur le sens d'ajustement, lorsque l'inflation s'écarte de la cible. La Banque centrale a la possibilité de choisir tous ses instruments qu'elle va utiliser pour ajuster l'inflation.

C'est pourquoi la stratégie de ciblage de l'inflation a été qualifiée de « politique discrétionnaire contrainte » par Bernanke et Mishkin [3] .

2. L'implémentation et la définition de la politique de ciblage de l'inflation

L'implémentation et la définition de la politique de ciblage de l'inflation supposent des choix: d'un indice des prix, d'une cible valeur ponctuelle ou fourchette, d'une valeur attribuer à la cible, d'un horizon pour la cible.

a) Quel indice de prix ?

Les pays développés utilisent le CPI, sans en tenir compte de l'influence des valeurs volatiles, et taxes. Par contre les économies émergentes utilisent le CPI non ajustée. Il faut ici préciser que les chocs individuels qui affectent les prix, ou les évolutions singulières des prix ne soient pas tenus en compte. On peut donner ici quelques exemples :

La Nouvelle Zélande utilise L'IPCX, exclut les services de crédit. En pratique, l'IPCX est corrigé des chocs de prix issus des termes de l'échange, des impôts indirects, des droits prélevés par l'État et des coûts en intérêts. Le Canada: IPC hors alimentation et énergie et corrigé des effets des modifications des impôts indirects. Le Royaume-Uni: IPC corrigé des paiements d'intérêts hypothécaires. Suède: en pratique, IPC corrigé des effets des modifications des impôts indirects. L'Australie: IPC corrigé des effets des modifications des impôts indirects, des paiements d'intérêts hypothécaires et d'autres éléments volatils.

b) Valeur ponctuelle ou fourchette ?

Certains des pays qui se sont fixé des cibles d'inflation ont adopté une valeur ponctuelle, et d'autres, une fourchette. Le Chili et le Royaume-Uni ont choisi de viser une valeur ponctuelle, tandis que la plupart des autres pays ont opté pour une fourchette.

La fourchette présente l'avantage de conférer une plus grande souplesse aux responsables de la politique monétaire. En autre, elle transmet au public un message important, à savoir que le processus d'inflation est marqué par des incertitudes qui limitent forcément la capacité de la banque centrale de maîtriser l'inflation. Le recours à une fourchette comporte néanmoins divers inconvénients. Premièrement, il n'est pas clair que l'utilisation d'une fourchette cible soit un bon moyen pour la banque centrale de faire comprendre l'incertitude qui entoure le processus d'inflation et sa capacité d'atteindre la cible d'inflation. Malheureusement, les estimations de l'incertitude incompressible qui entoure une cible d'inflation sont d'environ cinq points de pourcentage.

Par conséquent, la banque centrale se trouve placée devant un dilemme peu attrayant : viser une fourchette très large, ce qui risque d'embrouiller le public au sujet de ses intentions et d'entamer la crédibilité de sa politique, ou définir une fourchette si étroite que les « ratages » deviennent inévitables.

c) Quelle valeur attribuer à la cible ?

Dans toute stratégie reposant sur l'utilisation de cibles d'inflation, il importe de déterminer le taux d'inflation à viser à long terme. Il y a un consensus que le taux à long terme doit être faible. Pour déterminer la cible d'inflation appropriée à long terme, il faut commencer par établir ce qu'on entend par stabilité des prix. L'une des définitions les plus souvent citées est celle d'Alan Greenspan : selon lui, il y a stabilité des prix lorsque le taux d'inflation est suffisamment faible pour que les ménages et les entreprises n'aient pas à en tenir compte dans la prise de leurs décisions quotidiennes. Il s'agit là d'une définition raisonnable et, d'un point de vue pratique, tout taux d'inflation se situant entre 0 et 3 % semble répondre à ce critère.

La question est maintenant : est-ce que c'est bien que le taux soit fixé à une valeur proche de zéro ? La réponse est non, pour plusieurs motifs :

1. Un motif porte sur les erreur de mesure – selon les estimations, le taux officiel de l'inflation a la tendance à surestimer le taux réel, surestimation qui varie entre 0,5 et 2% par an, donc c'est claire que le cible doit être forcement fixé au dessus de zéro.

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2. Un important argument contre la fixation à zéro de la cible à long terme a été formulé par Akerlof, Dickens et Perry [1], à savoir que l'établissement du taux d'inflation à un niveau trop bas engendre de l'inefficience et fera augmenter le taux de chômage naturel. De l'avis de ces chercheurs, l'hypothèse de rigidité à la baisse des salaires nominaux, qui cadre selon eux avec les résultats disponibles, implique que les salaires réels ne peuvent baisser que s'il y a inflation. Un taux d'inflation très faible pourrait donc empêcher les salaires réels de s'ajuster à la baisse en cas de recul de la demande de travail dans certaines industries ou régions, ce qui aggraverait le chômage et entraverait le passage de la main-d'œuvre des secteurs en déclin aux secteurs en croissance.

3. Un argument plus convaincant contre l'adoption d'une cible d'inflation égale à zéro est que, en pareil cas, l'économie traverserait probablement des périodes de déflation (c'est le cas de la récession au Japon). Une déflation qui persiste peut affecter le système financier, parce qu'elle interfère avec son fonctionnement normal et en ce cas elle va générer la contraction économique.

4. Autre raison pour laquelle les banques centrales gagneraient à poursuivre une cible d'inflation supérieure à zéro : elles ne doivent pas être perçues comme obnubilées par l'idée de maîtriser l'inflation aux dépens de la stabilité de la production. Si une banque centrale est perçue comme obsédée par l'inflation au point de n'accorder aucun poids aux fluctuations de la production dans ses décisions, elle risque fort de perdre l'appui du public. Une cible d'inflation trop basse, disons 0 ou même 1 %, peut indiquer au public que la banque centrale ne fait pas suffisamment cas des préoccupations de celui-ci.

d) Quel horizon ?

La politique monétaire fait sentir ses effets sur l'économie, en particulier sur l'inflation avec des longs décalages. Dans les pays industrialisés, on estime en général à environ deux ans le délai qui s'écoule entre le moment où sont prises les mesures de politique monétaire et celui où elles agissent sur le taux d'inflation.

Des horizons plus courts, un an par exemple, qui ne sont pas rares dans les pays dotés de cibles d'inflation, peuvent causer bien des problèmes.

1. Le premier problème que pose un horizon trop court a trait à la «contrôlabilité», soit aux « ratages » fréquents de la cible d'inflation, même quand la politique monétaire est conduite de façon optimale.

2. Le deuxième problème réside dans l'instabilité possible des instruments de la politique monétaire. En effet, quand l'horizon est court, on peut être amené à modifier trop souvent le niveau des instruments afin de respecter les cibles.

3. Troisième et dernier problème : un horizon trop rapproché implique qu'on n'accorde pas suffisamment de poids aux fluctuations de la production dans la fonction de perte de la banque centrale.

La solution au problème consiste à établir les cibles d'inflation deux ans à l'avance, ce qui implique la fixation de cibles pluriannuelles. Ainsi, la cible de l'année civile en cours serait arrêtée deux ans auparavant et coexisterait avec celle de l'année à venir, définie elle aussi deux ans à l'avance. Les autorités pourraient faire varier la cible d'une année à l'autre, pour éviter que les chocs subis par l'économie, spécialement les chocs d'offre, l'entraînent des fluctuations excessives de la production. En outre, la prise en compte, comme il se doit, des fluctuations de la production dans la fonction objectif de la banque centrale oblige à adopter une approche gradualiste dans la poursuite de la cible d'inflation à long terme. D'où l'utilité d'un système de cibles pluriannuelles, dont l'une puisse différer, même à l'horizon de deux ans, de la cible à long terme si les chocs que subit l'économie portent le taux d'inflation à s'écarter de celle-ci.

3. Conclusion

On peut faire une comparaison entre les différents résultats des pays qui ont adopté le ciblage de l'inflation. Le graphique montre la moyenne annuelle de la déviation par rapport à la cible, en points de pourcentage. Les pays les plus performants sont Le Canada, Le Royaume Uni et La Nouvelle Zélande. La désinflation moyenne en 4 ans suivant l'adoption du ciblage de l'inflation dans les pays développés a été de 6,4% et dans les pays émergents de 10,2%. La désinflation annuelle moyenne des 5 pays émergents pendant 3 ans a été de 2,3%. On voit donc des résultats remarquables.

En effet, alors que les années soixante ont connu l'apogée d'un système où les économistes et leurs modèles réglaient l'activité d'agents économiques dociles, les années soixante-dix tiraient les conséquences de l'hypothèse d'anticipations rationnelles émise par Muth dès 1960 en insistant notamment sur la clairvoyance des agents économiques.

Dès lors, la critique de Lucas a jeté un doute, sinon un discrédit, sur tous les modèles "mécaniques" en vigueur antérieurement. De la même manière, on a mis en avant l'idée selon laquelle la politique monétaire devait agir sur les anticipations inflationnistes plus encore que sur l'inflation (constatée) et on a cherché à collecter toute information sur celles-ci. En particulier, les marchés financiers dont le développement a été foudroyant en Europe dans les années quatre-vingt ont paru pouvoir fournir en temps réel des indicateurs d'anticipations sur de nombreuses variables financières et en définitive sur le taux d'inflation.

Grâce à l'adoption de cibles d'inflation au début des années '90, les banques centrales ont réussis à contenir l'inflation tout en favorisant une forte croissance économique. On ne peut pas dire encore si le ciblage de l'inflation est la meilleure solution, parce que elle a été utilisée par des pays assez stabiles (avec quelques exceptions). La vraie validation sera quand ces pays vont subir un choc exogène très important. Il y a ici un autre question qui mérite notre attention : est-ce que ces pays n'ont pas eu un choc important grâce à cette politique ou parce qu'ils ont eu la chance ?

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MODELLING THE BUSINESS CYCLES – A DYNAMIC STOCHASTIC GENERAL EQUILIBRIUM MODEL

Meşter Ioana Teodora

Universitatea din Oradea, str. Universității nr. 1, 410087, Oradea, telefon: 0259 408 410, e-mail: imester@uoradea.ro

Abstract: The term "business cycle" refers to joint time-series behavior of a wide range of economic variables such as prices, output, employment, consumption and investment. The model embodies the main characteristics of small open developing economies. In particular, the model provides an environment in which the dynamic interactions between world price shocks and business fluctuations in traded and non-traded goods sectors, and several factors of production including imported capital goods sectors, imported intermediate inputs, non-tradable and inelastically supplied capital (land), and labor can be studied. We also examine impulse responses to investigate the propagation of economic fluctuations generated by world price shocks and domestic productivity shocks.

Key words: economic fluctuations, dynamic equilibrium model, log-linearization

1. The model

The representative household maximizes expected lifetime utility given by:

$$U(c,l) = E_0 \left[\sum_{t=0}^{\infty} \left\{ \frac{u(c_t,l_t)-1}{1-\sigma} \exp\left(-\sum_{\tau=0}^{t-1} \varphi(c_\tau,l_\tau) \right) \right\} \right] \tag{1}$$

$$u(c_t,l_t) = \left(c_t - \psi(1-l_t)^\upsilon \right)^{1-\sigma} \tag{2}$$

$$\varphi(c_\tau,l_\tau) = \beta \ln\left(1 + c_t - \psi(1-l_t)^\upsilon \right) \tag{3}$$

$$\sigma > 0,\ \beta > 0,\ \upsilon > 1,\ \psi > 0 \tag{4}$$

where β denotes the elasticity of the discount factor with respect to the utility, σ is the risk aversion parameter. υ governs the intertemporal elasticity of substitution in labor supply, and ψ scales labor hours. c_t is consumption of the non-traded final good, and l_t, represents leisure in period t. The non-time separable preference formulation features an endogenous discount factor, $\exp[-\varphi(c_t, l_t)]$, which is increasing with the level of past consumption. This preference structure produces well-defined steady state dynamics of net foreign assets in a small open economy model - see Blanchard and Kahn [2].

The production side of the model also reflects the empirically relevant structural differences discussed above. The economy produces non-traded final goods and primary goods. Non-traded final goods production, y_t^f uses labor, n_t^f, capital, k_t^f, and intermediate inputs, υ_t:

$$y_t^f = z_t^f (n_t^f)^\alpha \left[s(k_t^f)^{-u} + (1-s)v_t^{-u} \right]^{-(1-\alpha)/u} \tag{5}$$

$$0 < \alpha,\ s,\ u < 1$$

z_t^f represents the exogenous productivity shock. α is the share of non-traded output earned by labor and s is the relative weight of capital. The elasticity of substitution between intermediate inputs and capital is governed by u. This formulation allows me to analyze the impact of degree of substitutability between domestic capital goods and foreign intermediate inputs on the dynamics of the model.

The primary goods sector produces output using labor, n_t^p, capital, k_t^p, and land, L^p, which is assumed to be inelastically supplied. The production function in the primary goods sector is

$$y_t^p = z_t^p (n_t^p)^{\theta_1} (k_t^p)^{\theta_2} (L^p)^{1-\theta_1-\theta_2} \tag{6}$$

$$0 < \theta_1, \theta_2 < 1$$

where z_t^p is the productivity shock. θ_1 and θ_2, are the labor and capital income shares, respectively. Considering that the production of primary goods requires significant amount of land input in developing countries, we introduce land into the production function; hence there are decreasing returns to scale in the non-fixed factors. While capturing the important role played by land in the production process, introducing land also reduces the volatility of primary sector output by limiting the substitution effects across different factors. .

Capital accumulation is modeled as:

$$k_{t+1}^j = (1-\delta) k_t^j + \Phi_j \left(\frac{i_t^j}{k_t^j} \right) k_t^j, \quad j = f, p \tag{7}$$

Here δ is the rate of depreciation and $\Phi_j(\cdot)$ represents the adjustment cost function, with $\Phi_j(\cdot) > 0$, $\Phi_j(\cdot)' > 0$, and $\Phi_j(\cdot)'' < 0$. Adjustment costs differentiate physical from financial capital and prevent excessive volatility of investment (see Baxter and Crucini [1]).

Fluctuations in the cost of servicing external debt seem to be another important source of business cycles in highly indebted developing countries. The average ratio of external debt to GNP is more than 77%, and debt service to export ratio, which is a widely used measure of debt burden, is about 28%. To examine the importance of world interest rate fluctuations in inducing business cycles in developing countries, we explicitly model world financial markets in which each household can trade a single financial asset, A_t, with a stochastic rate of return, r_t, from period t to t+1. The holdings of financial assets evolve according to the formula:

$$p_{t+1}^\upsilon A_{t+1} = nx_t + p_t^\upsilon A_t (1 + r_t) \tag{8}$$

where nx_t, represents the balance of trade and p_t^υ denote the stochastic price of imported intermediate inputs. We assume foreign financial assets are denominated in units of the imported intermediate inputs. Since the quantitative implications of models with incomplete contingent-claims markets depend on the units in terms of which foreign financial assets are denominated, the choice of the units is important. Depending on this choice, different types of wealth affects can arise as the unit choice can change the real value of debt commitment. The possibility of the household playing a Ponzi game is ruled out by imposing the condition:

$$\lim_{t \to \infty} E_0 \left(A_t \frac{1}{(1 + r_t)^t} \right) = 0 \tag{9}$$

The resource constraint for the non-traded goods sector is given by:

$$c_t + i_t^f = y_t^f \tag{10}$$

and for the primary goods sector is

$$p_t^k i_t^p + p_t^\upsilon v_t = y_t^p \tag{11}$$

where i_t^f and i_t^p are investment in capital goods in the non-traded and primary goods sectors, respectively, and p_t^k denote the stochastic price of imported capital goods. The price of the primary good is the numeraire.

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We assume that labor input is mobile across the sectors. This feature of the model allows me to study the impact of different types of shocks on fluctuations in labor supply. The household, who has a fixed time endowment normalized to one, faces the following labor-leisure allocation constraint

$$l_t + n_t^f + n_t^p = 1 \tag{12}$$

There are five shocks in the model: two sectorial productivity shocks, two shocks to the relative prices of imported capital and intermediate goods, and a world interest rate shock. The vector of exogenous shocks is represented by

$$Z_{t+1} = \left[\ln\left(p_t^k\right), \ln\left(p_t^v\right), r_t, \ln\left(z_t^f\right), \ln\left(z_t^p\right) \right]' \tag{13}$$

The evolution of Z, follows a first order Markov process and is given by

$$Z_{t+1} = \prod Z_t + \varepsilon_{t+1} \tag{14}$$

The vector of innovations is denoted by

$$\varepsilon_t = \left[\varepsilon_t^k, \varepsilon_t^v, \varepsilon_t^r, \varepsilon_t^f, \varepsilon_t^p \right]' \tag{15}$$

where $\varepsilon_t \sim N(0, \Sigma)$.

2. The calibration

We solve the optimization problem of the representative household by maximizing the expected lifetime utility, (1), subject to the constraints (2)-(12). Since this problem cannot be solved analytically, I find an approximate solution using the log-linear approximation method of King and al [3]. The parameters used in the model are presented in table 1:

Table 1

Parameter	Description	Value
Preferences		
β	Consumption elasticity of rate of time preference	0.043
r	Real interest rate	0.18
$1/(v-1)$	Intertemporal elasticity of substitution in labor supply	0.83
σ	Coefficient of relative risk aversion	2.61
ψ	Level parameter for labor supply	8.02
Technology		
Primary goods sector		
θ_1	Share of labor income	0.35
θ_2	Share of capital income	0.2
η_p	Elasticity of marginal adjustment cost function	2
Final goods sector		
α	Share of labor income	0.36
$1/(u+1)$	Elasticity of substitution between intermediate and capital goods	0.74
s	Weight of capital input in the	0.55

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	CES composite	
Δ	Depreciation rate	0.1
η$_f$	Elasticity of marginal adjustment cost function	5

The model calibration involves selecting a combination of parameter values which are roughly consistent with the long-run features of the economic environment of a representative small open economy. The calibration was realized in conformity with the economic literature – see Kouparitsas [4] and Ostry and Reinhart [6].

3. Conclusions

Our results reveal the following stylized features of business cycles in Romania: first, the volatility of output in the primary goods sector is larger than that in the non-traded final goods sector with aggregate output being the least volatile. Second, the volatility of consumption is slightly greater than that of aggregate output since my consumption series includes durable goods. Third, while investment exhibits high cyclical volatility, the trade balance is the most volatile aggregate and employment is slightly more volatile than consumption. Fourth, except the trade balance, all macro aggregates are procyclical.

The model replicates most of the qualitative features of data. For example, the volatility ordering of the production sectors is captured by the model: the primary sector output has the largest variability and aggregate output is the least volatile series. This is largely explained by the fact that productivity shocks in the primary goods sector are more volatile than in the non-traded final goods sector. The model also correctly predicts that investment is more volatile than output, and the trade balance is the most volatile aggregate. The volatilities of consumption and employment relative to output are somewhat lower in the model than in the data. The consumption results would probably be closer, if the data only included non-durable consumption expenditures. Also, labour supply variation in the model is captured only along the intensive margin.

We next evaluate the performance of the model in replicating comovement properties of the data. The model closely matches the correlation between the primary sector output and aggregate output, and slightly over predicts the aggregate output-non-traded sector output correlation. Sensitivity experiments suggest that it is possible to reduce this correlation by reducing the correlation between productivity shocks in the two sectors. The correlation between consumption and output in the model is higher than that in the data. We conjecture that world price shocks are not able to generate strong enough intertemporal consumption substitution effects in the model to dampen the correlation between consumption and output. The output-labour hours correlation in the model is higher than in the data. The preference formulation implies that the marginal rate of substitution between consumption and leisure depends only on labour supply inducing perfectly procyclical labour hours. In response to the positive productivity or negative world price shocks, both of which induce positive income effects, agents increase their imports of capital goods and intermediate inputs instead of saving by buying foreign assets. There is a relatively high negative correlation between the trade balance and aggregate output in the model.

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EVALUATING INFORMATION SYSTEM DESIGNING STRATEGIES

Mihălcescu Cezar

Universitatea Româno Americană, Calea 13 Septembrie 104, Bl 48, Ap 21, sector 5, Cod Postal 050727 Bucureşti, Tel: 0722-387-162, e-mail cezar_mihalcescu@hotmail.com

Iacob Ionel

Universitatea Româno Americană, Bld. Expozitiei nr. 1B sect 1 Bucuresti, tel:0723.279166, email: ionel-iacob@rau.ro

Evaluating information systems designing strategies was initially used to justify certain decisions that had already been taken, or as an argument to prove the utility of the analysts and system engineers' work (a somewhat formal evaluation); later on the move has been made towards an objective evaluation of these strategies and, finally, of the information systems, in order prove the benefits brought by the new technologies. Unfortunately, the preponderant orientation towards quantitative methods has discouraged some people, while others rejoiced, because the benefits were not at all easily definable and measurable.

Keywords : informatics system, evaluation,

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Adopting information technologies and information systems offers a lot of organizations the possibility of obtaining a wide range of strategic and operational benefits. Still, although many of these benefits can be taken into consideration in today's accountability, the intangible and non-financial benefits are those that make the process of justifying expenses much more complicated. Therefore, many companies find themselves in the situation of not being able to estimate all the implications of investing in new technologies, limiting themselves to a limited evaluation process, to analyzing the quantifiable benefits and costs. That is why we question the predictive value of these decision making processes that are based only on traditional approaches of investment evaluation.

The first problem that needs to be solved is defining the object to be evaluated. Evaluation can refer to the strategy of realizing an information system, but, as the subject is complex, it can only be approached in context. In time, 4 strategic applications of the Information Systems were created, each one having their own implications on management:

- Applications which ensure an efficient integration of information in the company's key processes, the ones that add value.
- Applications which create more efficient links between the organization and its main suppliers and customers.
- Applications which make it possible to project and deliver new or improved products or services for the market.
- Applications which offer the executive management the information needed in order to run the company and its strategy as efficiently as possible.

The last type of strategic use of IS/IT is probably the most uncommon one, although the concept of executive information system is well known and sold on the market by software suppliers. The idea of offering executive managers reliable information straight form the information systems is not a new one. It was one of the subjects of the management-oriented information systems era, but this objective has rarely been achieved. The main reasons for this are:

- It is difficult to define the relevant information for the executive management and these change continuously and rapidly; the need for external information combined with internal information;
- The simplicity of approaching Management Information Systems, which doesn't easily allow adding interpretations to gross data, therefore not being able to ensure the basis for strategic decisions and their potential implications.

In order to design an efficient management information system, all these factors need to be taken into consideration. Different techniques are needed in order to determine which information is necessary for

taking a strategic decision. Often, the strategy of the company itself is unclear. We need to identify the relevant external data sources, to validate and integrate them into the information resource of the organization. Complex, but flexible analyses need to be performed on the data, as well as adequate presentations of the results for the executive, offering a limited time amount for assimilating the details.

The facilities offered by the information systems for presentations have improved spectacularly. At the moment there are knowledge bases and expert systems capable of incorporating the managers' knowledge in interpreting the data. But all these cannot substitute finding the information that is necessary in order to take each type of strategic decision.

The successful development of the information systems is, at the moment, a matter of understanding the managerial processes involved and, in this field, there is a lot to be learned. Some organizations have made significant steps in building efficient systems, even if they are not wide enough to support decision-making at an executive level.

Strategic applications develop aspects of the IS/TI use that remain outside the field of automated data processing and management information systems. These imply new approaches, in order to identify and then design strategic information systems. Here is a series of key factors to the success in approaching a strategic information system:

- The information needs should be analyzed in the wider context of the activity branch and the relations with the suppliers and clients.
- The focus should be kept on the added value and on quality, not on reducing the costs.
- All parties involved should benefit from the system
- Understanding the client, his needs, his possible future tendencies
- Innovations based on the organizational profile and on an adequate technology.
- Step-by-step development of the systems.

Today's complex environment requires much more understanding, knowledge and experience from managers, who need to decide what to do with an information system for obtaining the desired benefits. There is a series of concepts that can facilitate explaining the way in which information systems can be used at present in order to improve organizations.

Evaluation signifies appreciating or recognizing values, being synonymous with measuring values. But, in order to measure something, we need to define the intrinsic dimensions of the object or phenomenon, to establish a measuring unit and to execute the measuring. This measuring, presumably objective, depends to the highest degree on a series of subjective judgements. The Oxford dictionary offers the following definition: "Value is the quantity of goods or trade means considered the equivalent for something else". Form a commercial point of view, value is considered to be the amount of money exchanged between parties, when a buyer buys a good or a service from a seller. Value is always determined by context and perception. Changes in value can happen entirely due to a change of perception. When measuring the performance of a company, the standard used for measuring value is, undoubtedly, a flexible one. Evaluating the achievements of information systems is at the moment of high interest from different points of view: IT, managerial, sociological etc. It is a favorite subject for many controversies, both in academic environments, as well as in business ones, and it is a lively debated issue in scientific publications, seminaries and conferences. The reason for this wide public interest is the fact that IT is becoming more and more important in achieving the organizational objectives in general, and in achieving the strategic objectives in particular. Investments in IT never cease to grow and deciding persons are beginning to fear that the benefits brought by these investments will not meet the expectations.

A normal restriction in this field is taking into consideration the organizational context to use and multiple perspectives. Neils Bjom-Andersem wrote that: "many of our researches in the information systems area did not take into consideration the dynamic nature of the environment and the requests addressed to society and individuals." Targett thinks that: "evaluation is interpreted too narrowly in many organizations, referring only to quantifying well defined benefits, with the obvious aim of having the project approved." Not taking into account the benefits that appear for some categories of the interested groups leads to ignoring one of the most important effects of designing and implementing information systems, only because they are not highlighted in the balance sheet. Indicatives such as profit rate only mirror the objectives of a small group of interested parties. But in the base methodology for designing Multiview information systems, the techniques and instruments are chosen according to the actual state of facts, as opposed to the traditional designing methodologies, such as SSADM, where the steps are very clearly specified and must be rigorously followed in any situation. A major influence on the functioning of a new information system belongs to the existing practices and the organizational culture. The evaluation of the information systems designing strategies has a series of specific characteristics that render it extremely difficult. Hence, evaluation is a rather complex issue. The designing of information systems includes multiple actions, impossible to separate from the organizational context in which they are placed and from

the infrastructure that they stand on; information systems are a product of people's work, a product that is continually improving.

Due to the fact that the requirements that need to be satisfied and the restrictions set on the information system are not always clearly formulated, evaluation implies a high degree of ambiguity. We must consider the fact that information related to the information system and to its environment are not always available, correct and exact. Therefore, we specify the following:

– The time elapsed between the planning, designing, realizing, implementing of the information system and obtaining the benefits is considerable. During this time, both the organization, as well as the environment can change.
– The high number of interested parties involved is due to the fact that information systems influence the whole organization, but also the environment, and change the working method. Often, the costs appear in other parts of the organization, different to those where the benefits appear, and often, both costs, as well as benefits, migrate outside the organization, too.
– Insufficient information on the area, as well as the rapid evolution of technologies, makes this field less accessible for the evaluators having only economic knowledge.

Therefore, we ask the following question: "When can we consider that an information system is a success and the managerial strategy used is efficient?"

We can consider that the system has reached its pre-determined purposes when:

– The users are satisfied;
– Its use brings a profit
– The share-holders are content.

The evaluation of the information systems design strategies aims towards:

– Evaluating the performances of information systems, because the performances of the system are in fact evaluated.
– Evaluating the software when we refer only to the programming part of the system.
– Evaluating the IT, referring only to equipments and programs.
– Evaluating the IS/IT, in order to highlight the lack of a clear distinction, widely accepted, between these terms.
– Evaluating the informational function, when we refer to the whole organization and all the information systems in an organization.
– Post implementation auditing, referring to the type of evaluation which is carried out after the implementation of an information system and which verifies if the initial specifications have been observed.
– Justifying investments in IS/IT, referring to the evaluation of investment options in order to choose the best one.

There are two categories of generic benefits which can be obtained: tangible and intangible. A tangible benefit is a benefit which directly affects the profit rate of the organization. An intangible benefit is a benefit which has a positive effect on the organization, but does not directly influence the profit rate.

Inside these wide categories of tangible and intangible benefits, there is also need for another classification of the benefits, into quantifiable and unquantifiable benefits. A tangible quantifiable benefit of realizing and implementing information systems is a benefit which directly affects the organization's profit rate and the effect is of such a nature that it can be objectively measured. For example, reducing costs or increasing incomes is also a benefit. A tangible unquantifiable benefit also directly affects the organization's profit rate, but the extent of this influence cannot be directly measured. For example, the possibility of better information as a result of optimizing the access time to information is a benefit.. The intangible unquantifiable benefits are the most difficult ones. They cannot be easily measured and their impact does not directly affect the profit rate of the organization. Examples of this type are: the market reaction, the customers/employees' opinions on the company's products. Compliance with legal dispositions: this type of benefits is either obtained, or not; there are no intermediary steps. It is usually advised for their delivery to be made at the lowest possible cost. Usually, an information system is not designed and used only for the organization to comply with certain legal dispositions.

Strategies can be evaluated by assessing the performance of the system. In the industrial culture of the developed countries there is a deep need to periodically measure the organization's performance, for several reasons, including the need to improve performance and ensure development. Both the improvements of performance, as well as the ensuring of development are necessary to fulfill the hopes related to increased salaries, profits, dividends of the interested parties. When evaluating performance, one must keep in mind the nature of the organization, its dimension and, especially, the management's style and objectives.

In general, there are certain situations in which performance is not measured or is measured with less attention:

- When the funds involved are not substantial;
- When performance or value are considered as guaranteed;
- When the organization thinks that a certain activity is a current expense and not an investment.

The expenses for Information Systems are usually watched closely because:

- The amount of funds involved is often substantial
- Investments in this field are not linked directly to the aspects that generate profit for the organization and that is why there is no consensus on the necessity of such investments;
- Expenses on IS, especially those on equipment, are cleared off in time
- The risk of these investments is higher than in other fields.

All these factors have led the management demand a detailed and analytical approach to the IS investments evaluation in the wider context of IT investments. Also, in order to ensure quality services, the performances of the information system should be periodically evaluated. This evaluation consists of comparing real performance to those specified, both in regard to the use of resources and functioning and maintenance. When the functioning is not in the prescribed standards, a corrective action is necessary, followed by re-evaluation. A functioning evaluated as satisfactory does not indicate the immediate need for change, but it should not lead to the limiting at that level. The information field is not a static field. The emergence of new technologies, the changes in the economic climate, the increase of the loading degree , a change that involves the users, the demand for new applications or a delay in the design of new systems can change today's satisfied users into tomorrow's frustrated users in a minute. Because of this, evaluations need to be programmed at regular times, so that weaknesses of the designed system can be detected and corrected before they become chronic. Also, every time there is trouble, evaluations should be carried out.

The evaluation of performance is in fact a control mechanism. Surprisingly, many informatics compartments which design and ensure the maintenance for reporting systems used for financial activities and for the functioning of the organization globally, carry out their own evaluation only occasionally. As a matter of fact, the Information Systems' role is to lead to an increase in efficiency in all other compartments of the organization. Such systems are installed because they promise to provide benefits which equal or even surpass their costs. Therefore, any improvement in the information function efficiency will amplify on the organization as a whole. There are also financial reasons for focusing on increased performance in the informatics activity. Generally speaking, informatics departments take up between 1-5% of the income generated by producing companies. In companies that offer services and in public agencies that have information at their core, this level rises up to 20%. Why wouldn't the organization look for a way to reduce these expenses? Evaluating performance leads to savings, by identifying weaknesses and taking the right action.

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E-COMMERCE SECURITY STRATEGIES

Munteanu Alin

"Tibiscus" University of Timisoara, Faculty of Economics, 1/A Daliei Street, 300558, Timisoara, Romania, Phone: +40-256-202931, E-mail: a_munteanu@yahoo.com

This article presents an overview of security and privacy concerns based on the author experiences as testing a few applications developers. It explores the current state of e-Commerce applications and describes techniques that can make your online site or online shopping experience more secure. The aplications are business middleware that accelerates the development of any business transaction-oriented application, from the smallest online retailer to B2B portals, to supply chain management applications and provides an integrated platform that runs both their customer facing online shopping sites, and their internal distributor or supplier portals.

Key words: e-commerce, Internet, security

Introduction

The applications for e-commerce are business middleware that accelerates the development of any business transaction-oriented application, from the smallest online retailer to B2B portals, to supply chain management applications. For many clients, this aplications provide an integrated platform that runs both their customer facing online shopping sites, and their internal distributor or supplier portals as shown in Figure 1.
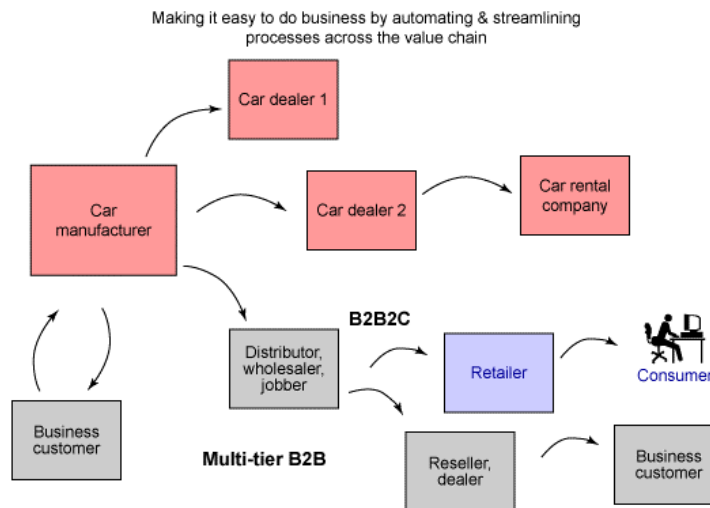
Figure 1. Common applications business model

E-commerce refers to the exchange of goods and services over the Internet. All major retail brands have an online presence, and many brands have no associated bricks and mortar presence. However, e-Commerce also applies to business to business transactions, for example, between manufacturers and suppliers or distributors.

Security overview

A secure system accomplishes its task with no unintended side effects. Using the analogy of a house to represent the system, you decide to carve out a piece of your front door to give your pets' easy access to the outdoors. However, the hole is too large, giving access to burglars. In the software industry, security has two different perspectives. In the software development community, it describes the security features of a system. Common security features are ensuring passwords that are at least six characters long and encryption of sensitive data. For software consumers, it is protection against attacks rather than specific features of the system. Your house may have the latest alarm system and windows with bars, but if you leave your doors unlocked, despite the number of security features your system has, it is still insecure. Hence, security is not a number of features, but a system process. The weakest link in the chain determines

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the security of the system. In this article, we focus on possible attack scenarios in an e-commerce system and provide preventive strategies, including security features, that you can implement.

Security has three main concepts: confidentiality, integrity, and availability. Confidentiality allows only authorized parties to read protected information. For example, if the postman reads your mail, this is a breach of your privacy. Integrity ensures data remains as is from the sender to the receiver. If someone added an extra bill to the envelope, which contained your credit card bill, he has violated the integrity of the mail. Availability ensures you have access and are authorized to resources. If the post office destroys your mail or the postman takes one year to deliver your mail, he has impacted the availability of your mail.

In a typical e-commerce experience, a shopper proceeds to a Web site to browse a catalog and make a purchase. This simple activity illustrates the four major players in e-commerce security. One player is the shopper who uses his browser to locate the site. The site is usually operated by a merchant, also a player, whose business is to sell merchandise to make a profit. As the merchant business is selling goods and services, not building software, he usually purchases most of the software to run his site from third-party software vendors. The software vendor is the last of the three legitimate players. The attacker is the player whose goal is to exploit the other three players for illegitimate gains.

The attacker can besiege the players and their resources with various damaging or benign schemes that result in system exploitation. Threats and vulnerabilities are classified under confidentiality, integrity, and availability. A threat is a possible attack against a system. It does not necessarily mean that the system is vulnerable to the attack. An attacker can threaten to throw eggs against your brick house, but it is harmless. A vulnerability is a weakness in the system, but it is not necessarily known by the attacker.

Security features

While security features do not guarantee a secure system, they are necessary to build a secure system. Security features have four categories:

- authentication: Verifies who you say you are. It enforces that you are the only one allowed to logon to your Internet banking account;
- authorization: Allows only you to manipulate your resources in specific ways. This prevents you from increasing the balance of your account or deleting a bill;
- encryption: Deals with information hiding. It ensures you cannot spy on others during Internet banking transactions;
- auditing: Keeps a record of operations. Merchants use auditing to prove that you bought a specific merchandise.

Password policies are enforced for shoppers and internal users. A sample password policy, defined as part of the Federal Information Processing Standard (FIPS), is shown in the table below.

Tabel 1

Policy	Value
Account lockout threshold	6 attempts
Consecutive unsuccessful login delay	10 seconds
Matching user ID and password	N (no, they cannot match)
Maximum occurrence of consecutive characters	3 characters
Maximum instances of any character	4 instances
Maximum lifetime of passwords	180 days
Minimum number of alphabetic characters	1 alphabetic character
Minimum number of numeric characters	1 numeric character
Minimum length of password	6 characters

Reuse user's previous password	N (no, cannot be reused)

Source: Howard M., LeBland D., Writing Secure Code, Second Edition, Microsoft Press, 2003

Site development best practices

Security policies and standards

There are many established policies and standards for avoiding security issues. However, they are not required by law. Some basic rules include:

- Never store a user's password in plain text or encrypted text on the system. Instead, use a one-way hashing algorithm to prevent password extraction.
- Employ external security consultants (ethical hackers) to analyze your system.
- Standards, such as the Federal Information Processing Standard (FIPS), describe guidelines for implementing features. For example, FIPS makes recommendations on password policies.
- Ensure that a sufficiently robust encryption algorithm, such as triple DES or AES, is used to encrypt all confidential information stored on the system.
- When developing third-party software for e-commerce applications, use external auditors to verify that appropriate processes and techniques are being followed.

Recently, there has been an effort to consolidate these best practices as the Common Criteria for IT Security Evaluation (CC). CC seems to be gaining attraction. It is directly applicable to the development of specific e-commerce sites and to the development of third party software used as an infrastructure in e-commerce sites.

Using cookies

One of the issues faced by Web site designers is maintaining a secure session with a client over subsequent requests. Because HTTP is stateless, unless some kind of session token is passed back and forth on every request, the server has no way to link together requests made by the same person. Cookies are a popular mechanism for this. An identifier for the user or session is stored in a cookie and read on every request. You can use cookies to store user preference information, such as language and currency. This simplifies Web page development because you do not have to be concerned about passing this information back to the server. The primary use of cookies is to store authentication and session information, your information, and your preferences. A secondary and controversial usage of cookies is to track the activities of users.

Cookies marked as secure (storing encrypted data and passing to the user only under SSL) remain the most popular method of providing a secure online experience.

Using an online security checklist

Use this security checklist to protect yourself as a shopper:

- Whenever you logon, register, or enter private information, such as credit card data, ensure your browser is communicating with the server using SSL.
- Do not shop at a site when the browser does not recognize the server's SSL certificate. This check is done by your browser the first time your URL becomes HTTPS for the site. If the certificate is not recognized, then your browser presents a pop-up message to inform you.
- Use a password of at least 6 characters, and ensure that it contains some numeric and special characters (for example, c0113g3).
- Avoid reusing the same user ID and password at multiple Web sites.
- If you are authenticated (logged on) to a site, always logoff after you finish.

Conclusion

This article outlined the key players and security attacks and defenses in an e-commerce system. Current technology allows for secure site design. It is up to the development team to be both proactive and reactive in handling security threats, and up to the shopper to be vigilant when shopping online.

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E-MARKETPLACES BUSINESS-TO-BUSINESS E-COMMERCE

Munteanu Alin

"Tibiscus" University of Timisoara, Faculty of Economics, 1/A Daliei Street, 300558, Timisoara, Romania, Phone: +40-256-202931, E-mail: a_munteanu@yahoo.com

An entire new class of dynamic e-commerce solutions is quickly overtaking the comparatively static models of the first wave. This new wave has the potential to leverage the Internet's full capacity for creating truly dynamic, interactive communities and e-marketplaces. This year alone, hundreds of new e-marketplaces will emerge, changing the way business is done in some of the largest and most tradition-bound industries in the world.

Key words: e-commerce, Internet, B2B

Introduction

Organizations are increasingly using the Web to conduct business with greater speed, reach and efficiency. Despite this, buyers and sellers alike are still struggling with high transaction costs, disjointed and complex supply chains, inefficient processes and poor communications that characterize traditional trade in many industries. The first wave of business-to-business (B2B) e-commerce did little to ease these inefficiencies, merely replicating existing business models and barely tapping the Internet's full potential for interactivity and responsiveness.

A whole new class of dynamic e-commerce solutions is quickly overtaking the comparatively static models of the first wave. This new wave has the potential to leverage fully the Internet's inherent capacity for creating truly interactive communities and markets, with realtime, market-driven pricing and interaction. These trading communities, or *e-marketplaces*, employ a combination of technologies and services to enable buyers and sellers to interact in a dynamic environment and to establish and maintain relationships with supply chain partners.

B2B e-commerce is poised for a revolution, and at the forefront of this revolution are the new *Net market-makers,* online intermediaries that bring buyers and sellers together in a virtual environment to facilitate B2B trade. Dataquest predicts that these market-makers will reintermediate many supply chains—disrupting existing relationships and industry practices in some, driving new efficiencies in many, and adding value to most.

Some of the drivers fueling the rapid growth of e-marketplaces include:

- inefficiencies in traditional and first wave B2B trade;
- increased bandwidth and computing power;
- improvements in technology and applications;
- nontraditional competition in traditional industries;
- collapsing technology barriers for e-marketplaces;
- shifting of venture funding to B2B trade;
- availability of spot-market products;
- costly point-to-point communications;
- lower costs and richer experiences provided by Web technology;
- development of open, Web-based standards.

E-marketplace value propositions

Market-makers and e-marketplaces can provide significant value to buying and selling organizations of all sizes. They facilitate more efficient and effective trade of goods and services, and eliminate inefficiencies inherent in the trading process. They can improve productivity by providing secure, integrated and ubiquitous access to relevant information and applications. And they can improve business processes by facilitating better two-way flow of information between people and applications in a collaborative environment. The following table lists the benefits of e-marketplaces that are unique to each type of participant:

Table 1

Suppliers	Buyers	Market-makers
Enhanced selling power (reach, range, efficiency)	Enhanced buying power (reach, range, efficiency)	New customers
New marketing and distribution channel	More negotiating power	Improved or additional service to customers
Improved customer service (better content, more efficient processes)	More suppliers, more products	Better leverage current content and customers
Automated order and fulfillment processes	Better service	Protection of current intermediary role or creation of new role in chain
Channel for secondary inventory	Access to surplus supply, spot purchases	New and ongoing revenue opportunities
Lower acquisition cost	Faster time to market	
Improved pricing efficiencies	Lower cost and risk	
Community participation	More comprehensive solution	
Level playing field	No ongoing upgrade and maintenance costs	

A market-maker's primary purpose is to bring together virtually a highly targeted audience of corporate buyers and sellers to solve specific industry problems imbedded in the trading process. Market-makers provide solutions that go beyond the first wave of B2B e-commerce to provide dynamic, open e-marketplaces that can enter the supply chain of vertical and horizontal industries, introducing new efficiencies and new ways of buying and selling. By simply resolving inefficiencies, market-makers act as catalysts to compress process time, decrease costs and improve business processes, in ways previously unimaginable. By adding value beyond efficiency, market-makers can truly revolutionize the way trading partners do business. Providing a comprehensive range of services surrounding trade, market-makers offer a strong value proposition, improve customer retention and expand their own potential revenue.

First-moving market-makers who focus on market capitalization over long-term viability and the creation of value will risk failure. Success depends on the market-maker's ability to attract and retain multiple participants—buyers, sellers and supply chain partners. The requirements and critical success factors of these participants should drive the design and implementation of an e-marketplace. Poorly designed or executed e-marketplaces will attract few participants. In a vicious cycle, e-marketplaces with fewer members provide less value and therefore fail to attract and retain new members. A sound, forwardthinking market design will gain critical mass and motivate others to participate.

Characteristics of an effective e-marketplace platform

Most early-adopting market-makers built their own e-marketplace infrastructures. They found that the e-marketplace solutions of most third-party vendors lacked functionality or could not be configured to meet industry needs. Now, time-to-market pressures, along with the breadth and depth of function required for an e-marketplace to be successful, make proprietary solutions ineffective and unwieldy. Market-makers should choose an e-marketplace platform carefully to avoid getting locked into limited and limiting technology, which will be costly to replace later.

Most packaged e-marketplace software focuses only on one or two key aspects of B2B trade, such as community, procurement or auctions. E-marketplaces built on software platforms that only support the capabilities of one or two of these types of solutions cannot deliver the total value proposition of a trading hub. A true e-marketplace must provide comprehensive trading capability comparable to that of all of the above examples combined. The strength of the design of an e-marketplace, as well as the platform underlying it, will be a significant factor of its success. E-marketplaces built on the most innovative and robust platforms will be the ultimate winners. Some critical characteristics of an effective e-marketplace platform include:

Quick to market. One of the market-maker's most critical success factors is speed to market. An e-marketplace solution should be quick and easy to implement, providing robust out-of-the-box functionality and preconfigured options.

Highly flexible. In addition to being "prebaked" enough to get to market quickly, a platform must also be highly customizable and configurable. Different industries have unique market requirements; market-makers have preferred business models; and e-marketplaces will be adapted and extended over time to create additional value.

Unified content. E-marketplaces should provide a single point of access to heterogeneous data sources, transparently aggregating catalog content into a single, unified view. They should also provide mechanisms for effectively searching, filtering and mining content.

Dynamic trade mechanisms. Businesses have a variety of wants and needs for negotiating trade. They look for a single e-marketplace that can fulfill all of these requirements. First-wave B2B solutions supported only fixed pricing. True e-marketplace solutions must support dynamic pricing and negotiation through various realtime mechanisms, such as contracts, auction, reverse auction and exchange.

Open, standards-based architecture. To avoid locking customers into limiting, proprietary solutions, a platform should be based on industry-accepted standards. This will better enable market-makers to extend the system, and achieve integration and interoperation with other systems.

Ease of integration. To provide a truly end-to-end solution, market-makers must be prepared to enable the integration of the diverse data, applications and processes of their members. Market-makers unable to manage the back-end integration among buyers and sellers will fall short of their promises of huge efficiencies.

Built for success. A market-making solution should presuppose the success of the e-marketplace. Gaining critical mass will require scalability; achieving high liquidity will require robust, high-performance transaction capability; rapidly increasing scope will require advanced functionality and adaptability.

The future of e-marketplaces

Industry analysts and Net market-makers expect explosive growth, migration to nextgeneration solutions and a major shift from transaction fees to value-added services. According to Forrester, beginning next year, the focus of e-marketplaces will move beyond racing to gain critical mass to racing to deploy increasingly complex functionality to attract members and drive revenue.The winners will be second-generation e-marketplaces-industry leaders whose sites will integrate multiple transaction mechanisms and a range of value-added services.

New challenges facing market-makers include:

- increased competition;
- rapid commoditization of service offerings;
- lack of virgin markets;
- technical sophistication of competitive e-marketplaces;
- the network effect: finite trading means only two-to-three e-marketplaces in each industry.

To address the trends and meet these challenges, an e-marketplace platform must embody the following characteristics:

More robust out-of-the-box functionality. Solutions should support such features as: dynamic and flexible contract capability, collaborative procurement to refine projections, automated replenishment for better inventory management and realtime progress tracking along the entire supply chain.

Pervasiveness. An e-marketplace should provide access to data, applications and people-anytime, anywhere-through a variety of devices, such as phone, pager, fax and e-mail.

Decision support. As trading transcends price, decisions are based on realtime analysis of criteria, such as availability, delivery time, quality, financing and insurance. Decisions are also driven by data, forecasts and analyses housed in ERP and supply chain systems-as well as in the e-marketplace itself. That intelligence is the true value of aggregation.

Ease of integration. E-marketplaces will continue to find new ways to help buyers and sellers cut costs, tying them even more closely to the business processes they support. Businesses and business systems will need to communicate and collaborate with each other more directly and more efficiently for an e-marketplace to be truly dynamic and efficient. E-marketplace platforms that cannot facilitate this cost effectively will not meet the needs of market-makers.

More flexibility. The market model and design must be easily changeable to react to new opportunities and requirements before competitors do.

Interoperability. Customer requirements and expectations may outpace the built-in function of a single e-marketplace; and horizontal e-marketplaces may be able to provide value to vertical ones. For these reasons, e-marketplaces should be able to connect and communicate with one another, creating true networked markets.

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WEB METHODS FOR ONLINE PUBLIC OPINION POLLS

Năchilă Cătălin

Universitatea „Petrol–Gaze" Ploieşti, katonec@yahoo.com

If the Internet is sensible to unsettle the economic terms, to modify the concept of communication, it can also make it possible to improve the process of research in business-oriented knowledge. The Internet provides a great richness to the researcher wishing carried out surveys so much near the consumers that near the companies and offer a substitute of choice compared to the traditional postal questionnaires. The researchers can also use the tools which are provided by this media in order to improve or to facilitate the collection of information necessary to its work. Web surveys have already an impact on the survey industry with a rapidity and breadth like few other innovations before.

Keywords: online survey, questionnaire, Internet, web applications

Introduction

Nowadays, the companies have reached to the conclusion that the Internet represents a possible giant for the market research, and the consultants in the domain started very quickly to exploit this idea. The spreading of the computer networks and the increased interest for the Internet, determined the electronic development in all activities. As the Internet and the computer networks involve human participation of all categories and the software permits an easier data processing, it is preferred that also the surveying of the public's opinion to be electronically made. We can speak now about many international data bases, recurrently updated, which contains important information about the subjects, natural or legal entity (possible respondents), who can be the object of a scientific research.

By using a scientific method, a representative sample is chosen, which can permit that through the Internet (e-mail or online questionnaires) all the subjects receive the questionnaire to fill in. This type of poll has important advantages for the social environment, where changes are quickly made and more often the results of the ordinary statistic researches lose their topical interest by the time they are published.

Types of survey using the Internet

There are many ways of collecting data from the respondents (from a representative sample or by inquiry). The most used are: direct interview (personal or by group), by telephone (CATI: Computer Assisted Telephone Interviews), by mail, fax, electronic ways (CAPI: Computer Assisted Personal Interview) or by using the Internet (emails or using dedicated Web sites).

The principle is to collect the answers by Internet after a making of contact using exclusively these media. It rests on the idea that the researcher can know the emails addresses of the questioned subjects. That supposes either an access to a targeted data base or a good control of the information via Internet. There are two types of this procedure

1. Questionnaire using mail (figure 1). The process consists in sending of the questionnaire by email and the respondent returns the message after having filled in all the fields of the questionnaire.

This procedure is used for simple questionnaires containing few questions and is adapted for open questions. Indeed, it will be enough to leave a sufficient spacing after each question so that the questioned subject can insert its answers there.

Briefly, it is a method interesting for any short investigation into a large sample. The rate of answer can be higher if it relates to a more limited number of questions.
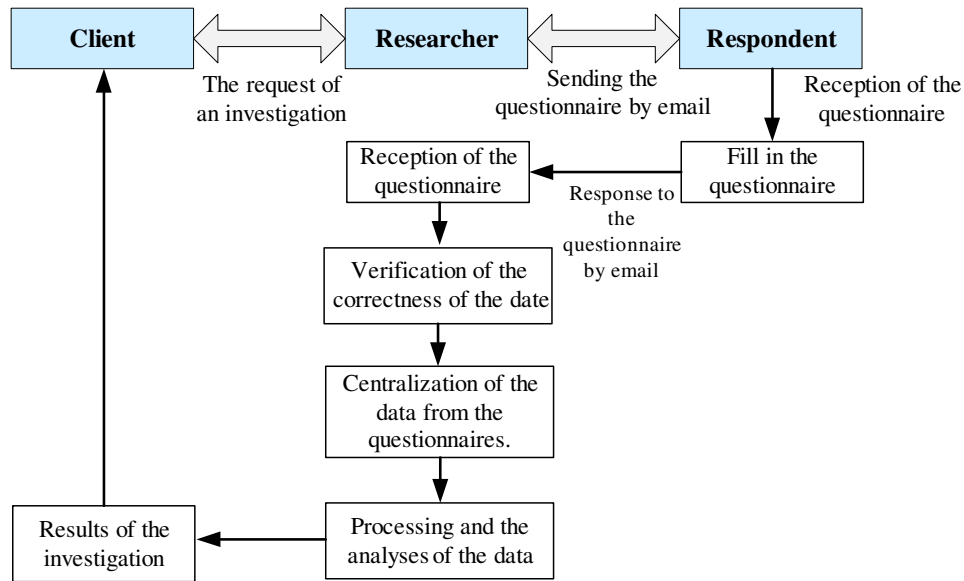
Figure 1. Process of the administration of the questionnaire – email method

2. The questionnaire on a site (HTML page) (figure 2). The idea will be to substitute the traditional postal questionnaire by the use of the Internet sites. This type of inquiry of the market requires the construction of a site (Web application), specially designed for a certain study or in connection with the host pages of big companies. The market survey using questionnaires on Web pages represents a managerial tool which rapidly gains field and popularity due to its rapidity, increased flexibility and reduced costs.

The principle is simple: it is a question of putting the questionnaire on a www address that is easily and accessible. The software where through the site is build must provide all the elements allowing the realization of these questionnaires. So from a technical point of view, all researchers can have direct access. There's no need to be a specialist in programming, because the interface of this software allows a fast and easy use. The major advantage lies in its flexibility of operation and the possibility of integrating interactive functions into the questionnaire.
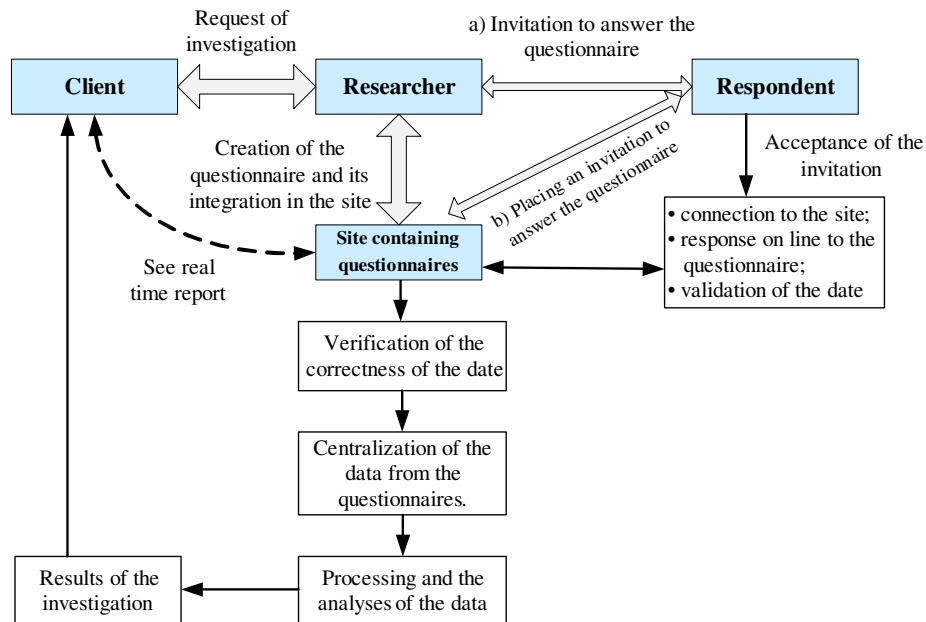
Figure 2. Process of the administration of a questionnaire – Web site method

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There are **three possibilities to inform** the respondent by the existence of the questionnaire:

a. *Invitation to answer the questionnaire*: sends emails to present the research to the selected addresses, according to the selected criteria to build the sample (an invitation to access the site where the questionnaire can be found);

b. *Inscription in diffusion lists* (generally targeted on precise topics);

c. *Placing an invitation on a frequently visited site to answer the questionnaire* (link to the site where the questionnaire can be found). In addition, if the questionnaire is targeted, there is a risk to get answers coming from people not aimed by the object of research. This solution seems the least effective in an academic step of research. For a commercial investigation, it can be adapted.

The two types have similar characteristics witch presume the application of questionnaires in three steps: defining of the questionnaire, its distribution to the clients (email or link to the web site) and the analysis of the results (this can be done in real time).

Advantages of the administration of the questionnaire by Internet

The two methods witch use the Internet have many advantages compared to the questionnaire by postal way. First of all, there is *no price to pay for the sending of the mails*. The researcher does not need more to obtain a budget for the postal sending which can take considerable proportions according to the number of the respondents or sample size.

In addition to the financial aspect, the method using the Internet can involve a *saving of time and a more effective use*. Indeed, hundreds of questionnaires can be sent in a few seconds. The respondent will tend to lean on the questionnaire starting from the reception of the message of invites.

The principal advantage of the questionnaire on site as well with the questionnaire by email or by postal way is that *the researcher can build an interactive working paper*. This process allows the addition of functionalities which will improve the validity of the questionnaire. For example, the improvements can be the explanation of terms and the checking of answers.

The explanation of terms (questionnaire on site method) consists of the presence of definitions of certain terms which can lead to confusion, in terms of comprehension, for the answering subject. It will be enough for the respondent to click on certain words and a window will appear giving a precise definition of the answers. The interest is that a questionnaire will not be weighed down by the presence of this surplus of information, necessary to the precision of an academic research.

Another function resides in the *checking of the answers before the sending of the filled out questionnaire.* The Web application will make it possible to check if all the items are correctly filled. The researcher will have homogeneous answers since the respondent will be able to validate only if all the required fields comprise an answer, but the researcher should not force to answer certain questions which would question the respondent.

For certain research, in marketing in particular, it will be able to obtain *multimedia contents* such as images or sounds, thing which is impossible in a questionnaire by postal way. This interactive character will be reinforced for the questionnaires by advance where the questions to come will depend on the preceding answers.

In addition, the questionnaire using the Internet can be an *international tool*. It will be enough to translate the questionnaire in a language and to find addresses of respondents of the desired country.

The administration of the questionnaire on site can be improved by the presence of meters making it possible to measure the audience of certain phases. According to this, Gueguen [3] build three indicators allowing to largely improving construction of the questionnaires:

– *number of answers / number of sending: it acts of the traditional rate of answer (TR).*
– *number of visits / number of sending: it is the rate of visits (TV).*
– *number of answers / number of visits: it is the rate of accessibility (TA).*

So we will have the following relation: $TR = TV * TA$

These methods are very adapted since the researcher receives directly on his computer the answers according to his care. The answers can be quickly transferred to the statistical software. We see that the administration of the investigations by Internet allows a considerable saving of time especially when the data are numerous. That consolidates the idea to regard this methodology as effective in the quantitative investigations.

Disadvantages of this mode of administration

The main difficulty is the construction of a data base *of respondent's addresses*.

In addition to the aspects concerning the collection of addresses, other disadvantages are related to *the mode of administration of the questionnaires*.

It seems that *the Internet does not convey an image of confidence*, of safety, as it is underlined in marketing research. Indeed, the respondent is not always certain of the researcher's identity. Breeds [1] reports that 74% of the Internet surfers, who do not have confidence in the on line investigations think that the use of *information can be diverted*. The lack of confidence is an important source in the *non-responses*.

In addition to this problem of confidence, the respondent has the right to wonder whether its anonymity will be truly respected (when necessary). If the researcher is easily identified, this question raises less ambiguity. If one compares, the Web site method and the email one, the first can provide a stronger source of anonymity. In this case, the respondent is not obliged to give his electronic address and the researcher carrying out the survey will not be able to know it.

This type of administration, which introduces a new style of communication between the investigators and respondent, must avoid as much as possible to badger the people selected. A well known practice is that of the *spamming* in which the message (related to commercial) is sent many times to several people who do not request it. The researcher must think that the sending of the questionnaires should not correspond to this method. The Internet offers a space of freedom and facility that only a reasoned use can preserve. The message of invitation will have to be done as personal as possible.

Implications for actors

Respondent:

- Improved interaction
- Multimedia communication
- Feedback and incentives
- Discussion forums

Client

- Greater involvement in study design
- Monitoring of data collection
- Real-time data analysis
- Improved decision-making

Researcher:

- He must:
  – establish networks;
  – generate questionnaire and report templates;
  – ensure quality: sample, statistics, etc.
  – mediate relationship between other actors;
  – extend the barriers of research, etc.;
- More interactive software
- Improved communication networks
- Greater task integration

Sampling

Primary information on which the production of exploited samples online, it's saved in special databases. Each record from such database include information referring to a series of characteristics or interest attributes of a person or family, such as the age, sex, income, job, etc. When there is a history of the phenomenon process of choosing the value interval divisions of a characteristic can be automatized with the help of the algorithms based on the explanations of variation or on the study of dependencies. When we do not dispose of such historical data such as in the case of new products, the decision of choosing the relevant groups is left to the experts appreciations. The same thing also happens when there exist statistic data but they do not present relevance anymore because of some major changes.

The most important steps of making samples are:

– the establishment of control characteristics and of the intervals of segmentation;
– the segmentation of person from the database;
– the determination of sample's structure by balancing with the structure of reference; population ant the establishment of sample dimension;
– the sample extraction.

The database of the respondents should be large enough so as in case of client's refusal to respond to the invitation they can complete with sampling unities.

Conclusion

The purpose of this article was to emphasize the relevance of the administration of questionnaires via Internet.

The lack of confidence in the security of the Web is still an important determinant of supplying an e-mail address. Internet use and supply e-mail addresses are not sufficient to participate in Web surveys. An important factor seems to be the integration of the Internet into every-day activities. The participation rate in Web surveys will presumably increase in the future as Internet use is getting more and more integrated into every-day activities of the population.

A Web application that use the method of the questionnaire on site, will allow the creation of professional questionnaires, their application to the respondents and in the end the analysis of the results. That application will be designed for the improvement of sampling techniques, innovative products which will help clients to improve the quality of the research, costs and research risks decrease. The beneficiaries of the application service can be found in all the domains. One of them can be private companies who want to make studies over the employees, to discover customer wishes, to make marketing research, etc. The application can be also used by the governments or the national institutions who want to make statistics and social inquests.

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PROTECTING DATA FROM UNAUTHORIZED ACCESS
"ARE WE AWARE OF THE RISKS INVOLVED?"

Popa Adela

University of Oradea, Faculty of Economics, telephone: 0745137246, e-mail: apopa@uoradea.ro

Roşca Remus Dorel

University of Oradea, Faculty of Economics, e-mail: rrosca@uoradea.ro

Abstract: The purpose of this work is to offer some scenarios of what could happen if important/confidential data would fall into the wrong hands. The terms "Information Security", "Data Privacy" or "Computer Security" have the common goals of protecting the confidentiality, integrity and availability of information. Because the protection of confidential information is a business requirement, and in many cases, also a legal one, and because for individuals, information security has a significant effect on its privacy, the importance of the field of information security has grown and evolved very much in the last years, Even if we talk about business data or personal data, the importance of data security is even more important then most of us can imagine. We are all aware that we want to protect our privacy, but are we aware of the fact that, by not protecting data stored on our computers, we put our privacy in big danger?

Keywords: information security, data privacy, computer security

Who should assure the information security protection?
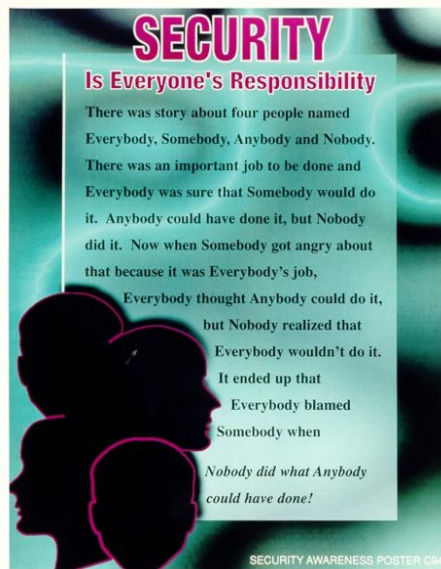
This is a security awareness poster message. U.S. Department of Commerce/Office of Security

"Security is everyone's responsibility"

"There was a story about four people named Everybody, Somebody, Anybody and Nobody. There was an important job to be done and Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it. Now when Somebody got angry about that because it was Everybody's job, Everybody thought Anybody could do it, but Nobody realized that Everybody wouldn't do it. It ended up that Everybody blamed Somebody when

Nobody did what Anybody could have done!"

Basic principles of Information Security

During the last twenty years was settled that there are three key concepts as being the core principles of information security. These three fundamental concepts on which information security is based are: confidentiality, integrity and availability, and they are known as the CIA triad (see Figure 1).
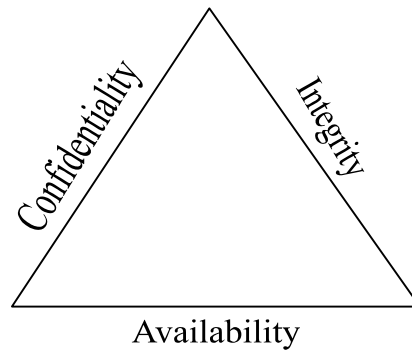
Figure 1: CIA security triad

Confidentiality

The International Organization for Standardization (ISO) has defined confidentiality as "ensuring that information is accessible only to those authorized to have access". The Confidentiality concept refers to the fact that information that is considered to be confidential in nature must by accessed, used, copied, or disclosed by persons who have been authorized to access, use, copy, or disclose the information, and not by unauthorized people.

Integrity

The concept of integrity refers to the fact that data is consistent and that it hasn't been modified by persons which are not authorized to do it. This means that data can not be created, changed, or deleted without authorization. The idea of integrity must also prevent modification of stored data or data in transit.

Integrity generaly refers to the validity of data and it can be compromised in two main ways:

- Willfully - Malicious altering: when someone, intentionaly, modifies or deletes the date stored or transmited
- Accidentally: situations that can result from events like transmission errors or data storage devices crash.

Availability

The concept of availability refers to the fact that someone should have reliable and timely access to the data and resources in the case that the person is authorized to use it.

All these three concepts are important in order to assure the data security, but depending on the organization or personal desiderates, one aspect can become more important then the others.

Security classification for information

One of the most important aspect of information security is to recognize the value of the information in order to define appropriate procedures and protection requirements for the information. Not all information has the same importance, in conclusion, not all requires the same degree of protection.

In order to determine the appropriate security level, is essential to determine the value of an information. Some asspects that must be considered for this are: the cost of losing the confidentiality of the information, the cost to recreate the information in case it is lost or demaged and the cost of the un-availability of the information at a certain moment.

Depending on who the information belongs to, there are different types of clasifications, as follows:

- for personals or business sector, the information can be: **public, sensitive, private, confidential;**
- when talking about information which belongs to the government, the information is: **unclassified, sensitive but unclassified, confidential, secret, top secret.**

An example of confidential data lying unprotected on someone's computer – Have a look at the "Insecure World of File Deletion"

Not many people are aware that by deleting a file using the delete and format functions of Windows or some other programs, these procedures will not erase information beyond recovery and the content of the files will remain on the disk, easy to be recovered by anyone that has access to the computer. When a file is deleted, the operating system does not destroy the content of the file and remove it from the disk - it only deletes 'references' on the file from some system tables. When Windows formats a disk, it does not remove all data and files from the disk - it only marks the disk as ready to store new data. The contents remain intact until another file happens to overwrite it. If someone uses a software recovery tool, can easily restore the data if it has not been overwritten yet. In case of using hardware recovery tools, even overwritten files may be restored.

Some scenarios of privacy problems that may occur in the Insecure World of File Deletion

Sensitive and valuable documents stored unprotected on personal computers

Nowadays, anyone computer store sensitive files. Even if we talk about business plans, password files, financial reports, employees information or social security data, banking account information, financial statements, credit card numbers, or personal files like personal documents, photos, private emails or other like these, as mentioned above, anyone must be aware that by deleting them using the common delete functions from Windows, the content of these files is not really eliminated and it can be easily recovered.

Sensitive information stored without user's knowledge

When using Windows or different computer programs, all these create sensitive historical records without user's knowledge or "approval". These historical records may include: evidence of computer activities, lists of programs run, lists of opened files, Internet history, Web pages and pictures from sites visited on the Internet, unwanted cookies, chartrooms conversations, deleted e-mail messages and files, temporary files, the Windows swap file, the Recycle Bin, etc. Even if many people do not know these files exist, they are there, on the computer, ready to put in danger the privacy of the user.

Recycling/disposing computers, exchanging disks

Due to the technology evolution and because we need more and more advanced equipments, recycling/disposing computers is made more and more often. Such situations may be:

- – upgrades to new computers or hard drives
- – company trades older computers towards newer systems
- – returning leased computers or laptops
- – companies reassign computers to different departments or personnel
- – removing old computers from operation and donating them to charity or to other organizations

Even if they are sold or donated, the first thing to do is to eliminate the sensitive information and to be aware that it can be easily recovered in case is not used an appropriate software product to eliminate it. EAST Technologies, a software company headquartered in Oradea, Romania, is widely known for the East-Tec Eraser and East-Tec Dispose Secure security products designed to protect the privacy, identity and confidential information of the computer and Internet user.

Dangerous Internet surfing and free access to "deleted" e-mail messages

Knowing that browsers used to surf the Internet also "have the job" of recording the Web pages user surfed on, pictures from sites visited on the Internet, unwanted cookies, chartrooms conversations, passwords, anyone can imagine that these are all evidence of what someone did on using the Internet. Also, email programs don't make sure the messages user deleted after reading them are really deleted. In fact, they simply "ask" Windows to make the deletion, but it leaves the messages in a trash folder and on disk, ready to be retrieved by someone else with access at that computer.

These are some of the most common scenarios that may occur in a usual computer user life. We, all, as persons using computers to fulfill our everyday work tasks or just to have fun using computers, are in one or more of these scenarios. But are we aware about how much we risk by not according appropriate importance to our personal information security?

Starting by having a look at these scenarios and others more, we intend to continue this work by questioning people from different work fields and organizations, about the importance they give to the confidentially of the date they use and to the information security and privacy.

The questionnaire will include questions like:

Where do you feel your computer and online privacy is at the highest risk? (Possible answers: Home, Office, Both)

What poses the greatest fear of discovery on your computer? (Possible answers: Sites visited on the Internet, Pictures/Movies from Internet, Search Engine Terms, Deleted files, deleted Emails, etc.)

You consider the data stored on your computer as being: (Possible answers: Confidential, Partially confidential, Not at all confidential)

If you are in the situation of transferring or donating your computer to someone else, do you think to take measures of security in order to avoid your information to fall into the wrong hands? (Possible answers: Yes, I always think about protecting my data, Is the first time I think about this, I thought about it but I don't think is very important, It is not my responsibility, etc.)

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INFORMATION SECURITY MANAGEMENT

Raduț Carmen

Universitatea "Constantin Brâncoveanu" Rm. Vâlcea, tel 0723245092, c_radut@yahoo.com

Abstract

Information is a valuable asset in any organization, whether it's printed or written on paper, stored electronically or sent by mail or electronic means.

To effectively manage the threats and risks to your organization's information you should establish an Information Security Management System (ISMS).

An ISMS based on the international standards ISO/IEC 27001: 2005 will help you to implement an effective framework to establish, manage and continually improve the security of your information.

Key Words: Information Security Management System, the information security, ISO/IEC 27001: 2005

1. Security

Security issues are now top of the political, social, economic and business agenda. Whether it's ensuring that information is secure, preventing crime or protecting an individual's identity then best practice standards and guidelines from BSI Business Information can help.

Securing a Safer Environment

Best practice security-related standards support industry sectors, public or private enterprises, large or small and help you to identify risks and minimize security breaches to avoid incidents.

This papers aims to encapsulate the main and hot-topic areas concerned with managing security: electronic security; fire protection; information security; IT security; people and employee security; physical security and vehicle security.

By adopting a practical approach to security you can derive a number of broad benefits by minimizing risks, avoiding litigation, reducing insurance premiums and meeting regulatory requirements in turn saving time, money and lives.

Information security defines information as an asset, which adds value to an organization and consequently needs to be suitably protected. It can be printed or written on paper, stored electronically, transmitted by post or using electronic means, shown on films, or spoken in conversation.

Information security protects information from a wide range of threats in order to ensure business continuity, minimize business damage and maximize return on investments and business opportunities.

Information security is achieved by implementing a suitable set of controls, which could be policies, practices, procedures, organizational structures and software functions. These controls need to be established to ensure that the specific security objectives of the organization are met.

BSI developed the internationally recognized information security management standard BS 7799 to help you meet the challenge of minimizing your internal and external threats. This has now been updated to BS ISO/IEC 17799:2005. Information security is characterized in the standard as the preservation of:

- confidentiality
- integrity
- availability.

BS ISO/IEC 17799:2005 will initiate, implement, maintain and manage information within your organization and help you manage your inherent vulnerability to information security issues.

The standard has been written such a way so that it can be harmonized with other management system standards to assist in the integration and operation of an organization's management system.

Needed of the information security

The purpose of information security management is to ensure business continuity and reduce business damage by preventing and minimising the impact of security incidents. The Audit Commission Update report (1998) shows that fraud or cases of IT abuse often occur due to the absence of basic controls, with one half of all detected frauds found by accident. An Information Security Management System (ISMS) enables information to be shared, whilst ensuring the protection of information and computing assets.

The Audit Commission Update report shows that in the UK the percentage of organizations reporting incidents of IT fraud and abuse in 1997 rose to 45% from 36% in 1994. While equipment theft is a real

problem, the most damaging aspect is the loss of data and software. Sources of damage such as computer viruses, computer hacking and denial of service attacks have become more common, more ambitious and increasingly sophisticated. The internet exposes organizations to an increased risk that networks will be accessed improperly, data corrupted and viruses introduced. The percentage of organizations reporting hacking incidents has trebled, with telephone systems as a new target. Not all breaches are the result of crime; inadvertent misuse and human error play their part too. Virus infections are still the single most prevalent form of abuse. More common place and just as destructive as crime, are threats like fire, system crashes, and power cuts.

Poor supervision of staff and lack of proper authorization procedures are frequently highlighted as the main causes of security incidents. Companies vary in their approach to preventing security breaches: some prohibit everything, making mundane access tasks difficult; others are too lax and permit access to all by all, exposing themselves to a high degree of risk. Business efficiency relies on the right balance and this is where standards can help.

Dependence on information systems and services means organizations are more vulnerable to security threats. The interconnecting of public and private networks and sharing of information resources increases the difficulty of achieving access control. The trend for distributed computing has weakened the effectiveness of central, specialist control.

Assessing information security risks

Security requirements are identified by a methodical assessment of security risks. Expenditure on controls needs to be balanced against the business harm likely to result from security failures. Risk assessment techniques can be applied to the whole organization, or only parts of it, as well as to individual information systems, specific system components or services where this is practicable, realistic and helpful.

The results of this assessment will help guide and determine the appropriate management action and priorities for managing information security risks, and for implementing controls selected to protect against these risks. The process of assessing risks and selecting controls may need to be performed a number of times to cover different parts of the organization or individual information systems.

Selecting controls

Once security requirements have been identified, controls should be selected and implemented to ensure risks are reduced to an acceptable level. Controls can be selected from BS ISO/IEC 17799:2005 or from other control sets, or new controls can be designed to meet specific needs as appropriate.

There are many different ways of managing risks and this standard provides examples of common approaches. However, it is necessary to recognize that some of the controls are not applicable to every information system or environment, and might not be practicable for all organizations.

IT service management

Service management in the IT sector is based on a set of integrated processes that underpin core business procedures by linking infrastructure management with business needs. The BS ISO/IEC 20000 series applies to organizations of all sizes, enabling them to understand how to enhance the quality of service delivered to their internal and external customers

Service management in the IT sector is based on a set of integrated processes that underpin core business processes by linking infrastructure management with business needs.

2. BS ISO/IEC 20000 series

The BS ISO/IEC 20000 series applies to organizations of all sizes and enables organizations to understand how to enhance the quality of service delivered to their internal and external customers. The requirements for best practice service management processes do not change according to the organizational form. The management framework provided allows processes to be followed and applied accordingly.

The new international standard for IT service management, BS ISO/IEC 20000, recommends that service providers should adopt common terminology and a more consistent approach to service management, thus increasing productivity, saving costs and improving customer service.

The benefits to be gained from implementation of best practice in service management include:

- improved customer service
- focused service that supports the business strategy
- cost efficiency
- reliable and consistent service quality
- independent proof of service quality.

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ISO/IEC 27001

Information is critical to the operation and perhaps even the survival of your organization. Being certified to ISO/IEC 27001 will help you to manage and protect your valuable information assets.

ISO/IEC 27001 is the only auditable international standard which defines the requirements for an Information Security Management System (ISMS). The standard is designed to ensure the selection of adequate and proportionate security controls.

This helps you to protect your information assets and give confidence to any interested parties, especially your customers. The standard adopts a process approach for establishing, implementing, operating, monitoring, reviewing, maintaining, and improving your ISMS.

Information security.

Recent high profile information security breaches and the value of information are highlighting the ever increasing need for organizations to protect their information. An Information Security Management System (ISMS) is a systematic approach to managing sensitive company information so that it remains secure. It encompasses people, processes and IT systems.

The Information Security Standard is published in two parts:

– ISO/IEC 17799:2005 *Code of practice for Information Security Management*
– ISO/IEC 27001:2005 (formerly BS 7799-2:2002) *Specification for Information Security Management*

Information is the lifeblood of all organizations and can exist in many forms. It can be printed or written on paper, stored electronically, transmitted by mail or by electronic means, shown in films, or spoken in conversation. In today's competitive business environment, such information is constantly under threat from many sources. These can be internal, external, accidental, or malicious. With the increased use of new technology to store, transmit, and retrieve information, we have all opened ourselves up to increased numbers and types of threats.

There is a need to establish a comprehensive Information Security Policy within all organizations. You need to ensure the confidentiality, integrity, and availability of both vital corporate information and customer information. The standard for Information Security Management System (ISMS) BS 7799-2 (the predecessor to ISO/ IEC 27001:2005) has fast become one of the world's established biggest sellers.

An Information Security Management System (ISMS) is a systematic approach to managing sensitive company information so that it remains secure. It encompasses people, processes and IT systems. BSI published a code of practice for these systems, which has now been adopted internationally as ISO/IEC 27001:2005 like:

1. Develop an information security policy and identify your organization's key information assets. Purchase the standards, ISO/IEC 17799:2005 and ISO/IEC 27001:2005 to help you do this.

2. Carry out a risk assessment and build your ISMS. Training of key staff will help to ensure its successful implementation.

3. Once your management system is fully implemented you can register to ISO/IEC 27001:2005 with BSI.

ISO/IEC 17799:2005

The ISO/IEC 17799 Code of Practice for Information Security Management establishes guidelines and general principles for organizations to initiate, implement, maintain, and improve information security management. The objectives outlined provide general guidance on the commonly accepted goals of information security management. ISO/IEC 17799:2005 contains best practices of control objectives and controls in the following areas of information security management: *Security policy; Organization of information security; Asset management; Human resources security; Physical and environmental security; Communications and operations management; Access control; Information systems acquisition, development and maintenance; Information security incident management; Business continuity management; Compliance.*

ISO/IEC 27001:2005 (formerly BS 7799-2:2002) is a standard setting out the requirements for an Information Security Management System. It helps identify, manage and minimize the range of threats to which information is regularly subjected. The standard is designed to ensure the selection of adequate and proportionate security controls that protect information assets and give confidence to interested parties including an organization's customers.

It is suitable for several different types of organizational use, including the following:

– Formulation of security requirements and objectives;

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- To ensure that security risks are cost effectively managed;
- To ensure compliance with laws and regulations;
- As a process framework for the implementation and management of controls to ensure that the specific security objectives of an organization are met;
- Identification and clarification of existing information security management processes;
- To be used by management to determine the status of information security management activities;
- To be used by internal and external auditors to determine the degree of compliance with the policies, directives and standards adopted by an organization;
- To provide relevant information about information security policies, directives, standards and procedures to trading partners;
- To provide relevant information about information security to customers.

An organization using ISO/IEC 27001:2005 as the basis for its ISMS, can become registered by BSI, thus demonstrating to stakeholders that the ISMS meets the requirements of the standard.

Information Security Management Systems Registration

In order to be awarded a BSI certificate of registration for your Information Security Management System, you must pass an assessment by a BSI auditor to the standard ISO/ IEC 27001:2005. BSI registration of your ISMS delivers a number of valuable benefits:

- Commercial Credibility, Trust and Confidence Your customers can feel confident of your commitment to keeping their information safe. Registration can help set a company apart from its competitors and in the marketplace. Already, international invitations to tender are starting to require ISO/IEC 27001 compliance.
- Cost Savings The cost of a single information security breach can be significant; the cost of several could be catastrophic. Registration reduces the risk of such costs being incurred and this is important to stakeholders and other investors in your business. Possible reduction in insurance premiums can also be realized.
- Legal Compliance Registration demonstrates to competent authorities that the organization observes all applicable laws and regulations. In this matter, the standard complements other existing standards and legislation.
- Commitment Registration helps to ensure and demonstrate commitment at all levels of the organization.
- Operating Level Risk Management Leads to a better knowledge of information systems, their weaknesses and how to protect them. Equally, it ensures a more dependable availability of both hardware and data.
- Employee Improves employee awareness of security issues and their responsibilities within the organization.
- Continual Improvement The regular assessment process will help you to continually use, monitor and improve your management system and processes.

BSI's ISO/IEC 27001:2005 registration service is accredited by the United Kingdom Accreditation Service (UKAS). Accreditation is a valuable indicator for you to use to verify that your registrar is competent to be carrying out assessment services at your facility. It provides assurances to you that BSI Management Systems continues to operate according to internationally accepted criteria.

Conclusion

ISO/IEC 27001 is suitable for any organization, large or small, in any sector or part of the world. The standard is particularly suitable where the protection of information is critical, such as in the finance, health, public and IT sectors.

ISO/IEC 27001 is also highly effective for organizations which manage information on behalf of others, such as IT outsourcing companies: it can be used to assure customers that their information is being protected. *BS 7799: Part 2* has been updated and was released by the International Organization for Standardization (ISO) as ISO/IEC 27001:2005 on October 15th 2005.

The new international version of the standard clarifies and strengthens the requirements of the original British standard, and includes changes to the following areas: risk assessment, contractual obligations, scope, management decisions, measuring the effectiveness of selected controls.

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ACTIVEX - AN INTERNET STRATEGY FOR APPLICATIONS DEVELOPMENT

Roşca Doina

University of Craiova, 200585 Craiova, str. A. I. Cuza, nr. 13, tel.: 0721632019, rosca2na@yahoo.com

Bănică Logica

University of Pitesti, 11040 Pitesti, str. Targul din Vale, nr.1, tel.: 0745227774, olga.banica@upit.ro

Abstract: ActiveX is a set of technologies that has the potential to change the way information is accessed and used on the Internet; allows software components to interact with one another in a networked environment, regardless of the language in which the components were created. Powerful abstractions based on OLE have been developed to enable fast, scaleable integration of your objects within the Internet. Microsoft is making a major effort to make the Internet everything it can possibly be. By using ActiveX, developers can make the best use of their system resources while providing instant, dynamic content and functionality in their Internet applications. How information is presented greatly affects how interesting and usable people find it.

Keywords: Internet, ActiveX, OLE, COM

Introduction

Microsoft has unveiled an extensive new solution technology for the Internet called *ActiveX*. Microsoft ActiveX is a broad and powerful abstraction for Microsoft Internet Solutions. Content providers and Internet application developers now have a robust and extensible frameworks that enables them to develop a new generation of Internet applications. ActiveX started out as an Internet strategy. It now covers all aspects of OLE/COM/Internet development.

Microsoft introduced the term *ActiveX* at the Internet Professional Developers Conference (Internet PDC) in March 1996 and referred to the conference slogan "Activate the Internet".

ActiveX is the new corporate slogan of Microsoft--similar to the term OLE in the early 1990s and in a very short time, has come to mean much more than "Activate the Internet."

ActiveX has become the all-encompassing term used to define everything from Web pages to OLE (Object Linking and Embedding) Controls. It has come to signify, on one hand, small, fast, reusable components that can get you hooked into all the latest technologies coming out of Microsoft, the Internet, and the industry. On the other hand, ActiveX represents Internet and applications integration strategies. These days, products and companies that don't have ActiveX and Internet somewhere in their nomenclature are considered, both internally and externally, as being behind the times.

Why use ActiveX? With ActiveX, you can make the most of Internet resources with less effort. ActiveX Controls and Scripting give you the infrastructure needed to add language- and tool-independent extensions to Web pages. Using ActiveX Controls lets developers take advantage of existing OLE development tools and the investment they have already made in OLE.

ActiveX, OLE, and the Internet

ActiveX and OLE have become synonymous. What people once referred to as OLE Controls (OCXs) are now refered to as ActiveX Controls. OLE DocObjects are now ActiveX Documents. In some cases, entire documents on how to implement OLE technologies have been updated to be ActiveX technologies, and the only thing changed was the term OLE, which now reads as ActiveX.

ActiveX was not meant to replace OLE, but simply to broaden it to include the Internet, intranet commercial and in-house applications development, and the tools used to develop them.

In addition to the specific technologies for creating ActiveX components, Microsoft has set a standard for the use and integration of ActiveX components. Every product from VB to Microsoft Word to Java is inherently capable of using ActiveX components.

ActiveX exposes a set of *Application Programming Interfaces* (*APIs*) that enables developing a new generation of client/server applications for the Internet. ActiveX has interfaces to integrate almost every media technology within an application. It provides extensive support for animation, 3D virtual reality, real-time audio, and real-time video.

ActiveX gives developers an open framework for building innovative applications for the Internet. ActiveX technologies form a robust framework for creating interactive content using reusable components, scripts, and existing applications. Specifically, ActiveX technologies enable content providers and application

developers to create powerful and dynamic Web content and Web server extensions quite easily. This feat is achieved by using ActiveX controls, Active client and server side scripts, and the Active document interfaces and ISAPI (Internet Server Application Programming Interface).

An ActiveX control is an object that supports a customizable, programmatic interface. Using the methods, events, and properties exposed by a control, Web authors can automate their HTML pages. Examples of ActiveX Controls include text boxes, command buttons, audio players, video players, stock tickers, and so on.

You can develop ActiveX Controls using Microsoft Visual Basic, Microsoft Visual C++, and Java. Because ActiveX Controls are complex, Microsoft offers some tools that help a C++ developer create an ActiveX control. The following table describes these tools:

Tool	Description	Ships with
Microsoft Foundation Classes (MFC)	A set of C++ classes that support Component Object Model (COM), OLE, and ActiveX (among other things). MFC provides the simplest means of creating ActiveX Controls.	Visual C++ version 4.2 or later. (MFC ships with earlier versions of Visual C++; however, these versions do not support ActiveX.)
Microsoft ActiveX Template Library	A set of C++ templates designed to create small and fast COM objects.	Active Template Library (ATL) 2.1 ships with Visual C++ version 5.0. (ATL 2.0 is a Web release that relies on the Visual C++ 4.2 IDE.)

Classifying ActiveX Components

ActiveX components can be classified and broken into the following categories:

1. Automation Servers
2. Automation Controllers
3. Controls
4. COM Objects
5. Documents
6. Containers

Automation Servers are components that can be programmatically driven by other applications. An Automation Server contains at least one, and possibly more, IDispatch-based interfaces that other applications can create or connect to. An Automation Server may or may not contain User Interface (UI), depending on the nature and function of the Server.

Automation Servers can be *in-process* (executing in the process space of the Controller), *local* (executing in its own process space), or *remote* (executing in a process space on another machine). The specific implementation of the server will, in some cases, define how and where the server will execute, but that is not guaranteed. A DLL can execute as either in-process, local or remote; an EXE can execute only locally or remotely.

Automation Controllers are those applications that can use and manipulate Automation Servers. A good example of an Automation Controller is VB. An Automation Controller can be any type of application, DLL or EXE, and can access the Automation Server either in-process, locally, or remotely. Typically, the registry entries and the implementation of the Automation Server indicate which process space the server will execute in relation to the Controller.

ActiveX Controls (formerly known as OLE control) has a broader definition. It refers to any COM objects. For instance, the following objects are all considered an ActiveX control.

- Objects that expose a custom interface and the IUnknown interface
- OLE automation servers that expose the IDispatch/Dual interfaces
- Existing OLE controls (OCX)
- OLE objects that make use of monikers
- Java Applet with the support of COM

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ActiveX Control used inside scripting languages make this binary reusable components reused in the Internet world. Almost any type of media wrapped into an ActiveX control can be seamlessly integrated into your Web page. Sound, video, animation, or even credit-card approvals controls can be used within your Web page.

COM: The Fundamental "Object Model" for ActiveX and OLE

COM (Component Object Model) is the technical cornerstone for the ActiveX technology; it defines how objects expose themselves for use within other objects and how objects can communicate between processes and across a network. You can easily integrate COM objects for use in many languages, such as Java, Basic, and C++. COM *objects* are reusable binary components.

The following concepts are fundamental to COM:

- *Interface*: The mechanism through which an object exposes itself.
- *IUnknown Interface*: The interface on which all others are based. It implements the reference-counting and interface-querying mechanisms required for COM objects.
- *Reference Counting*: The technique by which an object keeps track of its reference instance count. The instance of the object class should be deleted when there is no reference to this instance.
- *QueryInterface Method*: It is called with the Interface ID (IID) to which the caller wants a pointer. Can be generated by Guidgen.exe by choosing DEFINE_GUID(...) format. QueryInterface enables navigation to other interfaces exposed by the object.
- *IClassFactory Interface*: This interface must be implemented for every object class. It provides functionality to create an instance of the object class with CLSID and locks the object server in memory to allow creation of objects more quickly.
- *Marshaling*: The mechanism that enables objects to be used across process and network boundaries, allowing interface parameters for location independence by packing and sending them across the process boundary. Developers have to create proxy/stub dll for the custom interfaces if exist. The custom interface has to be registered in the system registry.
- *Aggregation*: COM object supports an interface by including another object that supports that interface. The containing object creates the contained object as part of its own creation. The result is that the containing object exports the interface for the contained object by not implementing that interface.
- *Multiple Inheritance*: A derived class may inherit from multiple interfaces.

ActiveX Object Model

There are two primary pieces to the ActiveX Object Model: the Microsoft HyperText Markup Language (HTML), Viewer component (MSHTML.dll) object and the Web Browser Control (shdocvw.dll). Both are in-process (DLL-based) COM objects.classes.

All interfaces defined in the ActiveX Object Model are "dual" interfaces. A "dual" interface means that the objects inherit from IDispatch and IUnknown. They can be used by client application at "early-bind" via Vtable and at "late bind" via OLE automation controller by using IDispatch::GetIdsOfNames and IDispatch::Invoke.vtable).

MSHTML is the HTML viewer part of Microsoft Internet Explorer 3.0. It is an in-process COM server and a Document Object. It can be hosted in OLE Document Object containers.

MSHTML implements the OLE Automation object model described in the HTML Scripting Object Model. With this object model, you can develop rich multimedia HTML content. VBScript running inline in the HTML and Visual Basic 4.0 running external to the HTML can use the object model.

The Web browser control object is an in-process COM Server. It also serves as a Document Object container that can host any Document Objects, including MSHTML, with the added benefit of fully supporting hyperlinking to any document type.

The Web browser control is also an OLE control. The IWebBrowser interface is the primary interface exposed by the Web Browser Control.

The Web browser control is the core of what customers see as "the Internet Explorer 3.0 product". Internet Explorer 3.0 also provides a frame to host this control. Internet Explorer 3.0 supports the following HTML 3.x0 extensions:

- Frame: Creates permanent panes for displaying information, supporting floating frames or borderless frames
- NOFRAMES: Content that can be viewed by browsers not supporting frames
- OBJECT: Inserts an OLE control
- TABLE: Fully compliant with HTML 3.x0 tables with cell shading and text wrapping

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- StyleSheet: font size, intra-line space, margin, highlighting and other features related with styles can be specified in the HTML by the user
- In-Line sound and video

ActiveX Documents, or DocObjects as they were originally called, represent Objects that are more than a simple Control or Automation Server. A document can be anything from a spreadsheet to a complete invoice in an accounting application. Documents, like Controls, have UI and are hosted by a Container application. Microsoft Word and Excel are examples of ActiveX Document Servers, and the Microsoft Office Binder and Microsoft Internet Explorer are examples of ActiveX Document Containers.

The ActiveX Document architecture is an extension of the OLE Linking and Embedding model and allows the document more control over the container in which it is being hosted. The most obvious change is how the menus are presented. A standard OLE Document's menu will merge with the Container, providing a combined feature set; whereas an ActiveX Document will take over the entire menu system, thus presenting the feature set of only the document and not that of both the Document and the Container. The fact that the feature set of the Document is exposed is the premise for all the differences between ActiveX Documents and OLE Documents. The Container is just a hosting mechanism, and the Document has all of the control.

ActiveX Documents are used within a uniform presentation architecture, rather than within an embedded document architecture, which is the basis for OLE Documents. Microsoft Internet Explorer is a perfect example of this. The Explorer merely presents the Web pages to the user, but they are viewed, printed, and stored as a single entity. Microsoft Word and Microsoft Excel are examples of the OLE Document architecture. If an Excel spreadsheet is embedded in a Word document, the spreadsheet is actually stored with the Word document and is an integral part of it.

ActiveX Documents also have the added capability of being published as Web pages on the Internet or on a corporate intranet. Imagine an in-house tracking system for purchase orders run from the same Web browsers that are used to connect to the Internet.

ActiveX Containers are applications that can host Automation Servers, Controls, and Documents. VB and the ActiveX Control Pad are examples of Containers that can host Automation Servers and Controls. The Microsoft Office Binder and the Microsoft Internet Explorer can host Automation Servers, Controls, and Documents.

With the decreasing requirements defined by the ActiveX Control and Document specifications, a Container must be robust enough to handle the cases where a Control or Document lacks certain interfaces. Container applications may allow little or no interaction with the Document or Control they host, or they may provide significant interaction capabilities in both manipulation and presentation of the hosted component. This capability, however, is dependent upon the Container hosting the component and is not defined by any of the Container guidelines as being required.

Conclusions

A specification is important to establish the basic requirements of the component you are asked to create. Before you can proceed, you must have a clear understanding of what kind of component or application is needed and why you are creating it. Appropriate questions to ask are, "What created the need for the component, and how is it going to be used?" If the person or persons can't describe the problem, they probably don't understand the problem. The last thing anyone needs is an incomplete picture of the problem, which tends to create delays and promote last minute changes that can cause unexpected results. Try to get as much of the specification as possible on paper.

After you determine the need, you can move on to designing the component. Again, it is critical to get as much information as possible. Does the problem require a single component or multiple components? Do the components need the capability to interact together? And, if so, is speed an issue? What about the skill level of your developers? How are they able to cope with change or possibly new and unfamiliar development methods? What are the support and maintenance requirements?

All these issues and more will affect the kind of component you create and how you will develop it. As a developer of ActiveX components, it is your responsibility to know the answers to these questions.

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DECISON SUPPORT SYSTEMS DEVELOPMENT

Rus Rozalia Veronica

Babeş Bolyai University, Faculty of Business, Cluj-Napoca, Almaşului Street, No 4, ap. 27, Phone: 0745-944801, E-mail: vrus@tbs.ubbcluj.ro

Information systems are vital tools for any organization because they deal with the coordination and use of three very important organizational resources: information, people and information technology. Decision support systems (DSS) are an important class of information systems that use data, models and knowledge to help managers solve semistructured and unstructured problems. The purpose of this paper is to analyze the most suitable methodologies for DSS development considering the properties of these systems, the actual trends in DSS field and the progresses made in Information Technology. In order to achieve this goal we will present a number of analysis and design approaches that can be applied in DSS development process: the phased methodology, the ROMC analysis, the evolutionary method, prototyping and end-user development. Each methodology has a number of advantages and disadvantages and DSS success depends, greatly, on choosing a development methodology that is most appropriate for DSS problems. The DSS development process is a complex process that employs experience and knowledge in different areas, such us: decision making, statistics, operational research, information systems analysis and design, user interface design and programming.

Keywords: Decision Support Systems, System Development Life Cycle, Tools, Development Methodologies.

Introduction

From the beginning of decision support research, in the late 1960s, till now, a number of methodologies for DSS development have been developed. These methodologies provide instruments for requirements analysis, for specifications, and for design and deal with semistructured problems. Peter G. Keen, Steven Alter, Clyde W. Holsapple, A. Whinston, Efraim Turban, Paul Gray, Eric D. Carlson, Ralph H. Sprague, Hugh J. Watson, and Dan J. Power are some of the researchers who were interested in DSS development methodologies. "Ralph Sprague and Eric Carlson's (1982) book *Building Effective Decision Support Systems* was an important milestone. It further explained the Sprague (1980) DSS framework of data base, model base and dialog generation and management software. Also, it provided a practical, understandable overview of how organizations could and should build DSS" (Power 2003).

The researchers agree that this type of systems cannot be developed using a traditional system development approach. The way of designing DSS is different from that of a transactional processing system. The purpose of this article is to analyze the most suitable methodologies for DSS development. We will use in our research the analytical descriptive method based on a reach specialty bibliography, the content analysis method and the observation method.

Modern DSS provide managers with a wide range of capabilities: quick access to crucial information, reduce the necessary time for decision making, join various sources of information, provide intelligent access to relevant knowledge and provide strategic and competitive advantages. DSS must be part of any managerial activity because they improve the effectiveness of decision-making process.

Development methodologies

DSS development methodologies are different in paradigm, models and objectives. A paradigm describes a specific way of thinking about the problems, while a model represents a subjective way of representing the reality. There are many types of DSS development methodologies:

1. Decision driven methodologies: focus on the comprehensive analysis of decision-making process and on supporting and improving this process using decision support systems.
2. Process driven methodologies: the central component of DSS development is the representation of the system capacities using processes.
3. Data driven methodologies: focus on the DSS database definition, design, construct and management.
4. System driven methodologies: the analysis of the internal component of DSS is made based on the system theory.

Almost all methodologies, except system-driven, specify the sequence of phases that must be followed in order to develop DSS. The main phases of decision support system development process are:

– requirements definition;
– analysis;

- design;
- prototype design and test;
- implementation;
- maintenance and evolution.

DSS can be obtained in different ways: by internal development (*insourcing* or *selfsourcing*) or by acquisition or development by a specialized organization (*outsourcing*). If a company choose the first solution, internal development, it can use the forth generation programming languages, such as *Delphi* or *Visual C++*, or the new generation programming languages, like *Java*, *C#*, *Visual Basic*. DSS can be also obtained using a *DSS Generator* or *DSS Tools*. Using a *DSS Generator* can be a profitable solution. A *Generator* is a package of hardware and software that provides a set of capabilities to quickly and easy build a specific DSS: modeling language, reports generation, graphical data display, financial analysis, inquiry capabilities, etc. The most known DSS generators are *spreadsheet* programs, and we mention here *Microsoft Excel, Lotus 1-2-3* and *Quattro Pro*. There are, also, on the market, a lot of sophisticated DSS generators, such an example is *DSS Architect* offered by *Micro Strategy*, and a number of generators for specific areas: financial analysis, statistic analysis, etc. *DSS Tools* are hardware and software elements that are used to create a DSS generator or a specific DSS. Examples for DSS tools are graphical programs, text editors, query systems, spreadsheet programs, etc.

1. Phased methodology (systems development life cycle)

The DSS main characteristics are: provide quick and easy access to information, perform quick calculation, are easy to use, are flexible, contain graphical capabilities, are interactive systems used by managers, can generate complex reports, process large amount of data, offer the possibility to query data, integrate models and databases. The developers have to consider these characteristics when they want to build a decision support system.

The phased methodology is also known as the *waterfall* model. According to this methodology the systems development life cycle (SDLC) is decomposed in sequential phases; each phase has its own set of inputs, activities (processes) and outputs. There are literally hundreds of different activities associated with each phase in the SCDL. The transition from one phase to another is done only when the previous phase was completely finished. Each phase is ended with a writing documentation for that phase. According to this methodology the main stages in DSS development are:

1. *Problem definition* – in this phase the analysts identify the problems, set the DSS objectives, identify the decisions that will be supported, determine the outputs that must be provided by the system and define the functional and nonfunctional requirements. Before starting the development of a DSS all the alternative ways for solving the problem must be analyzed. The feasibility studies have an important role in this phase. These studies analyze the way that the system reaches the organizations goals, the report between benefits and costs (development costs, acquisition costs and utilization costs). In this context the feasibility can be:

a. *Organizational* – analyzes the way in which the proposed DSS reaches the organization goals;

b. *Economical* – analyzes the anticipated benefits related with the development and utilization costs;

c. *Technical* – identifies the software products and hardware elements that must be acquired for DSS development;

d. *Operational* – analyzes if the system is operational.

A project plan is also developed in this phase. The project plan defines the persons involved in this project, project's deadlines, the financial resourced implied in the project etc.

2. *Analysis:* involves end user and IT specialists working together to gather, understand and document the requirements for the new system. The physical model is transformed in a series of logical models.

3. *Design:* defines the solution for the proposed system based on the requirements and the constraints established in the previous stage. The most important activities performed in this phase are: the design of the technical architecture and the design of system models. A model is a graphical representation of a design. In this stage the main components of DSS are designed: the dialog management component, the data management component, the model management component and the knowledge management component. The IT specialists identify the necessary internal data files, the external sources of data and the data flows between the sources and the system. The primary goal of the design phase is to build a technical blueprint of how the proposed system will work.

4. *Programming:* in this phase, based on the specification resulted from the previous phase the logical model is transformed in a physical model with the help of programming languages. The

main activities that must be performed during the development phase are: the built of the technical architecture and the built of the DSS components and programs. This phase is finalized with the module testing and integration.

5. *Implementation:* in this stage the DSS is distributed to the final users. The main activities performed in this phase are: functionality testing, integration of modules, programs exploitation, writing detailed user documentation and providing training for the system users. Postimplementation contains a number of activities evolved after the distribution of DSS to the end-user: exploitation, operation, maintenance, update, extend, and evaluation of the DSS.

The phased methodology can be used in the development of the DSS but it is not the most suitable approach due to the following reasons:

- managers requirements cannot be entirely specified in advance;
- is a rigid approach;
- requires large documentation cost;
- system updates are not easily performed, while managers are confronted with problems that requires quick and easily update of the system;
- the decision maker is not sufficiently involved in the development process;
- the unstructured and semistructured nature of DSS problems;
- the system is delivered to users only when the development cycle is finished.

2. ROMC Analysis

Ralph Sprague and Eric Carlson defined this methodology in a series of articles on development of DSS and in their book *Building Effective Decision Support System* (1982).

This methodology is a descriptive one, is a process-driven methodology and is based on four entities: *representations (R)*, *operations (O)*, *memory aids (M)* and *control (C)*. Using this methodology the analyst characterizes different *representations* available for use as methods of communication between the user and the application. Examples of representation are: graphical displays, charts, tables, lists, menus, etc. The representations will provide the frame of reference for the operations involved in using the system. The managers and analysts must analyze and choose the appropriate representation.

The *operations* are the activities necessary for the DSS to perform or facilitate the generation and the delivery of the representation in the system. Operations are activities that the decision maker can execute using the decision support system.

The *memory aids* are elements that provide support in using the representations and in executing the operations. Databases, views, workspaces, libraries, reminders, triggers, profiles are examples of memory aids.

The *controls* are elements that help the decision maker to use the DSS: to use the representations, operation and memory aids. Sprague identified five roles that managers and technicians will play in the development and operation of DSS as follows: the manager or user, the intermediary, DSS builder, technical supporter and the toolsmith. The main activities that must be performed according to ROMC approach are: identify the representations that are meaningful for the system, find a way to computerize the representations, identify the operations that will be performed on it for each representation, design memory aids and design control mechanisms.

3. Evolutionary development

A better alternative to the typical system development process is the evolutive model. According to this model the most important four steps of the development life cycle: analysis, design, construction and implementation are combined into a single step that is iteratively repeated. This approach is appropriate for DSS development for the following reasons: is subproblems-driven; is oriented on small, usable DSS; the system is constantly evaluated.

The essence of this approach is that the manager and the developer agree on a small subproblem then design and develop an initial system to support the decision making process required for resolving that problem. After a short period of use, for example, a few weeks, the system is evaluated, updated and developed to include other subproblems. This cycle is repeated many times over the course of a few months until a relatively stabile system is developed.

This approach requires a high degree of management involvement in DSS design. The iterative process is different from prototyping because the initial system is real, usable, not just a pilot system.

4. Prototyping

Prototyping is another efficient method that can be use with success in DSS development. The managers' requirements are not very clear from the beginning and the development of a prototype can help them to

identify more easily the informational needs. A prototype, in DSS development methodology is a relatively small DSS, developed in a short period of time, in a way that allow quick interactions, with components that are not very detailed and that can be adapted and refined further accordingly to the users suggestions. Prototyping is an iterative process, a dynamic process that allows users to see, work with and evaluate a model of DSS and suggest changes to that model.

The advantages of prototyping are:

- – short development time;
- – encourages end-user participation in the development process;
- – gives user a feel for how the final system will look and work;
- – allows a better understanding of a system, of information needs and of system capacities;
- – offers a tangible product;
- – offers the core of the system that can be extended later;
- – the users can interact with the system and can identify previously the elements that are not exactly as they wanted;
- – reduces the risks of development and the development costs;

A prototype demonstrates, at a smaller scale, and only partial, which are the capabilities offered by the final system. If the prototype is a failure the project can be redesign. In conclusion, a prototype is the best way to prove the feasibility even before the investment in a project. Two categories of prototypes can be used in DSS development:

- – *throwaway prototype* - is used only for demonstrative scopes and is destroyed when is not longer needed.
- – *evolutionary prototype* - this prototype is continually refined until satisfies the users requirements.

5. End-user development

Selfsourcing is the development of DSS by end users with little or no help from IT specialists. End users, managers, can build their own decision support systems using the DSS tools and generators available on the market. The *selfsourcing* process is similar to SDLC process but it also includes prototyping. An important advantage of this method is that knowledge workers understand very well the problems they confront with and the decision processes. The advantages of end-user development are: improved requirements determination, increased decision maker participation and increased speed of DSS development. The disadvantages of this approach are:

- – end user do not have adequate expertise in information system development;
- – the anomalies that can appear if the database is not design respecting the rules;
- – the models are not tested properly and can contain errors;
- – the lack of documentation and external support;
- – the interfaces are not designed properly and can cause data input errors.

Conclusions

The nature of DSS requires a different design approach from other classes of information system (transaction processing systems, management information systems, etc.). The traditional approach for system analysis and design have proven inadequate because the conditions which decision maker faces are continually changing and because the problems assisted by DSS are unstructured. The research of DSS methodologies is necessary because the build of a DSS imply important material and human resources and if the methodology is not suitable for them then the resources are not used efficiently. The quality of DSS depends, greatly, on the developers' experience and competence, on the development process and on the development tools.

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ECONOMIC INDICATORS USED FOR EU PROJECTS, IN OTHER CRITERIA OF AGGREGATION THAN NATIONAL/REGIONAL

Săvoiu Gheorghe

University of Piteşti, Calea Bucureşti no. 8 bl. 27 sc. B ap. 5 Piteşti, postal code 110133, mobil 0745047 085, e-mail: gsavoiu@yahoo. Com,

Economical and social indicators are created and published for national and regional dimensions. Nowadays, both local and territorial indicators are really able to define more adequate the stage of social and economical development and to illustrate the impact of European programs and projects in fields like: long lasting development, entrepreneurial development, scientific research development and strategies, education and learning resources, IT resources, dissemination of European culture etc. If in the first part, there is only quantitative information, offered by our National Institute of Statistics (NIS), in the following few examples of some useful economical and social indicators provide a dynamic vision in defining objectives, methods and implementation Thus the need for a quantitative framework of local and territorial indicators demands for an original statistical methodology.

Key words: gross domestic product, indicators in macro, mezo and microeconomics, weight of selected factors, representative methodology.

INTRODUCTION

The aim of this study is not simply to fit local and territorial indicators' methodologies in Romania to local and territorial indicators in European countries, but generally more to find a quantitative solution of opportunity in "ante" and "post" programs and project evaluations. The general target of these methodologies is to acquire abilities for handling or managing, more and more adequate and reliable, not only the latest but even the next alternatives of social and economical stages of development, in different fields and activities. A deeper insight into present statistics reveals only national and regional dimension of some social and economical indicators like employment and employment rate, unemployment and unemployment rate, monthly gross nominal wages and salaries, all kinds of incomes and earnings in nominal or real terms from the latest household budget survey, gross domestic product and gross value added including all kinds of derivate solutions (GDP per capita). Statistically speaking, the concept of "local and territorial" as the attribute of an indicator is more adequate to "mezo" or medium and "micro" or small programs and projects, but also it is more difficult to create a representative methodology (an accurate value becomes indispensable to analyse and implement local or territorial development strategies and programs, other than regional and national).

METHODOLOGY

This study offers an original and systematic method in the area of knowing how to obtain a local and territorial indicator. Data required were brought together from the most recent Romanian Census (18.03.2002) and from the adequate demographic information, published by NIS. Present methodology is an average solution using a hydrographical criterion of aggregation (Appendix no 1). In fact, a specialized institution created after this criterion, which has been called Water Division-County Arges-Vedea (acronym WDCAV), demands local and territorial indicators. The answer was an original and useful methodology. The methodology comprises the following steps:

STEP1.Selection of the most important factors (criteria)

An example based on gross domestic product (GDP) make an easier understanding of all these steps. Here the seven most important and finally selected factors are:

1. Population (P- number and national weight);
2. Total employment (TE-number and national weight);
3. Employment in industrial activities (EIA- number and national weight);
4. Employment in agricultural activities (EAA-number and national weight);
5. Gross industrial value added (GIVA-current prices and national weight);
6. Gross agricultural value added (GAVA-current prices and national weight);
7. Total unemployment (TU-number and national weight);

STEP2. Evaluation and definition for the weight of each factor (criteria)

$$(1) \; g_i = \sum_{j=1}^{n} g_j k_j, \quad \sum_{i=1}^{n} g_i = 1{,}00 \text{ and } \sum_{j=1}^{n} k_j = 1{,}00 \text{ and where:}$$

g_1 (national weight of territorial population) x k_1 $k_1 = -1{,}1$

g_2 (national weight of territorial employment) x k_2 $k_2 = 3{,}8$

g_3 (national weight of territorial employment in industrial activities) x k_3 $k_3 = -0{,}85$

g_4 (national weight of territorial employment in agricultural activities) x k_4 $k_4 = -0{,}95$

g_5 (national weight of territorial gross industrial value added) x k_5 $k_5 = 0{,}35$

g_6 (national weight of territorial gross agricultural value added) x k_6 $k_6 = -0{,}5$

g_7 (national weight of territorial un employment) x k_7 $k_7 = 0{,}25$

                              Total $(\sum g_i) = 1{,}00$

STEP 3. Defintion of the estimation's method, based on GDP and national weight of selected factors for the "X" territory:

$$(2) \; GDP_{(\text{"X" territory})} = (GDP_{(ROMANIA)} \times g_i) / 100$$

and where: X = territory resulted from a hydrographical criteria of aggregation (reunited counties or territories or any kind of aggregation, instead of national or regional dimension)

STEP 4. Generating the final form of a linear regression for the period of three years before national census (a period between 2000 and 2002):

The dependent variable(Y) is GDP $_{\text{"X" territory}}$ and $Y = a + bx_1 + cx_2 + dx_3 + ex_4 + fx_5 + gx_6 + hx_7$

Table no. 1

Region	SELECTED FACTORS						
	P_i	TE_i	EIA_i	EAA_i	$GIVA_i$	$GAVA_i$	TU_i
N-E	3,674	1,40	0,28	0,70	25,6	15,4	0,182
S-E	2,848	1,07	0,22	0,47	25,5	12,8	0,170
S	3,379	1,27	0,29	0,61	30,7	13,2	0,190
S-V	2,331	0,94	0,19	0,47	24,7	10,1	0,100
V	1,959	0,81	0,22	0,28	20,7	8,50	0,085
N-V	2,740	1,18	0,27	0,52	23,7	12,7	0,104
CENTRAL	2,523	1,05	0,33	0,35	33,6	11,2	0,137
BUCUREŞTI	2,226	0,84	0,22	0,06	34,5	1,20	0,072
TOTAL	21,68	8,56	2,02	3,46	219,0	85,1	1,040

Data source: Anuar teritorial – România 2004 (date 2002), Ed.INS, Bucureşti, 2004

Estimation of GDP regional (RELATIVE VALUES - 2000)

Table no. 2

Region	WEIGHT OF SELECTED FACTORS							GDP
	g P	g TE	g EIA	g EAA	g GIVA	g GAVA	g TU	Y
N-E	0,170	0,163	0,139	0,202	0,117	0,181	0,175	0,096
S-E	0,131	0,125	0,109	0,136	0,116	0,150	0,163	0,093
S	0,156	0,148	0,143	0,176	0,140	0,155	0,183	0,098
S-V	0,108	0,110	0,094	0,136	0,113	0,119	0,096	0,075
V	0,090	0,095	0,109	0,081	0,095	0,100	0,082	0,075
N-V	0,126	0,138	0,134	0,150	0,108	0,149	0,100	0,095
CENTRAL	0,116	0,123	0,163	0,101	0,153	0,132	0,132	0,102
BUCHAREST	0,103	0,098	0,109	0,018	0,158	0,014	0,069	0,169
TOTAL	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0,803

Data source: Anuar teritorial – România 2004 (date 2002)- Ed.INS, Bucureşti, 2004

(3) The dependent variable is GDP regional = $g_i^Y = a* + bx_1 + cx_2 + dx_3 + ex_4 + fx_5 + gx_6 + hx_7$

Table no. 3

Independent variables	Estimated Parameters (α_i)	Normalized Parameters ($\alpha_i / 0,803$)
a*	a = - 0,00908	-
Population x_1	b = - 0,888	-1,1
Total employment x_2	c = 3,048	3,8
Employment in industrial activities x_3	d = - 0,668	-0,85
Employment in agricultural activities x_4	e = - 0,742	-0,95
Gross industrial value added x_5	f = 0,306	0,35
Gross agricultural value added x_6	g = - 0,384	-0,5
Total unemployment x_7	h = 0,205	0,25

*Because of its insignificant value, constant „a" was not useful in the next steps for validating the parameters.

The final form for multiple linear regression models:

(4) g_i^{GDP} estimated = $-1,1g^P + 3,8 g^{TE} - 0,85g^{EIA} - 0,95g^{EAA} + 0,35^{GIVA} - 0,5g^{GAVA} + 0,25g^{TU}$

The multiple regression line accuracy can be measured with a characteristic error and tested with "t" (Student test):

Table no. 4

Region	GDP	Estimated GDP	Deviation $d_i = Y - Y\,es$	$(d_i)^2 = (Y - Y\,es)^2$
N-E	0,096	0,0932	0,0028	0,00000784
S-E	0,093	0,0923	0,0007	0,00000049
S	0,098	0,0956	0,0024	0,00000576
S-V	0,075	0,0763	-0,0013	0,00000169
V	0,075	0,0771	-0,0021	0,00000441
N-V	0,095	0,0948	0,0002	0,00000004
CENTRAL	0,102	0,1012	0,0008	0,00000064
BUCHAREST	0,169	0,1725	0,0035	0,00001225
TOTAL	0,803	0,8030	-	0,00003312

The specified error shows a good confidence of the method, because e = 2,027 % and the acceptable value of "t".

STEP 5.The estimations for the year of Romanian Census, based on published information in 2004:

The estimation of territorial GDP– 2002 (W.D.C.A.V.)

Table no. 5

Territory from region:	SELECTED FACTORS						
	P_i	TE_i	EIA_i	EAA_i	$GIVA_i$	$GAVA_i$	TU
S	1,653	0,624	0,146	0,297	27,4	18,0	0,063
S -V	0,072	0,026	0,002	0,016	0,80	0,90	0,003
Bucharest	2,174	0,895	0,298	0,039	85,4	1,60	0,031
Total WDCAV	3,899	1,545	0,446	0,352	113,6	20,50	0,097
TOTAL ROMANIA	21,68	8,329	2,334	3,014	515,2	177,2	0,761

Table no. 6

Territory from region:	WEIGHT OF SELECTED FACTORS							$g_i = \Sigma\, g_j \times k_j$	Estimated GDP billions ROL
	g^P	g^{TE}	g^{EIA}	g^{EAA}	g^{GIVA}	g^{GAVA}	g^{TU}		
S	0,076	0,075	0,069	0,099	0,053	0,102	0,083		
S -V	0,004	0,003	0,001	0,005	0,001	0,005	0,004		
Bucharest	0,100	0,107	0,121	0,013	0,166	0,009	0,040		
Total WDCAV	0,180	0,185	0,191	0,117	0,220	0,116	0,127	0,2823	426 910

	GDP - ROMANIA	1512 256

So, summarizing the methodology, here it is the GDP territorial final estimation:

Table no. 7

YEAR	ESTIMATED GDP in WDCAV - billions ROL current prices-	Total territorial population -number -	GDP - ROL per capita	Total employment - number -	GDP per employment ROL per capita current prices-
2002	426 910	3 899 445	109 479 682	1 545 109	276 297 659

CONCLUSIONS

The process of estimation, developed above, has leaded to interesting conclusions. Some of them will be further mentioned:

I. Territorial indicators have been obtained from regional and national published information, after a scientific analysis of economical phenomenon;

II. Any other solutions, methods and results will be useful in the future to create a territorial and methodological database;

III. A key success factor is to use the estimated values of indicators;

IV. Acceptance of any kind of projects requires full transparency from the very beginning;

V. Without the application of scientific methods for optimize the territorial information, the methodology is not "robust" enough (for a long period, until the year 2002, year of the most recent Romanian census, till the next census, perhaps in 2010 or 2013, the error will be bigger than 3 %, but not more than 5%, that will be indeed acceptable and useful for a program or project decision);

VI. To get and to offer to a more realistic dimension of the existent potential in any kind of projects and to estimate the impact in the future, territorial indicators must be presented and detailed;

VII. Study might be further developed as starting point not only for more complex indicators coming from economic and social research area, but even for the new data published by NIS (a new quantitative background in the economic and social development).

Briefly, we can say modern reality in the European projects means not only a new dimension for indicators, one so-called "territorial" or local dimension, but even a new methodology and database.

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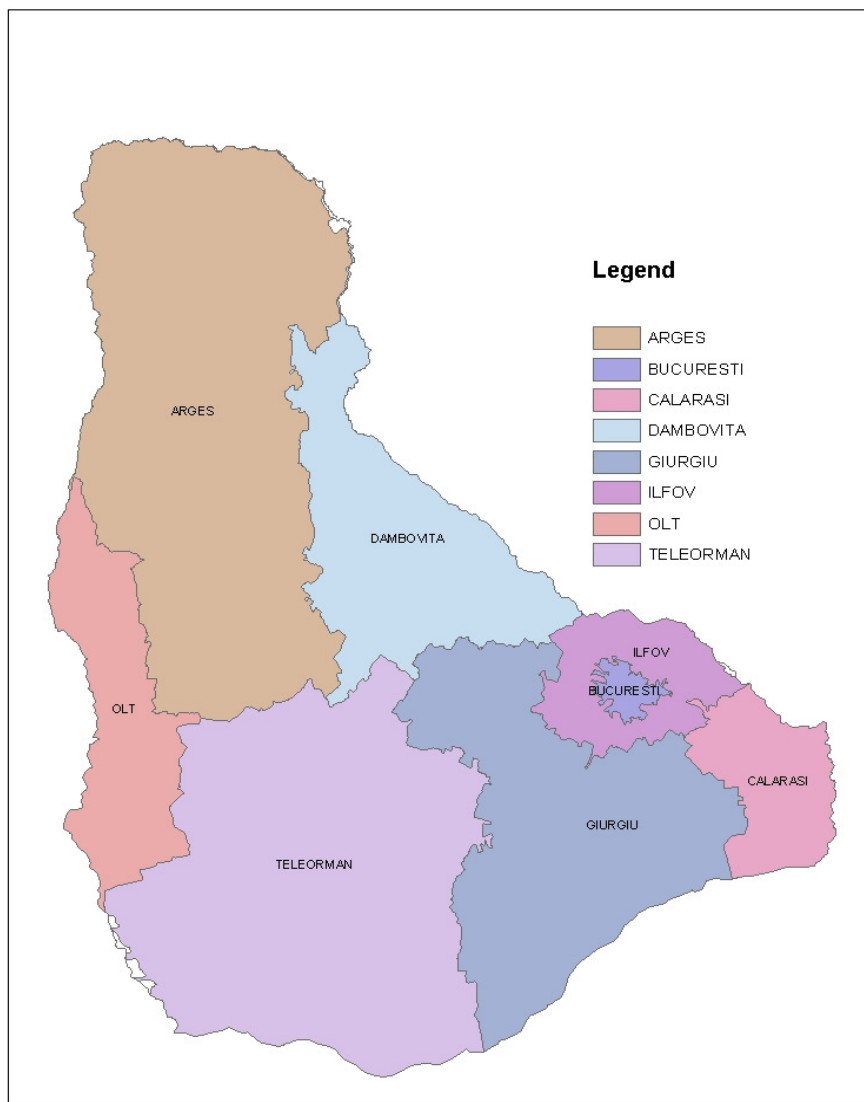
DECISION SUPPORT SYSTEMS – PRESENT AND PERSPECTIVE

Stanciu Cristina Ofelia

"Tibiscus" University of Timisoara, Faculty of Economics, 1/A Daliei Street, 300558, Timisoara, Romania, Phone: +40-256-202931, E-mail: ofelia_stanciu@gmail.com

The management within organizations has gone through a lot of changes due to the development of the information society, and the new information technologies have been a positive influence of the decision making domain. The decision tasks have become difficult due to the large amount of information, and the human decision maker needs to be assisted by computer based decision support systems. The paper presents a study upon the components of decision support systems, with data and model management modules, and upon the data processing technologies within a highly computerized organization.

Key words: management, decisions, decision support systems

1. INTRODUCTION

The management within organizations has gone through a lot of changes due to the development of the information society, and the new information technologies have been a positive influence of the decision making domain. The decision tasks have become difficult due to the large amount of information, and the human decision maker needs to be assisted by computer based decision support systems.

Researchers have had a tough job in trying to define decision support systems, as well as in establishing and defining their components.

2. THE COMPONENTS OFDECISION SUPPORT SYSTEMS

According to Sprague and Carlson [Lungu03], decision support systems would consist in the following components (Figure 1): data management component; model management component; user interface management component; decision support system architecture.

Boncyek and Holsapple (Foundation of Decision Support Systems - 1981) have considered a decision support system to consist in: dialog management; data management; model management.

Decision support systems have five components, according to Hattenschwiller [Lungu03]: user; decision context; target system; knowledge base; working environment.

Power has identified the following four components of a decision support system [Power00]: interface; the data base system (data base + DBMS); model system; communication component.

Nowadays, the components of decision support systems are very much like the ones identified by Sprague in 1982 (Figure 1): user interface; knowledge based subsystems; data management module; model management module.
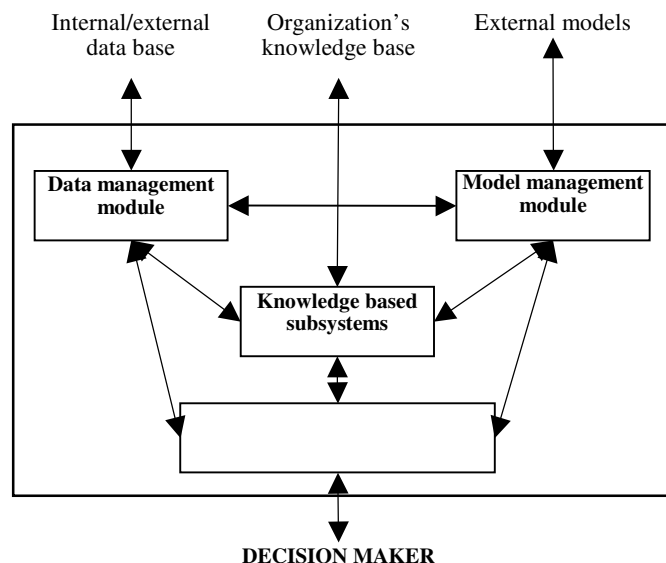
Figure 1. Decision support systems' components (Adapted after [Lungu03])

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The user interface is a component that provides the communication between the user and the decision support system. The proper design of this component is really important, as it is the only one the user actually deals with.

The data management method is a subsystem of the computer-based decision support system, and has a number of subcomponents of its own (Figure 2.):

- − the integrated decision support system database, which includes data extracted from internal and external sources, data which can be maintained in the database or can be accessed only when is useful;
- − the database management system; the database can be relational or multidimensional;
- − a data dictionary, implying a catalog containing all the definitions of database data; it is used in the decisional process identification and definition phase;
- − query tools, assuming the existence of languages for querying databases.
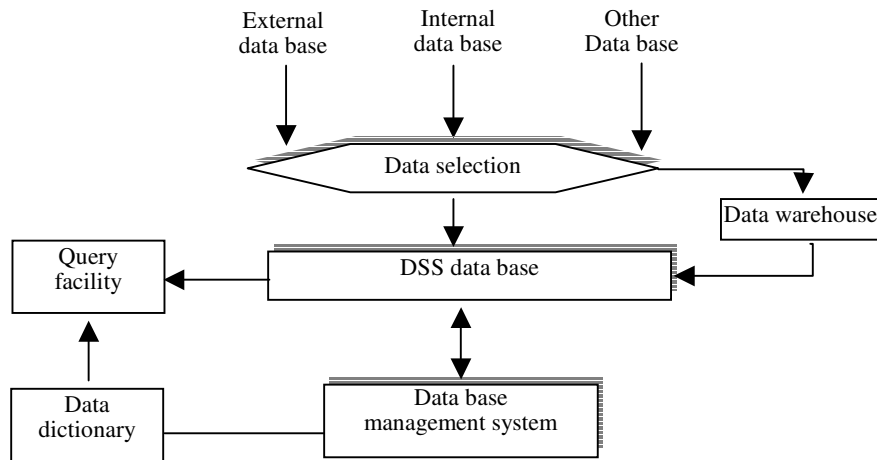
Figure 2. Data management module (Adapted after Turban 2001)

The model management module consists in the following components (Fgure 3):

- − the model base, that contains the quantitative models that offer the system the capacity of analyzing and finding solutions to problems [Zaharie01];
- − the model base management module, that is meant to create new models by using programming languages;
- − the model disctionary, that contains the models' definition and other information related tot hem;
- − the creation, execution and integration module of models, that will interpret the user's instructions according to models and will transfer them towards the model management system [Zaharie01].
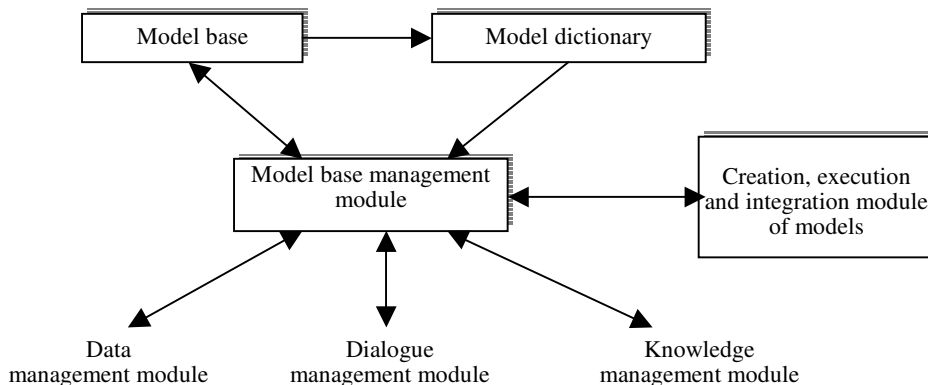
Figure 3. Model management module (Adapted after Turban 2001)

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3. Data Warehouse and Online Analytical Processing (OLAP) within decision support systems

The Data Warehouse is a complex system that holds operational and historical data for an organization, representing a separate entity from the other operational databases. The huge quantity of data maintained in a data warehouse is collected from internal sources as well as from external sources of the organization. The data warehouse fetches data from operational databases; the data can be then analyzed in various ways, for the purpose of helping the decider in the decisional process.

W. H. Inmon, the most remarkable author in the area of building data warehouses, describes these as "a subject-oriented, integrated, historical and non-volatile data collection designed to assist in the decisional process", thus the primary properties of data warehouses: subject-oriented, integrated, with an historical character and persistent data.

The process of building and using data warehouses is known as *data warehousing*; this process implies integration, filtering and consolidating the data.

The objectives of a data warehouse can be identified within the following:

- providing the user with persistent data access – the computer is the tool permitting easier access to the data warehouse;
- providing an unique version of the data – ambiguous data will not be supplied to the user, as so there will be no debates regarding the truthfulness of used data;
- recording and accurate playback of past events – historical data can be extremely important to the user because often the present data is meaningless unless compared to past data;
- allowing a high level as well as a detailed level access to data – information can be collected and formatted easier using the data within data warehouses;
- splitting operational level and analytic level processing – maintaining an informational system in which the decisional and operational information must be gathered together raises many issues.

Data warehouses can hold different types of data: detailed data, aggregated data, metadata; the latter also allow specifying the data structure, source, transformation rules, being used when loading data and thus playing an important role in populating the data warehouse. The data warehouse architecture is presented in Figure 4.

Data warehouses can be very useful to various categories of deciders, and the most important ways to benefit from the data within the warehouses are online analytical processing (OLAP) and Data Mining techniques. The OLAP technology refers to the possibility of aggregation of data in a warehouse, being able to filter the large amount of data to obtain useful information for the decisional process within an organization. According to specialists, an alternative term for describing the OLAP concept would be FASMI (Fast Analysis of Shared Multidimensional Information). The essence of each OLAP is the OLAP cube, also known as the multidimensional cube composed from numeric facts called measurements, categorized by dimensions [http://en.wikipedia.org]. These measurements are obtained from records in the relational databases tables. The outcomes of user requirements can be achieved by dynamically traversing the dimensions of the data cube, on a high or detailed level.

The available technologies for managing data and information must lead to better understanding of past events and to predict the future through an increase efficiency brought to the decisions made, also involving Data Mining here. Data Mining techniques integrated with decision support systems determine the existence of a decision support tool that is still based on the man-machine interaction (man-computer system), and these two entities taken together represent a specter of computer-based analytic technologies developing a platform for an optimum combination for an data-driven analysis, but controlled by man [Ganguly05].
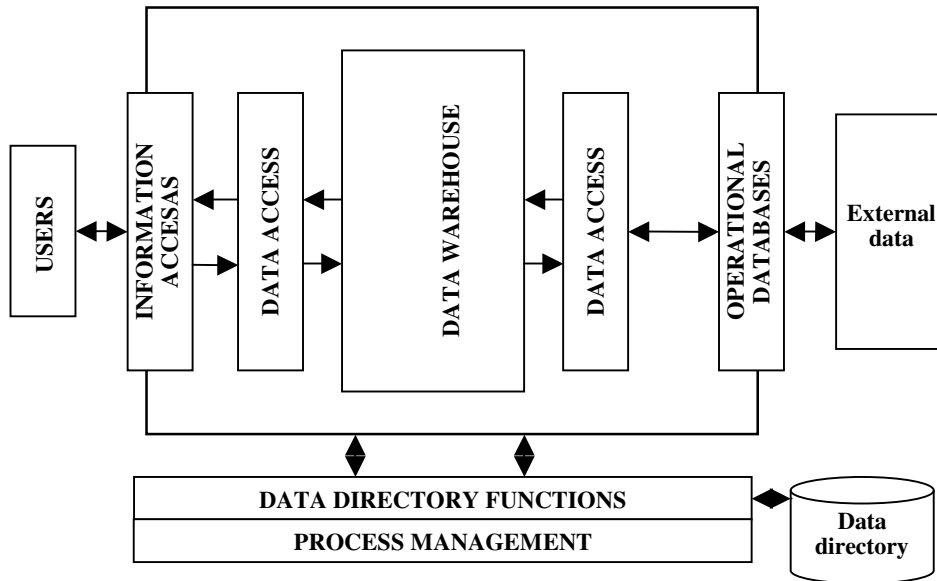
Figure 4. General architecture of the data warehouse

CONCLUSION

A decision support system in an organization using information technologies has the components shown in Figure 5. Still, depending on the system, on its complexity and functionality, the mentioned elements may or may not appear.

It is important to understand that decision supporting systems are heading towards a direction that will involve new technologies, including intelligent systems, Machine Learning technologies, distributed systems and collaborative systems.
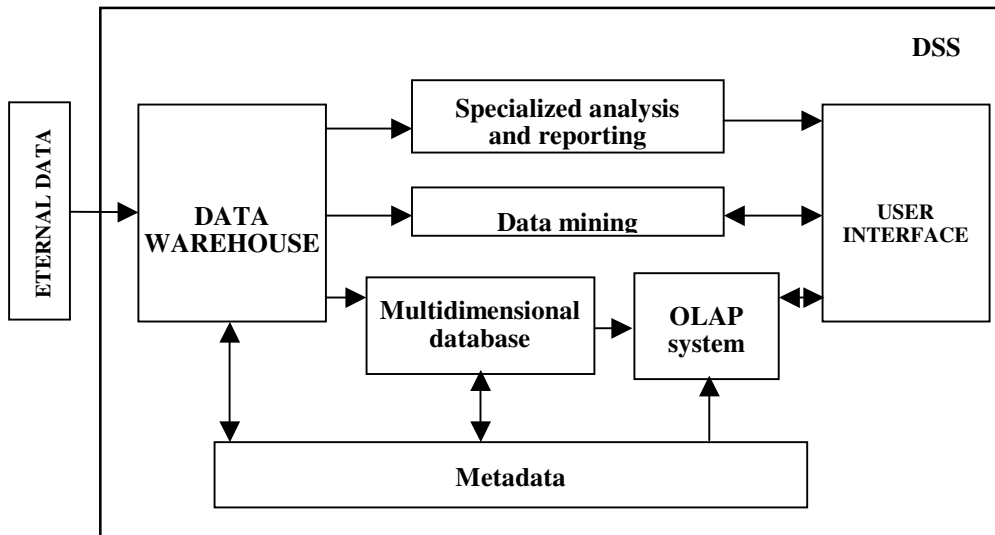
Figure 5. The components of a decision support system within an organization using information technologies

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THE ECONOMIC-MATHEMATICAL MODELING OF THE MULTI-OBJECT BIDS

Stancu Stelian

Department of Economic CyberneticsAcademy of Economic Studies, Bucharest, ROMANIAAddress: Dumitru Secareanu Street, no.5, district 2, Bucharest, RomaniaPhone: 0040723-581346, E-mail: stelian_stancu@yahoo.com

Gogonea Rodica - Manuela

Department of Economic Cybernetics, Academy of Economic Studies, Bucharest, ROMANIA, Address: Dumitru Secareanu Street, no.5, district 2, Bucharest, Romania, Phone: 0040723-581346, E-mail: stelian_stancu@yahoo.com

The paper makes a general characterization of the classical bids' theory, enumerating on one side, the single-object bids, with its specific types: English bid, Dutch auction, secret bidding at the first price, the bid with secret bidding at the second price (Vickrey type bid), Japanese bid and the reverse bid.On another side, there are enumerated multi-object bids, being acknowledged in this regard: double bid, sequential bid, secret simultaneous bid at the first price, (English) bid with simultaneous and growing multiple bidding, secret bidding at the second price (secret and simultaneous).

In the second part of the paper, it is presented an adjusted variant of the Lengweiler's model, with specific exemplifications, strategy and balance at its level.

The paper concludes with the run of an EXCEL application and the presentation of the conclusions drawn from this approach.

Key words: market, price, bids, negotiations, electronic bids, multi-product bids

General characteristics of the bids' theory

The bid represents a market mechanism where an object, a service, or a set of objects or services[4] are exchanged basing on biddings proposed by the participants in exchange for certain prices.

The main types of bids are[5]:

A) The single-object bid, with its specific types:

    a. English bid;

    b. Dutch auction;

    c. secret bidding at the first price;

    d. bid with secret bidding at the second price (Vickrey type);

    e. Japanese bid;

    f. reverse bid.

B) Multi-object bids

This type of bids is based, usually, on the above discussed, being acknowledged in this regard:

    a. double bid;

    b. sequential bid;

    c. secret simultaneous bid at the first price;

    d. (English) bid with simultaneous and multiple growing bidding;

    e. secret bidding at the second price (secret and simultaneous).

Besides the already presented types of bids, there are others as well, or derivations of the main types which however are not same usual.

Thus, we can find as well[6]:

    – the simultaneous bidding system;

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[4] in the case of the multi-object or multi-services bids
[5] for their detailed comment, to look in Stancu S., *Automated bids and negotiations. Possibilities of extension in Romania*, International Informatics Symposium, ASE, Romania, May, 2007
[6] in this matter you may consult a dictionary of economic terms

- the fortuitous or random bidding systems:
  - the system with written bids;
  - the system *by hand-shake*;
  - the *whispering* system;
- non-random bidding systems:
  - the *lapse of time* bid;
  - the silent bid;
  - the rotative phonic bid;
  - the Swiss bid.

Modeling of the multi-object (multi-product) bid

This zone analyzes the case of the bids which include multiple identical products.

The most laborious activity regarding the multi-product bids assumes two simplified conditions, namely:

- the quantity of products that are going to be sold is fixed, and
- the quantity of products requested by the buyers is, also, fixed.

Further on, we shall present an adjusted variant of the Lengweiler[7] model, based on the English bid with multiple products, private assessments and variable required quantities.

So, let's have a multi-product bid with

- one single seller;
- a finite number, *n*, of buyers or *agents* $C_1, C_2, ..., C_n$;
- a quantity Q of identical products as being available for sale;
- each buyer $C_i, i = \overline{1, n}$ wishes to obtain a quantity q_i of products[8], with:

$$\sum_{i=1}^{n} q_i > Q \qquad (1)$$

- each buyer has an amount of money, V_i, $i = \overline{1, n}$, having a rectangular uniform distribution $F(V)$ in the interval $[V_{min}, V_{max}]$, with

$$V_{max} - V_{min} > 1 \qquad (2)$$

and also

$$F(V_i) = F(V) = \frac{1}{V_{max} - V_{min}}, \text{ for } i = \overline{1, n} \qquad (3)$$

As the products are assumed to be identical, each buyer $C_i, i = \overline{1, n}$ ear-marks the same amount of money v_i for all the products he wants to obtain, so that:

$$V_i = v_i q_i, \text{ for } i = \overline{1, n} \qquad (4)$$

The bidders, as buyers, present their bids as if they wanted to acquire a single product, the respective demanded quantities q_i being unknown to the seller.

Let's consider p_i the buyer's supply $C_i, i = \overline{1, n}$, describing his bidding strategy, depending on his budget, V_i, and of the desired quantity q_i, from the product *i*:

$$p_i = p_i(q_i, V_i), i = \overline{1, n} \qquad (5)$$

Remark: It's obvious that $p_i \le v_i$, for $i = \overline{1, n}$.

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[7] proposes a bid model, where the available quantity is not fixed, but it can change during the bid, how it is for instance the case of the stock exchange market.
[8] to be ascertained that the demand is strictly higher than the supply, this being also the explanation of organizing the bid.

The buyer may decide to diminish the wanted quantity during a bid with the purpose of decreasing his possible bidding for the product i, according to the relationship:

$$v_i' = \frac{V_i}{q_i'} \qquad (6)$$

where v_i' is the new amount of money ear-marked for a type of product, by the buyer $C_i, i = \overline{1,n}$, while q_i' represents the new desired quantity, with $q_i' < q_i$.

Let's assume, for instance, that a buyer $C_i, i = \overline{1,n}$ has a sum which he wants to use $V_i = 10.000$ euro for the purchase of the desired products.

If this buyer orders a quantity of products $q_i = 100$ natural units, the amount of money that he will ear-mark for each product will be of:

$$v_i = \frac{V_i}{q_i} = \frac{10.000}{100} = 100 \text{ euro / product}$$

In case when the buyer decides to decrease the demanded quantity to $q_i' = 50$ products, the amount of money v_i' ear-marked for every product will be calculated as follows:

$$v_i' = \frac{V_i}{q_i'} = \frac{10.000}{50} = 200 \text{ euro/product}$$

Consequently, at the end of a bid, the buyer C_i receives $\tilde{q}_i$ products, as follows:

$$\tilde{q}_i = q_i, \qquad \text{if } Q - \sum_{j:p_j>p_i} q_j \geq q_i$$

$$Q - \sum_{j:p_j>p_i} q_j, \quad \text{if } 0 < Q - \sum_{j:p_j>p_i} q_j \geq q_i \qquad (7)$$

$$0, \qquad \text{if } Q - \sum_{j:p_j>p_i} q_j \leq 0$$

Indeed, the quantity $\tilde{q}_i$ obtained by the buyer C_i, depends on the demands of the other buyers C_j, which send the biddings $p_j, j = \overline{1,n}$, $j \neq i$, higher than the bidding p_i. The quantities afferent to these buyers are then: $\sum_{j:p_j>p_i} q_j$

The last buyer who wins is C_i, which will be able to satisfy partially his own need with the quantity remained and not sold to others.

For instance, assuming that 100 products are designed for sale and that the best bidding for 70 of the products he wanted is 130 euro/product, the first buyer (namely the one with the best bidding) will receive the 70 products he had ordered, while the second buyer, from the bidding's point of view, will receive only 100-70=30 products.

The buyers who win are paying sums representing the quantities from the bets, multiplied with the obtained quantity: $p_i \tilde{q}_i$.

Remarks: 1. Their returns will be: $U_i = (v_i - p_i)\tilde{q}_i = V_i - p_i \tilde{q}_i$.

2. In case when a buyer doesn't make any bet, or loses the bidding, then his gain it is assumed to be: $U_i = 0$

If the budgets ear-marked for the products that follow to be purchased are: 140 euro/product for the first winning buyer C_1 and 120 euro/product for the second one, C_2, then their returns will be:

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$$C_1: U_1 = (140 - 130) \times 70 = 700 \text{ euro}$$

$$C_2: U_2 = (120 - 100) \times 30 = 600 \text{ euro}$$

The gain (usefulness) function U_i, which has the meaning of surplus at the buyer's level, is called the *usefulness* of the buyer C_i, each of them trying to maximize his own usefulness.

Strategy and balance at the level of the Lengweiler's model

Each bidder tries to win as a participant in a simple English bid. As a participant doesn't know which are the quantities requested by the other competitors, it may happen that his bid be neglected by the other buyers.

In this way he deals with the risk that, the requested quantity q_i be entirely assigned to another buyer who offers a bigger price.

The buyer always deals with the dilemma that he wants to minimize his bid, p_i, to maximize his returns, and on another side he should take care that his bid p_i would have the highest chances to win.

The strategy of a winner's race takes into consideration these two principles that must be well-defined.

The buyer C_i presents a bid p_i. In order for him to win this bidding, it's necessary that all the other n-1 participants present bids which are inferior to p_i.

The probability that any bid p_j, be inferior to the bid p_i, knowing that C_i requests the quantity q_i, is:

$$P(p_j < p_i \mid q_i) = \int_{V_{min}}^{p_i q_i} F(V) dV \tag{8}$$

with $F(V) = \dfrac{1}{V_{max} - V_{min}}$, wherefrom it results that:

$$P(p_j < p_i \mid q_i) = \frac{p_i q_i - V_{min}}{V_{max} - V_{min}} \tag{9}$$

The probability that the bids of the other n-1 buyers be inferior to p_i, leads to:

$$\prod_{i=1}^{n-1} \frac{p_i q_i - V_{min}}{V_{max} - V_{min}} = \left[\frac{p_i q_i - V_{min}}{V_{max} - V_{min}} \right]^{n-1} \tag{10}$$

All the buyers $C_i, i = \overline{1, n}$ try to improve their returns' situation, by maximizing the probability of winning a bid.

The buyer maximizes further the following expression:

$$[\max]\pi_i = (V_i - p_i q_i) \left[\frac{p_i q_i - V_{min}}{V_{max} - V_{min}} \right]^{n-1} \tag{11}$$

The necessary condition of optimum $\dfrac{\partial \pi_i}{\partial p_i} = 0$, leads to

$$-q_i(p_i q_i - V_{min})^{n-1} + (V_i - p_i q_i)(n-1)q_i(p_i q_i - V_{min})^{n-2} = 0 \tag{12}$$

or equivalent:

$$-q_i(p_i q_i - V_{min})^{n-2}[-(p_i q_i - V_{min}) + (n-1)(V_i - p_i q_i)] = 0 \tag{13}$$

Simplifying the writing, we have:

$$(p_i q_i - V_{\min}) + (n-1)(p_i q_i - V_i)] = 0 \qquad (14)$$

wherefrom it results that:

$$\tilde{p}_i = \frac{V_{\min} + (n-1)V_i}{n q_i} \qquad (15)$$

and represents the best bid of the buyer C_i, in the meaning that it is the minimum bid which maximizes the probability of winning the bid, in the condition where the other participants' budgets are being uniformly distributed.

The set p_i, $i = \overline{1,n}$ is the theoretical set of the best bidding. We remark that the buying agents are not able to acknowledge their optimum bids since the value $V_{\min}$ is not a common information.

The purpose of the bid's protocol is to determine the agents to present bids as close as possible to the optimum ones.

Application at the level of 3 agents (buyers) and an extension of it

We take into consideration a model with 3 agents (buyers) C_1, C_2 and C_3, and we assume, as well, as being given the following information:

Table 1.

C_1			C_2			C_3		
q_1 (tones)	v_1 (euro /tones)	p_1 (euro /tones)	q_2 (tones)	v_2 (euro /tones)	p_2 (euro /tones)	q_3 (tones)	v_3 (euro /tones)	p_3 (euro /tones)
400	1200	1000	200	1300	1200	300	1100	900

There are also known:

$$Q = 700 \text{ tones}$$

$$V \in [V_{\min}, V_{\max}], \text{ namely } V \in [240, 480]$$

By applying Lengweiler's model, it is obtained that

- the first satisfied one is the agent C_2, with the quantity of 200 tones;
- the second satisfied one is the agent C_1, with the quantity of 400 tones;
- the last one satisfied, with only 100 tones, is the agent C_3.

As regards the usefulness (surplus) at the level of each buyer, after making the calculations, there are obtained the results:

Table 2.

	C_1	C_2	C_3
$U(C_i)$ (in euro)	80.000	20.000	20.000

We make the extension to 100 agents (buyers), $C_i, i = \overline{1,100}$, we take $V \in [V_{\min}, V_{\max}]$, namely $V \in [240, 480]$ and we assume to be known the information in the first 3 columns of table 3, in the Annex 1.
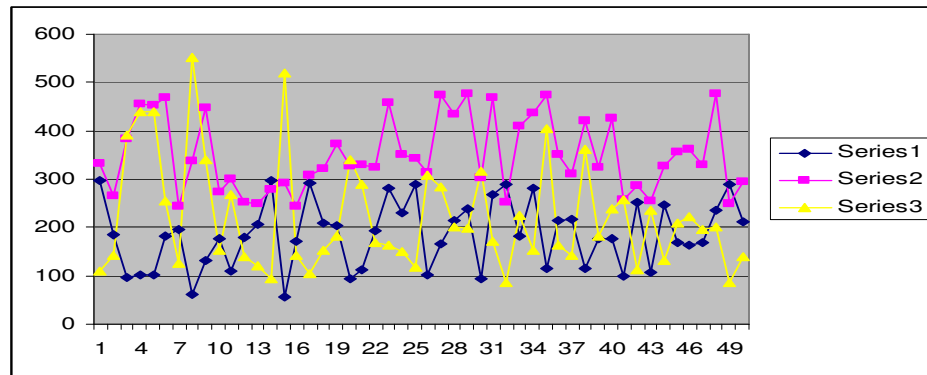
Figure 1.

Further on, it is followed the determination of the optimum price at the level of every agent from the 50 to have been assumed, so that each of them would maximize his profit.

In order to do this, it is applied the relationship (15), obtaining the values in the last column of table 3.

As it is also emphasized in figure 1, it is ascertained that the price and the quantity are in a reverse dependency.

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CREATION OF VIRTUAL LABORATORIES USED IN DISTANCE LEARNING

Şerbănescu Luminita

University of Piteşti, luminitaserb@yahoo.com

Abstract: The present article presents the modality of creation, administration and utilization of the virtual laboratories, showing many illustrative examples. The WinkPortable application is presented, which gathers close together films made in Flash aiming to create a complete and interactive laboratory. The virtual laboratories are inserted in the platform of distance learning where there are two sections: for creation and administration (the teachers' module), and for utilization and visualization (the students' module).

Keywords: virtual laboratory, WinkPortable, multimedia film.

Virtual laboratories represent an indispensable component for a complete approach of the field of the distance learning, the reason being the same with the one which doesn't allow the exclusion of the practical activities in laboratories from the "classical" educational processes. Using the present multimedia techniques, "laboratory guidance" can be realized, which can present clearly and intuitively different practical operations at low costs. With the help of these methods, the approached topics are understood and assimilated much easier. These multimedia films can be seen on any computer which has installed an Internet browser. Also, these films are created and exist as files *.swf* and *.pdf*, which can be watched on any computer, on any platform.

Virtual laboratories are inserted into the platform for distance learning where there are two sections:

- − for creation and administration (the teachers' module), and
- − for utilization and visualization (the students' module).

1. Teachers' module.

Using the present multimedia techniques, "laboratory guidance" can be realized, which can present clearly and intuitively different practical operations at low costs.

For example, the course of "Fundaments of Informatics" existing at the University from Pitesti, the Faculty of Accountancy and Administrative Data contains many examples which are linked to the practical side of learning and using the most important programs from the applications set Microsoft Office. Thus, the necessity to present the practical elements of this course into a manner as easy as possible can be seen. For this presentation we have chosen the topic: "The creation of documents in Microsoft Word application". This operation doesn't suppose special efforts, just a line of clicks in very specific places, which are easy to follow on the screen because they use the free software product "WinkPortable".

The software product "WinkPortable" helps creating audio - visual films, and they show how the systems and soft applications function. It can be used in different fields, among which:

- − demonstration of functioning of the soft applications;
- − marketing presentations;
- − the realization of materials for training, etc.

Fig. 1.1. Teachers' module – Creation of a virtual laboratory with the help of WinkPortable application.

Among the product's facilities we mention:

- It is available on different operating systems (Windows, Linux, Solaris),
- It allows "captures" from the screen, whose dimension can be set,
- It contains a "toolbar", which can be modified according to the active operation,
- It allows the administration of a page presentation: establishing time for pages presentation, import and export of a text, administration of the cursor's positioning, import of audio files and images,
- As exits, we can choose between the files Flash 5 or Flash 6, operable files, archived files, pdf files or images.

After the images were captured they can be deleted, doubled or processed.

For the images' processing presentation we can use the following elements presented in fig. 1.2:

Fig.1.2 Teachers' module – Utilized elements for images' processing
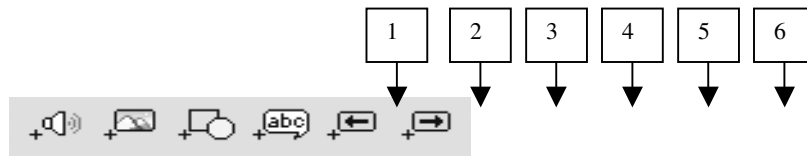
where:

1. adding audio files;
2. adding images;
3. creating geometrical shapes;
4. creating suggestions boxes;
5. adding circulation arrow for the previous page;
6. adding circulation arrow for the next page;unde:

In images' processing it is indicated to use circulation buttons (5 and 6) instead of a presentation with pre-established development time because each student assimilates information at his/ her own pace. Thus, the student is the one who decides to move on, onto the next page

2. Students' module.

For the school subjects where there are laboratories in the traditional school education, the student regimented in the distance learning can have access to the virtual laboratories. He/she can access both presentations made with specialized programs (WinkPortable – for the Informatics labs, LabView – for the Physics labs) and files in *.pdf* format which contain images with presentations and which can be saved in the personal computer (see fig. 2.1).

Buna A!

Prezentare WinkPortable   Prezentare PDF

Laborator 1   Laborator 1
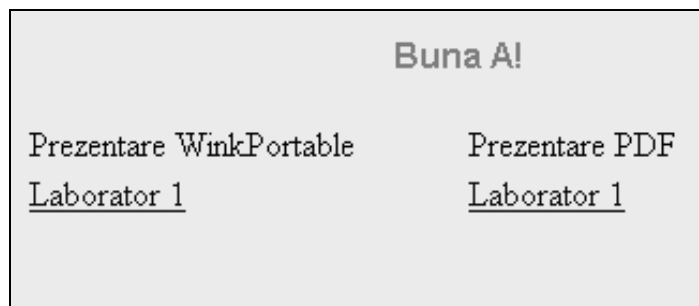
Fig. 2.1 Students' module - access to the virtual labs

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For example, for an Informatics lab made with the WinkPortable application, student will have access to the following presentation:
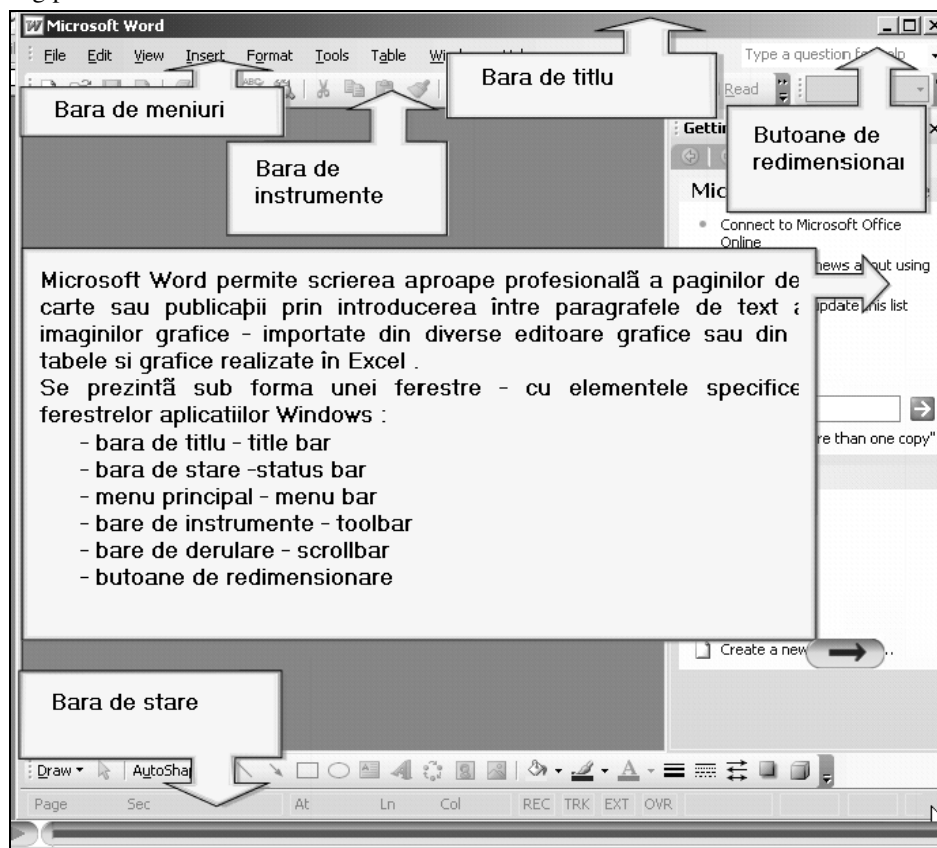
Fig. 2.1 Students' module – Presentation of a lesson for creating a Word document

There can be seen the circulation buttons from one page to another of the presentation and also the fact that the film has a navigation bar added, which allows both the quicker development and the pause at desired moments or simply the developing of the film back and forward.

The many facilities which WinkPortable application has allow for the development of virtual labs with different degrees of complexity.   .

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DETERMINATION OF THE EFFICIENCY OF THE TEACHING-LEARNING MULTIMEDIA

Şerbănescu Luminita

University of Piteşti, luminitaserb@yahoo.com

Abstract: In this article I shall present the results of an experiment made at the Faculty of Economics, Juridical and Administrative Sciences, specialization Finances Banks. In this scientific experiment we applied the technique of parallel groups which supposes the implication of 4 groups of second year students, 2 groups forming the experimental team for whom the multimedia courses for training process were used and 2 control groups for whom teaching was made in the traditional system. The experimental implementation and the determination of the efficiency of the teaching- learning multimedia technologies were made with the desire of underlining the necessities of transformations which self-impose to the educational system, to synchronize it with the general tendencies of development of the contemporary society.

Keywords: multimedia courses, arithmetic mean, square mean deflection, dispersion, independent student test

The contemporaneousness of the investigation topic relies on the fact that in recent years the society made more persistent demands linked to computers: the specialists' training in the implementation of the computer system through the development of the skills of finding, accumulating and understanding the information, of implementing the informational and communicative technologies for its processing, of building virtual models of the objects and actions into the real world. The advances informational technologies contributed to the motivational increase towards the study of some disciplines, which have nothing in common with informatics, because they facilitate learning, due to the fact that the individual particularities of the student are taken into account, also his/ her capacities and preferences, assuring the existence of feedback between the student and program, increasing the efficiency of the learning process.

Thus, the informational technologies are used more frequently in the diversity of the human activities' spheres: medicine, finances, mass-media, science and in education.

Bringing these arguments, we can state that the refreshment of the educational process is practically impossible, without the implementation of the advanced informational technologies, including the multimedia technologies.

The efficient implementation of the multimedia technologies in the teaching- learning process necessitates a scientific underlying, meaning a demonstration of its utility, its pedagogical reason. "The defining of the quality and efficiency categories into the teaching- learning process is possible only through evaluation" [1]. In any field of research, "evaluation means a set of operations through which data resulted from the investigation of phenomena are brought into light, are measured, represented and interpreted" [1].

For the statistical processing we shall examine the results of a testing which was applied to two comparative groups: experimental groups for whom the multimedia courses were used for the instruction process and the control groups for whom teaching was realized in the traditional system. The results are exposed in a synthetic chart (it realizes a grouping of measured data, not taking into account the subjects' names), in which the students' names were replaces with a code, which signifies the following:

a. Roman numbers I, II, ..., XI – indicate the subgroup's number, from which the student is a part of;

b. Letters E – show that the student is part of the experimental group, and C – indicate the control group;

c. Arabian numbers 1,2, ..., 11, 12 – show the place occupied by the student in the control lists.

Due to the fact that the elaborated test contains 30 questions, (the value it= 30), the questions were chosen in accordance to the knowledge's volume, included in the course. The test contains problems of varied difficulty.

Data indicating the score made by each student of the two groups compared after testing: for the experimental groups, are presented in the tables E1.1 – E1.2, and the results of the control groups are presented in the tables: C1.1 – C1.2, where:

− itc_i represents the score of the i student

− te_i represents the necessary time for student i to answer the questions.

Table E1.1 Experimental group I		
Id student	**itc$_i$**	**te$_i$**
IE1	24	35
IE2	22	38
IE3	29	32
IE4	30	40
IE5	15	27
IE6	26	26
IE7	18	30
IE8	23	31
IE9	27	40
IE10	19	30

Table E1.2. Experimental group II		
Id student	**itc$_i$**	**te$_i$**
IIE1	25	35
IIE2	29	38
IIE3	28	32
IIE4	30	40
IIE5	17	27
IIE6	26	26
IIE7	18	30
IIE8	26	31
IIE9	30	40
IIE10	21	30
IIE11	24	28
IIE12	39	39

Tabel C1.1 Control group I		
Id student	**itc$_i$**	**te$_i$**
IC1	19	38
IC2	18	38
IC3	25	32
IC4	28	40
IC5	15	39
IC6	24	36
IC7	18	30
IC8	22	31
IC9	21	40
IC10	14	37

Tabel C1.2. Control group II		
Id student	**itc$_i$**	**te$_i$**
IIC1	20	38
IIC2	17	38
IIC3	26	32
IIC4	21	40
IIC5	16	39
IIC6	23	36
IIC7	18	30
IIC8	20	31
IIC9	22	40
IIC10	13	37
IIC11	12	40
IIC12	25	35

1. The evaluation of the coefficients which express the arithmetic mean

a) Computation of the arithmetic mean[2] of the data indicates the following results:

Experimental groups: Control groups:

$$\overline{x_e} = \frac{\sum x_{ie}}{n} = \frac{537}{22} = 24{,}409 \qquad \overline{x_c} = \frac{\sum x_{ic}}{n} = \frac{437}{22} = 19{,}863 \qquad (1.1)$$

where: $\overline{x_e}$ – the arithmetic mean of the performances in the experimental groups; x_{ie} - the performances of the student in the experimental groups; $\overline{x_c}$ - the arithmetic mean of the performances in the control groups; x_{ic} - the performances of the student in the control groups.

It is obvious that the arithmetic means of the experimental groups are higher than those in the control groups, a fact which proves a higher level of performances in the experimental groups than in the control groups.

b) Computation of the balanced arithmetic mean. Balanced arithmetic mean in the case of representation of the results on multi-stage intervals will be:

Experimental groups: Control groups:

$$\overline{x_e} = \frac{\sum_{i=1}^{n} f_{ie} * x_{ie}}{\sum_{i=1}^{n} f_{ie}} = \frac{537}{22} = 24{,}409 \qquad \overline{x_c} = \frac{\sum_{i=1}^{n} f_{ic} * x_{ic}}{\sum_{i=1}^{n} f_{ic}} = \frac{437}{22} = 19{,}863 \quad (1.2)$$

c) The module represents the value of the variable which has the highest frequency. Obvious from the previous charts, the module for the experimental groups is 30, and for the control groups is 18. You can see that the module shows the most typical case from the results' series, and for a distribution of frequencies perfectly symmetrical, the value of the module is the same with the value of the arithmetic mean and of the balanced mean. In our research, these values are very close.

From the presented results' analysis, we can see that in the experimental groups a greater number of students had a higher score compared to the control groups. Thus, in the experimental groups, 4 students obtained 30 points (the maximum score), compared to 0 students – in the control groups, and respectively, 3 students obtained < 15 in the control groups compared to 0 students, in the experimental groups, where the lowest value of score was never lower than 15 points. The great difference between the results shows once again the veridical hypothesis of our research.

2. The values which express the variability's indices

The statistical indicator which allows the establishment of the dispersion's data, or the possible variation is the dispersion's amplitude (A), which represents the difference between the two extremes of the array: the maximum value and the minimum value of the measured performances.

$$A=Xmax\text{-}Xmin \qquad (2.1)$$

The amplitude of the dispersion of the performances of the researched groups will be:

Experimental groups: Control groups:

Ae=30-15=15 *Ac=30-12=18*

The abnormality or the central deviation of the analyzed results, which represent the abnormality of each value of the studied characteristics, compared to the central value of these, is calculated establishing the

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difference between the each value of the studied measure and the medium value of it, which represents the central tendency of the array data, meaning the arithmetic mean[3].

This computation shows how much a result from the obtained series x_i deviates from the mean $\overline{x}$. The central abnormality is notated d:

$$d = x_i - \overline{x} \tag{2.2}$$

where: x_i – the individual given value; $\overline{x}$ – the arithmetic mean of the data array.

Table 2.1. The establishment of the elements for the calculation of the central deviation (d) deviation of the linear mean (Vm) and of dispersion (S^2) x_i – individual values.

Experimental groups				Control groups				
Id	x_{ie}	d_e	$|d_e|$	$|d_e|^2$	**Cod**	x_{ic}	d_c	$|d_c|$	$|d_c|^2$

Id	x_{ie}	d_e	$|d_e|$	$|d_e|^2$	**Cod**	x_{ic}	d_c	$|d_c|$	$|d_c|^2$
IE1	24	-0.409	0.409	0.167	IC1	19	-0.863	0.863	0.744
IE2	22	-2.409	2.409	5.803	IC2	18	-1.863	1.863	3.470
IE3	29	4.591	4.591	21.077	IC3	25	5.137	5.137	26.388
IE4	30	5.591	5.591	31.259	IC4	28	8.137	8.137	66.210
IE5	15	-9.409	9.409	88.529	IC5	15	-4.863	4.863	23.648
IE6	26	1.591	1.591	2.531	IC6	24	4.137	4.137	17.114
IE7	18	-6.409	6.409	41.075	IC7	18	-1.863	1.863	3.470
IE8	23	-1.409	1.409	1.985	IC8	22	2.137	2.137	4.566
IE9	27	2.591	2.591	6.713	IC9	21	1.137	1.137	1.292
IE10	19	-5.409	5.409	29.257	IC10	14	-5.863	5.863	34.374
IIE1	25	0.591	0.591	0.349	IIC1	20	0.137	0.137	0.018
IIE2	29	4.591	4.591	21.077	IIC2	17	-2.863	2.863	8.196
IIE3	28	3.591	3.591	12.895	IIC3	26	6.137	6.137	37.662
IIE4	30	5.591	5.591	31.259	IIC4	21	1.137	1.137	1.292
IIE5	17	-7.409	7.409	54.893	IIC5	16	-3.863	3.863	14.922
IIE6	26	1.591	1.591	2.531	IIC6	23	3.137	3.137	9.840
IIE7	18	-6.409	6.409	41.075	IIC7	18	-1.863	1.863	3.470
IIE8	26	1.591	1.591	2.531	IIC8	20	0.137	0.137	0.018
IIE9	30	5.591	5.591	31.259	IIC9	22	2.137	2.137	4.566
IIE10	21	-3.409	3.409	11.621	IIC10	13	-6.863	6.863	47.100
IIE11	24	-0.409	0.409	0.167	IIC11	12	-7.863	7.863	61.826
IIE12	30	5.591	5.591	31.259	IIC12	25	5.137	5.137	26.388

The abnormality of the linear mean or the medium variation (Vm) represents the sum of the abnormality of variables, taken at their absolute value and divided at the number of cases:

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$$Vm = \frac{\sum\limits_{i=1}^{n}\left|x_i - \bar{x}\right|}{n} \quad (2.3) \quad S = \sqrt{\frac{\sum\limits_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n}} \quad (2.4) \quad S^2 = \frac{\sum\limits_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n} \quad (2.5)$$

where: S^2 – dispersion; S- square mean abnormality; x_i – individual values.

The abnormalities of the linear means of the individual performances were calculated for both groups, the results being presented in the table 2.1.

The square mean abnormality or the standard abnormality (S) represents the degree of dispersion of the results compared to central tendency. It is considered the most exact coefficient of variability and it is calculated according to formulae (2.4).

The square of the standard abnormality represents ***dispersion (S^2)***. Dispersion can be calculated according to formulae (2.5).

The results of the dispersion's calculation were included in the table 2.1. According to the results we shall calculate:

For experimental groups: Vme=3,91736   Se=4,618728   Se²=21,332645

For control groupsl: Vme=3,51245   Sc=4,245804   Sc²=18,02685

From the results obtained for the two groups it can be seen that the level of training of the control group is inferior to the level of training of the experimental group.

3. Independent Student test (t)

The analysis instruments test t for two samples test the equality of the means of the basis populations for each of the samples [3]. We observe that the groups are independent, that the number of subjects from each group is less than 30, so we can use the independent test t.

$$t = \frac{M_1 - M_2}{EE_{M_1 - M_2}} \quad (3.1) \quad EE_{M_1 - M_2} = \sqrt{\frac{Se^2}{n_1} + \frac{Sc^2}{n_2}} \quad (3.2)$$

where: M_1 and M_2 represent the means of the two samples: $EE_{M1\text{-}M2}$ represents the standard error of the difference between the two means, Se^2 represents the dispersion of the control group; n_1 – the number of students from the first group (experimental); n_2 - the number of students from the second group (control).

In the case of the given problem, the number of students from the two samples is equal ($n_1=n_2=22$). Because we know the dispersions (the square of the standard abnormality) and the means of the samples on the verifying test, we shall apply the first formulae, which we shall integrate in the computing formulae of the independent test t. For the testing assay: t = 3,398726.

After the calculation of the independent t we shall compare the obtained value with the given value in the t's chart. For these intermediate steps are necessary:

a. The establishment of the liberty degrees (to know the chart value of t which will be compared with our value). The calculation of the liberty degrees for the independent test t is done : df=(n1+n2)–2. In the present case we have df=22+22–2=42 degrees of liberty.

b. The second intermediate step is the choosing of the type of situation of t, meaning we have a test t one-sided or two-sided. In this case the two-sided independent test t is used.

c. The establishment of t's value in accordance to the chosen signification frame. The statistical practice considers necessary to establish a level of confidence of maximum 0,05.

Following in the table the value of two-sided t for df = 42 (it is considered the value for t the closest to 42, in our case df=40) and p=0,05, we find the value 2,021. Because the value found by us t = 3,398726 is much higher than the one in the chart, we reject the null hypothesis Ho: $M_1 = M_2$ and conclude that there is a statistical significant difference ($M_1 > M_2$) in the performances of the students from the experimental group compared to students from the control group.

Inspecting the data of the problems it can be observed that the students who were trained with the help of the multimedia courses obtained better results at the testing assay than the group of students for whom training was made in the traditional way.

Because the obtained result (3,398726) is higher than the charted values of t for p=0.02 (2,423); p=0.01 (2,704) we can present the obtained result like being eloquent and with very little chances to be due to randomness.

The application of the statistical methods of processing experimental data attested the hypotheses about the positive impact of the implementation of the multimedia courses in teaching- learning process in the experimental groups and the efficiency of the applied methods to the experimental groups, compared to traditional methods, applied to control groups.

The present research tried to propose a new perspective of implementation of the teaching- learning process, in accordance to present-day demands, one which offers new possibilities of stimulation of interest, new ways of active involvement of the student in the knowledge process, all through the use of informational technologies.

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PANEL ESTIMATOR: AN APPLICATION FOR ESTIMATE THE TRADE FLUX BETWEEN HETEROGENEOUS ECONOMIES

Şova Robert
Academy of Economic Studies of Bucharest[9]

Năstase Pavel
Academy of Economic Studies of Bucharest[10]

Şova Anamaria
Academy of Economic Studies of Bucharest[11]

Compared to time-series or cross-section analyses, panel data allow us to control for individual specific characteristics - possibly unobservable - which may be correlated with certain explanatory variables in the specification of an economic relationship. Not controlling for unobservables leads to obtaining biased results. After controlling for such unobservable characteristics, we calculate efficient estimates of a trade flux equation between heterogeneous economies.

Key words: individual heterogeneity, fixed effects, random effects, POLS estimators

INTRODUCTION

The fundamental advantage of a panel data set over a cross section is that it will allow the researcher great flexibility in modeling differences in behavior across individuals [Green, 2002]. In empirical analysis of data consisting of repeated observations on economic units it is often assumed that we have observable random variables, and unobserved effect. The unobserved effect is often interpreted as capturing features of an individual. In fact, a primary motivation for using panel data is to solve the omitted variables problem [Wooldridge, 2002].

One seeks has to test the null hypothesis of the unobserved characteristics presence. If the null assumption is rejected, then one must include individual effects in the model. In the traditional approach to panel data models, unobserved effect, is called a „random effect" when it is treated as a random variable and a „fixed effect" when it is treated as a parameter to be estimated for each cross section observation. We follow Wooldridge (2002) in the sense that unobserved effects are treated as random variables, and the key issue is whether the unobserved effect is uncorrelated with the explanatory variables. A minimum condition, in the linear panel data models is that the error in each time period was assumed to be uncorrelated with the explanatory variables in the same time period but for certain panel data applications this assumption is too strong. Basically we has two alternative different estimation methods "random effects" estimation (RE) which is associated with GLS estimator and "fixed effects" estimation (FE) with „within" estimator. To identify whether the unobservables are correlated with explanatory factors, we perform a Hausman test comparing the fixed effects and random effects estimators. The test is based on the fact that the random effects estimator is biased if unobservables are correlated with the explanatory variables, while the fixed effects estimator is always unbiased but is less efficient if there is no correlation. The gain in efficiency results from the utilization of the „between" estimator in addition to the „within" estimator. Furthermore, when the effects are not correlated with the explanatory variables, the within and between estimators are the same and therefore any weighted matrix combination thereof will be the same [Mundlak 1978].

Actually, bilateral trade can be influenced by specific characteristics. For instance, the impacts of historical, cultural and political links on trade flows are difficult to observe and quantify.

The choice of the method (FE or RE) depends on two important things, its economic and econometric relevance. From an economic point of view there are unobservable time invariant random variables, difficult to be quantified, which may simultaneously influence some explanatory variables and the trade volume. From an econometric point of view the inclusion of fixed effects is preferable to random effects because the rejection of the null hypothesis of correlation of the unobservable characteristics with some explanatory variables is less plausible (Baier and Bergstrand 2005).

We now briefly present the panel data econometric methods used in our paper to estimate the possible various specifications of our models: pooled OLS estimator (POLS), random effect estimator (RE), within estimator (FE).

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[9] Piata Romana nr. 6, tel. 00 40 21 319 19 89, e-mail robertsova@yahoo.com
[10] Piata Romana nr. 6, tel. 00 40 21 319 19 89, e-mail nastasep@ase.ro
[11] Piata Romana nr. 6, tel. 00 40 21 319 19 89, e-mail anamariasova@yahoo.fr

Estimating the trade flux between heterogeneous economies

The bilateral trade can be influenced by specific characteristics. For instance, the impacts of historical, cultural and political links on the trade flows between heterogeneous economies are difficult to observe and quantify.

Our model proposed to estimation is a two dimension gravity model as the following:

$$Log(X_{ijt}) = a_0 + a_1 log(GDP_{it}) + a_2 log(GDP_{jt}) + a_3 log(DGDPC_{ijt}) + a_4 log(Dist_{ij}) + a_5 log(Tchr_{ijt}) + a_6 Acc_{ijt} + u_{ij} + d_t + \varepsilon_{ijt} \quad (1)$$

for $(i = 1,\ldots\ldots N; t = 1,\ldots\ldots T)$

where X_{ijt} denotes the bilateral trade between countries i and j at time t with $i \neq j$ (source : CHELEM – CEPII data base), ao is the intercept, GDP_{it}, GDP_{jt} represents the Gross Domestic Product of country i and country j at time t (source : CHELEM CEPII – data base), $DGDPC_{ijt}$ is the difference of GDP per capita between partners and is a proxy of economic distance or of comparative advantage intensity, $Dist_{ij}$ represents the distance between two countries (CEPII data base), proxy variable for costs of transport, $Tcrh_{ijt}$ is the real exchange rate which indicates the competitiveness of price, Acc_{ijt} is a dummy variable that equals 1 if country i and country j have signed a regional agreement, and zero otherwise, u_{ij} is the unobserved bilateral effects ($i = 1,2,\ldots,N$, $j=1,2,\ldots,M$), d_t time specific effect, The time effects account for the business cycle and changes in openness across all countries $t = 1,\ldots\ldots T$ and εijt idiosyncratic errors assumed to have a normally distribution with zero mean and constant variance for all observations and pair wise uncorrelated

The estimation period goes from 1990 to 2004, i.e. 15 years for a sample of 19 developed countries (OECD) and 2 developing countries[12] (CEEC - Central and Eastern European countries). Data are organized in panel with two dimensions: country pairs, and years.

We compared various different method of estimation as POLS, FE, RE to study the effect of integration on trade flux performances. Random effects and fixed effects are still the most popular approaches to estimating unobserved effects panel data models under strict exogeneity of the explanatory variables. If the coefficients of the fixed model different systematic from those are estimated by the random model can be interpreted, following Mudlak (1978), that there is a skew of correlation between some of the explanatory variables and the bilateral specific effect.

The results of POLS, FE, RE estimations are reported in the table 1 in appendix.

The null hypothesis of no existence of individual effects is rejected. The F statistic test is 40.7. Thus, POLS not controlling for heterogeneity run the risk of obtaining biased results. The comparison between columns (2) and (3) shows several differences concerning the estimated coefficients of time-varying explanatory variables. The HAUSMAN test of the difference between random effects and within estimates confirms this result, but the difference in coefficients was not systematic. The null hypothesis of no correlation is accepted. The test statistic is 18.63, which is distributed as $Chi^2 1$ with Prob>Chi^2 0.48.

A comparison between the three estimation leads to conclusion that using POLS, we cannot expect to consistently estimate any parameters of the model when the omitted variable is ignore. With FE estimator we are obtained unbiased results but less efficient, and with the cost of losing the possibility to determine the influence of the time-invariant variable. The results indicate no correlation existence between the unobservable effect and the explanatory variables, and so RE estimator are unbiased and efficient.

The difference of income per capita has the expected positive sign which is in accordance with the Heckscher-Ohlin theory, i.e. the trade between two zones is based on comparative advantage. It's a complementary inter-industry trade where less developed countries are specialized in labor intensive industries and where the wage costs are less expensive. The variables like country size which have the most important coefficients explain better the level of bilateral exchanges. The international organization membership has a low positive influence (0.297) on trade flows. On the contrary, the distance variable represents an obstacle for trade. It should be noted that the distance between countries have an important elasticity (-1.283) and hence have an important explanatory capacity.

CONCLUSION

The use of panel econometric method in empirical analysis of trade flows is convenient because it permits for controlling the individual heterogeneity to avoid biased results. As it is known, the time-series and cross-section not controlling for heterogeneity run the risk of obtaining biased results[13].

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[12] Romania, Bulgaria

From the analysis of trade flows estimates between heterogeneous economies, more particularly from the trade between two CEEC – the last integrating countries in UE - and OECD countries with different levels of economic development one can draw several conclusions:

From an econometric point of view the use of an RE estimator for the gravity model appears convenient for our data sample.

In our analysis the time invariant variable "geographical distance" (-1.283) and the country sizes variables ($GDP_j = 0.973$; $GDP_i = 0.940$) have a major importance in international trade flows explanation.

From an economic point of view, trade flows developed between CEEC-2 and OECD countries with heterogeneous economies and different levels of economic development are inter-industry trade and vertical intra-industry trade.

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Table 1

VARIABLES	OLS	WITHIN	RANDOM
	(1)	(2)	(3)
	Xij	Xij	Xij
GDP$_i$	0.927	0.954	0.940
	(43.19)***	(4.47)***	(13.51)***
GDP$_j$	0.891	1.664	0.973
	(41.52)***	(7.81)***	(13.98)***
Dist$_{ij}$	-1.298	0.000	-1.283
	(-35.94)***	(.)	(-12.13)***
DGDPC$_{ij}$	0.219	0.130	0.157
	(2.65)***	(1.24)*	(2.10)**
Tchr$_{ij}$	-0.027	-0.028	-0.003
	(-1.95)*	(-1.91)*	(-1.98)*
Acc$_{ij}$	0.232	0.299	0.297
	(6.54)***	(12.47)***	(12.44)***
D_time	***	***	***
Constant	-4.114	-12.303	-4.455
	(10.97)***	(6.54)***	(7.03)***
Observations	1140	1140	1140
R-squared	0.78	0.69	0.78
Number of cod_rel		76	76
VIF	1.97		
F test that all α_i=0:	40.70	-	-
	(0.00)		
Ramsey-Reset Prob>Chi2	24.31	-	-
	(0.00)		
Breusch - Pagan / Cook – Weisberg (before correction)	117.76	-	-
	(0.00)		
Hausman test Prob>Chi$^2_1$	-	-	18.63
			(0.48)
Absolute value of t statistics in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			

LA SPECIALISATION ECONOMIQUE DE LA ROUMANIE ET INTEGRATION EUROPEENNE

Şova Robert
Academie d'Etudes Economiques Bucarest[14]

Şova Anamaria
Academie d'Etudes Economiques Bucarest [15]

Cimpoeru Violeta
Ministère de l'Education et de la Recherche[16]

Résumé

Dans cet article nous sommes intéressés d'étudier l'impact de l'accord de l'intégration sur les exportations de nouveaux pays membres de l'UE, dans les conditions des changements économiques, politiques rapide de ces pays et de voir également comment les accords ont-ils réglementés les objectifs d'ouverture commerciale préférentielle. Plus particulièrement de voir si les politiques de soutien de l'UE par l'intermède de l'accord européen ont eu une influence dans la modification de la structure des exportations de la Roumanie vers l'UE-15 et implicite de la spécialisation économique. Les résultats obtenus indiquent que les secteurs traditionnels ont bénéficié d'une meilleure dynamique de développement pour la période analysée.

Mots clés: accord d'intégration commerciale, modèle de gravité, structure des échanges.

1. Introduction.

L'élargissement européen vers l'Est a représenté l'action décisive de surmonter la division artificielle de l'Europe. Les pays d'Europe Centrale et Orientale qui ont toujours fait partie de l'Europe historique ont eu enfin la chance de participer au projet de réalisation d'une Europe Unie. Pendant les années quatre-vingt-dix, les PECO ont adopté une stratégie de développement orientée vers une économie de marché, une démocratie stable et de rattrapage de pays de l'UE. Les changements politiques qui ont eu lieu ont contribué à approfondir les relations entre l'UE et les pays d'Europe Centrale et de l'Est et alors, une vaque d'accords préférentiels a été signé en vue d'accélérer la libéralisation commerciale. En ce contexte, douze pays de PECO ont demandé leur adhésion à l'UE.

Alors, en quelle mesure l'association a-t-elle renforcé les relations commerciales et a-t-elle influencé la spécialisation économique ? Pour cela nous effectuons une évaluation empirique par la modélisation gravitationnelle et nous sommes intéressés d'obtenir des résultats efficients et non-biaisés qui reflètent l'effet réel de l'accord sur les échanges commerciaux.

En fait, l'estimation en cross-section tend d'ignorer les caractéristiques inobservables qui peuvent biaiser les résultats. C'est pourquoi, on pose le problème de l'éndogénéité de la variable accord car son élimination permet d'obtenir un impact réel et non biaisé sur les échanges commerciaux. . Le problème standard du biais de l'éndogénéité dans le travail empirique en coupe transversale est l'éndogénéité potentielle des variables indépendantes, la source la plus importante étant celle des variables omises.

De telles spécificités peuvent être dues aux politiques connexes non mesurables qui à leur tour peuvent avoir une influence sur les flux commerciaux ou des réglementations internes (protection de l'environnement, compétition et les règles anti-trust[17]). Si l'intensité de ces réglementations est significative, le coefficient de la variable de l'accord sera influencé. En ce cas, le terme d'erreur de l'équation à estimer peut représenter les barrières politiques connexes inobservables et tend à réduire le commerce entre deux pays.

Donc, quand les réglementations internes non mesurables empêchent le commerce à un moment, le terme d'erreur dans l'équation gravitationnelle est corrélé négativement avec l'accord et déterminera une baisse de l'influence de l'accord. C'est pourquoi, dans l'estimation le coefficient de la variable accord tendra à être sous-estimé.

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[14] Piata Romana nr. 6, tel. 00 40 21 319 19 89, e-mail robertsova@yahoo.com
[15] Piata Romana nr. 6, tel. 00 40 21 319 19 89, e-mail anamariasova@yahoo.fr
[16] e-mail violetacimpoeru@yahoo.com
[17] Lawrence (1996)

2. Accord d'intégration de la Roumanie

Les résultats positifs du processus d'association de la Roumanie avec l'UE devront être une conséquence de la libéralisation et le renforcement des échanges commerciaux ainsi que l'assistance financière accordée par l'UE.

D'ailleurs, cet accord représente un élément essentiel de l'intégration de la Roumanie d'un point de vue politique mais aussi économique. L'intégration économique prend la forme d'une zone de libre-échange établie progressivement avec l'UE pour une période de 10 années et l'intégration politique suppose l'adhésion aux valeurs de la démocratie de l'état de droit.

Tous les accords européens présentent une structure similaire et contiennent des clauses concernant la coopération politique, la libre circulation des biens, des travailleurs, des capitaux ainsi que la coopération économique culturelle et financière. Ces accords prévoient également des institutions communes.

Mais l'existence d'un cadre commun et d'une structure n'a pas exclu une approche quelque peu différente selon les pays en ce qui concerne l'association dans les domaines spécifiques tels que la réalisation de la zone de libre-échange, la coopération financière ou les politiques sectorielles.

Au cadre du processus d'intégration, les gains ou les pertes sont liés à l'accord d'association à l'UE, l'assistance financière et l'effort propre pour l'amélioration des performances économiques. D'ailleurs, il est difficile à faire une distinction entre les influences de l'intégration, de transition et globalisation.

Dans le cadre du principe général d'asymétrie qui implique une libéralisation des échanges plus rapide par l'UE que celle appliquée par ses partenaires, le traitement préférentiel offert à chaque pays associé peut revêtir deux formes: soit un calendrier différent de libéralisation selon le pays, soit des mesures spéciales de protection et de subventions dont disposent uniquement les pays membres.

Les périodes de libéralisation des échanges commerciaux bilatéraux avec l'UE différent d'un pays à l'autre. L'Europe Centrale a développé plus rapide une réorientation du commerce vers l'Union Européenne que les pays de l'Est. Donc, l'intensité des échanges a été plus importante pour l'UE et les pays de l'Europe Centrale que pour l'UE et les pays de l'Europe de l'Est.[18]

Compte tenu de ces accords préférentiels nous sommes intéressés d'étudier leur impact, au cadre du processus d'intégration, sur le commerce extérieur de la Roumanie qui peut refléter la spécialisation économique dans le contexte de la nouvelle économie géographique.

3. Evaluation empirique et résultats

Les économies d'intégration favorisent en général le commerce mais la question qui se pose est combien dans le cas de la Roumanie. Nous examinons l'efficacité de la politique commerciale de l'UE de soutien de la Roumanie, plus particulièrement de voir comment les exportations roumaines ont-elles été stimulées dans le sens de création du commerce. Enfin nous mettons en évidence aussi comment les préférences de l'accord semblant-elles stimuler la structure industrielle des exportations de la Roumanie et alors, la tendance de spécialisation. Est-ce que les forces de marché de l'Europe détermineront –elles un processus d'ajustement structurel au cas de la Roumanie?

Les réponses à toutes ces questions seront trouvées dans nos estimations empiriques. Pour l'évaluation empirique nous utilisons la modélisation gravitationnelle sur des données qui proviennent de la base de données CHELEM.

La période prise en étude est de 1990 à 2004, pour un échantillon de 19 pays partenaires d'où quinze pays de l'UE et un seul pays déclarant la Roumanie. Les données sont organisées en panel tridimensionnel.

La spécification retenue est la suivante:

$$Log(X_{ijt}) = a_0 + a_1 log(Y_{it}) + a_2 log(Y_{jt}) + a_3 log(POP_{ijt}) + a_4 log(Dt_{ij}) + a_5 Ac_{ijt} + d_i + d_t + \varepsilon_{ijt} \ (1)$$

Avec $(i = 1,……N; t = 1,…..T)$

ou : X_{ijt} représente les exportations du pays i vers le pays j au temps t avec $i \neq j$, a_o est la constante, Y_{it}, Y_{jt} représentent les tailles du pays i et du pays j au temps t, POP_{ijt} concerne les populations de deux pays , Dt_{ij} représente la distance géographique entre deux pays, une variable proxy pour des coûts de transport, Acc_{ijt} est une variable muette qui est égale à 1 si le pays i et le pays j ont signé l'accord européen, et zéro dans le

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[18] Quatre pays d'Europe Centrale et de l'Est exportaient vers l'UE 72% du valeur totale des exportations des PECO
De ce pourcentage seulement 6% reperesentait les exporations de la Roumanie vers l'UE (1996)

cas contraire, d_i représente les effets fixes de pays (j=1,2,…, M), d_t est l'effet spécifique de temps, ε_{ijt} est le terme d'erreur.

Nous estimons l'équation dans une forme logarithmique pour obtenir une fonction linéaire et les élasticités des variables. Les exportations d'un pays *i* vers un pays *j* au temps *t* sont expliquées par les tailles de marché, les populations, les couts de transaction y compris les couts de transport, et l'existence d'un accord d'association qui est représenté par une variable muette.

Pour éliminer l'hétérogénéité inobservable nous effectuons une estimation avec des effets fixes de pays et de temps pour capter les caractéristiques des pays et les cycles économiques.

Nous effectuons les estimations pour les secteurs qui représentent plus de 15 % du total des exportations roumaines. Donc, on sélectionne le secteur de textiles qui représente 47% (avec la valeur ajoutée faible) et le secteur mecano-électriques qui représente 24% du total des exportations (avec une valeur ajoutée plus grande). Les résultats des estimations sont présentés dans le tableau suivant.

Tableau 1. Résultats des estimations

VARIABLES	Textiles		Mecano-électriques	
	(1)	(2)	(3)	(4)
	XIJ	XIJ	XIJ	XIJ
Y_{it}	1.614	4.994	-1.906	2.225
	(1.82)*	(5.10)***	(9.45)***	(3.21)***
Y_{jt}	1.225	0.843	1.049	3.645
	(21.13)***	(10.33)***	(14.31)***	(21.98)***
POP_{ijt}	- 1.811	- 1.844	- 2.662	- 0.286
	(5.80)***	(6.90)***	(9.70)***	(0.91)
DT_{ij}	-1.197	-0.706	-1.886	-8.452
	(12.27)***	(5.63)***	(15.90)***	(23.13)***
Acc_{ijt}	0.563	0.286	0.130	0.137
	(9.75)***	(4.20)***	(1.73)*	(2.21)**
d_i		***		***
d_t		***		***
Constant	-17.662	-34.897	-11.45	-3.831
	(3.90)***	(7.31)***	(3.26)***	(-1.93)*
Observations	285	285	285	285
R-squared	0.74	0.90	0.82	0.94
VIF	1.32	2.08	1.32	2.08
Ramsey-Reset Prob>Chi2	35.39 (0.00)	7.57 (0.00)	30.58 (0.00)	2.97 (0.03)
Breusch-Pagan / Cook-Weisberg - Prob>Chi2 (avant corection)	220.68 (0.00)	35.06 (0.00)	109.15 (0.00)	108.49 (0.00)
t statistics in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Même si nous avons obtenu une influence positive de l'accord sur les exportations, l'impact est différent pour les deux secteurs. Pour des produits avec degré inferieur de fabrication la variable de l'accord a un coefficient en valeur de 0,29 (t=4.20) et pour les produits avec un haut degré de fabrication a une valeur de 0.14 (t=2.21). Suivant les résultats, l'accord d'association a été un facteur qui a dynamisé les exportations mais avec un impact plus important sur des produits intensifs en travail avec une valeur ajoutée faible et un impact modéré sur les produits intensifs en capital ayant une valeur ajoutée plus grande.

Toutes les variables sont significatives et elles ont le signe théorique attendu. En effet l'estimation de l'équation de gravité montre que l'introduction des effets fixes améliore la performance du modèle. La qualité de l'équation est bonne, R^2 prend des valeurs entre 0.90-0.94 et aucun problème de multicolinéarité ne vient pas perturber les modélisations.

4. Conclusions

Les observations au-dessus nous conduisent à la conclusion que le relancement de la production industrielle n'a pas été accompagné par des changements des structures conformément aux tendances

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européens mais plutôt d'une conjoncture favorable de marché dans les secteurs traditionnels de l'industrie roumaine.

La rigidité structurelle de l'industrie est encore maintenue, en constituant un point critique important pour les échanges roumains, cela parce qu'on connait que sur le plan mondial il y a la tendance de développer les secteurs de haute technologie, de moyens de transport, des équipements de ligne technologique. Les résultats empiriques pour la période analysée nous montrent que les segments des exportations roumains sont dominés par des industries intensives en travail.

La dynamique réduite de la modification structurelle de l'industrie Roumanie et donc, de l'offre des exportations est déterminé aussi des décalages enregistrés entre la Roumanie et l'UE.

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THE PUBLISHING AND RESEARCH ACTIVITY DOCUMENT MANAGEMENT SYSTEM

Tănăsescu Ana
Petroleum and Gas University of Ploieşti, atanasescuro@yahoo.com

Pătraşcu Aurelia
Petroleum and Gas University of Ploieşti, patrascuaura@yahoo.com

Abstract

The authors present in this paper a document management system for the publishing and research activity of a faculty, describing, first, briefly, the Caché postrelational database management system, the defined classes and, finally, the system web interface.

Key words: document management system, document management, object oriented model, postrelational database management system

Introduction

The university intellectual capital is materialized in documents (books, articles, research contracts, patents, scientific communications etc.). If in the past these documents had represented simple *piece of papers*, nowadays they are, increasingly, regarded as *electronic documents.*

Document management systems are software applications that capture paper and electronic documents and provide the storage, retrieval, security and archiving of those documents [6].

They are, also, known in the literature as *automated document management systems* [1, 3, 4].

The authors present in this paper a document management system for the publishing and research activity of a faculty.

The database management system (DBMS) used at the document management system (DMS) designing is Caché, a postrelational DBMS created by the InterSystems Corporation that joins the object oriented model with the relational model [2, 5, 7-9].

The paper describes, briefly, the Caché postrelational DBMS, the classes that were defined by the authors, and finally, the system web interface.

The Caché postrelational DBMS

The Caché postrelational DBMS provides to the professional developers the needed characteristics to quickly create the web and client/server applications [7-9].

Caché object oriented model (OOM) adheres to the ODMG Standard elaborated by the Object Data Management Group. The basic operations for Caché OOM are based on object classes (which are defined in Caché ObjectScript language in the visual development environment for creating object oriented database, Caché Studio, or directly in Class Definition Language (CDL)) and the subsequent compilation of these as runtime executables [2].

Caché does include a full-blown object oriented model and can interface with the commercial object modeling tools like Rational Rose. All three Caché's data access modes (Objects, SQL and multidimensional access) work directly with the Caché data. There are no data layers of processing to slow performance.

In addition to the modern object technology characteristics (inheritance, polymorphism, persistency and encapsulation), the Caché OOM has the following features [2]:

- Classes are determined by class definitions stored in the class directory.
- The basic elements are objects and literals (data types).
- Classes can contain properties. Properties can be literals, references to objects, embedded objects, collections of these, or relationships between persistent objects.
- Classes can contain methods defining operations that can be executed for a specific object or an object class.

Caché provides a multidimensional data structures that can store information in complex structures. The outcome of this is reducing the data access and programming time.

Classes' presentation

There are two categories of classes in the Caché postrelational DBMS [2]: *data type classes* and *object classes*.

Data type classes represent literals such as strings, integers and other data types defined by the user. These are special classes that define and maintain literal values. Unlike object classes, data types have no independent identity and cannot be instantiated.

Object classes contain objects and define the data structure and the objects behavior of a certain type. These classes can be divided in two categories: *registered classes* and *non-registered classes*.

The non-registered classes do not provide their own behavior, so that the developer must create all methods. In contrast to these, *the registered classes* have a comprehensive set of built-in functions and can be further subdivided into *embeddable classes* and *persistent classes*.

At the DMS designing the authors have defined in the ***gestiune*** package 18 object classes (figure 1): 17 persistent object classes and an embeddable object class, Adresa.

For instance, the Personal persistent object class contains beside *literals* (Marca and Nrtelefon whose type is Integer; Nume, Prenume, Grad, Funcție, Email whose type is String; Doctor and Conducdoc whose type is Boolean; Datanasterii whose type is Date), *an embedded object*, Adresa, that references the *embeddable object class,* Adresa and a *one to many* relationship with the object persistent class, Catedra.

The classes, also, include methods automated attached by Caché and queries that are called in the csp files (files with .csp file extension).

Thereafter, the authors present a fragment from the Personal class code defined in the Caché ObjectScript language using the Caché Studio tool.

Class Gestiune.Personal Extends %Persistent [ClassType = persistent, ProcedureBlock]

{

Property Marca As %Library.Integer [Required];

Property Nume As %String(MAXLEN = 20) [Required];

Property Prenume As %String(MAXLEN = 40) [Required];

Property Grad As %String(VALUELIST = ",Profesor,Conferentiar,Lector,Sef lucr,Asistent,Preparator,Colaborator");

Property Doctor As %Library.Boolean [InitialExpression = 0];

Adresa	Autoricarti	Carti	Edituri	Adresa
Strada Numar Oras	*Autorcarte* *Titlucarte* Rangautor	Titlu *Editura* An Nrpagini ISBN	Nume *Adresa* Tipeditura *Carti*	Strada Numar Oras

referire — n — 1 — referire

Personal	Autoriartrev	Articolerev	Articolevolum	Reviste
Marca Nume Prenume Grad Doctor Functie *Adresa* Email Nrtelefon Datanasterii Conducdoc *Catedra*	*Autorartrev* *Titluart* Rangautor	Titlu *Revista* Volum Numar An Pgi Pgf ISSN	Titlu *Conferinta* An Pgi Pgf ISSN ISBN	Nume Seria Tiprevista *Articolerev*

referire — referire — n — n — 1

	Autoriartvol			Conferinte
	Autorartvol *Titluart* Rangautor			Nume Tipconferinta Localitate Tara *Articolevolum*

referire — 1

Catedre	Cercetatori	Contracte	Brevete	Sesiunistiintifice
Denumire Descriere Telefon Centrucercetare *Membrii*	*Cercetator* *Contract* Calitate	Denumire Numar Datainit Datafin Suma Beneficiar Tip	Numarinreg Denumire	Nume Localitate Tara *Participanti*

referire

Figure 1. The ... asses.

Inventatori	Participanti
Numeinv *Numebrevet* Ranginv	*Numeparticipant* *Sesiunestiintifica*

referire — referire — 1 — n

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Property Adresa As Gestiune.Adresa;

Property Datanasterii As %Library.Date(FORMAT = 4, MAXVAL = "$Horolog");

Relationship Catedra As Gestiune.Catedre [Cardinality = one, Inverse = Membrii];

Index MarcaIndex On Marca;

Index NumeIndex On Nume;

Index PrenumeIndex On Prenume;

Index CatedraIndex On Catedra;

Query Persoane1(P1 As %Library.String) As %SQLQuery(CONTAINID = 1)

{

SELECT %ID, Marca, Nume, Prenume, Datanasterii, Grad, Functie, Doctor, Conducdoc, Adresa_Strada, Adresa_Numar,Adresa_Oras, Adresa_Tara ,Nrtelefon, Email

FROM Personal

WHERE (%ID = :P1)

}}

The web interface's presentation

The DMS web interface was created using Caché Server Pages (CSP), a set of flexible technologies, that allows professional programmers to build high-performance, highly-scalable web applications [2, 7-9].

The dynamic web pages (csp files or CSP pages) consist of standard HTML or XML, so they can be created and modified using any text editor or off-the-shelf web page creation tool (Macromedia Dreamweaver, Microsoft Frontpage) [8].

The Gestiune web application contains 45 CSP pages that can be used *to add* new elements in the application; *to display* the faculty departments, the members of each department and a detailed CV of some selected member and *to search* the books, the published articles, the research contracts, the patents or the scientific communication sessions that the person joined depend on the his/her mark and, optional, on the his/her degree or quality.

The application first page, called home.csp (figure 2), is the page that connects with the other CSP pages. This page, also, includes three frames: titlu.csp, meniu.csp and index.csp.

When the AFISARE option it is chosen by the user it is opened in the mainframe the Afiscatedre.csp page that contains information about the existing faculty departments and provides a link to the Afispersonal.csp page.

At the page building it was used a table with one row and two columns. The first column displays the information about the departments while the second contains the picture that represents the link to the next page.

The departments information are displayed in this page using the <csp: query> tag that allows using in the web page the output of the Catedre query defined in the Catedre class.

Another Caché special tag is <csp: while> that allows displaying the information about all the departments. The page source code is:

```
<html><head><title>Catedrele facultatii de Stiinte Economice</title></head>

<body>

<div align="center"><h1 class="style1"><marquee behavior="alternate">Catedrele Facultatii de Stiinte Economice  </marquee></h1></div>

<csp:QUERY NAME="ListaCat" CLASSNAME="Gestiune.Catedre" QUERYNAME="Catedre">

<table width="90%" border="0" cellspacing="2" cellpadding="0">

<csp:while Condition="ListaCat.Next()">

<tr>

  <td><p><font size="+2"><strong>#(ListaCat.Get("Denumire"))#</strong></font></p>

      <p>#(ListaCat.Get("Descriere"))#</p>

      <p><strong>Telefon</strong>#(ListaCat.Get("Telefon"))#

       <strong>Centru de cercetare </strong>#(ListaCat.Get("Centrucercetare"))#</p>
```

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```
        <p></p><p></p>
      </td>
      <td><div align="right">
        <a href="Afispersonal.csp?CatedreID=#(ListaCat.Get("ID"))#">
        <img src="Sigla4.jpg" width="109" height="107" border="0" /></a></div></td>
</tr></csp:while></table></body></html>
```


Figure 2. The home.csp page.

If the user clicks on the picture that is right beside a certain department it is opened the Afispersonal.csp page that displays the department members sort on the Grad property and provides a link to the Afispersonaldetalii.csp page for viewing a certain person adequate CV.

The page contains a table with two rows and seven columns in which are introduced, using the <csp: query> and <csp: while> Caché tags, the outputs of the Persoane query with parameter, query defined in the Personal class. The parameter is represented by the department ID retrieved using the Data property of the %request object. In this page the authors, also, have used two special Caché tags <csp: class> (to encode the data in URLs) and <csp: object> (to define the Catedra object whose ID it is known and to use its properties values). Further, it is presented a sequence of the page source code:

```
<html><head><title>Membrii catedrei</title></head>

<body>

<CSP:CLASS SUPER="%CSP.Page" PRIVATE="0" ENCODED="1">

<csp:QUERY   NAME="ListaPers"   CLASSNAME="Gestiune.Personal"   QUERYNAME="Persoane"
P1='#($Get(%request.Data("CatedreID",1)))#'>

<CSP:OBJECT              NAME="Catedra"              CLASSNAME="Gestiune.Catedre"
OBJID=#($Get(%request.Data("CatedreID",1)))#>

<div align="center"> Membrii catedrei #(Catedra.Denumire)# </div><br />

<table width="100%" border="0" cellspacing="2" cellpadding="0">

    ...

<csp:while Condition="ListaPers.Next()">

<tr ><td><div align="center" >

    <a href="Afispersonaldetalii.csp?PersonalID=#(ListaPers.Get("ID"))#">
```

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```
        #(ListaPers.Get("Marca"))#</a></div>        </td>
    <td><div align="center" ">#(ListaPers.Get("Grad"))#</div></td>

    ...
</csp:while></table></body></html>
```

Conclusions

The publishing and research activity DMS allows information updating in real time and querying regarding these activities.

The advantage of using the Caché DBMS consists in web applications quickly developing. The components of these applications can be reused so that programmers can work with familiar tools.

The system can be improved by adding new classes and extending to the entire university.

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QUANTITATIVE METHODS USED IN THE ANALYSIS OF A KNOWLEDGE-BASED ECONOMY

Titan Emilia
Surcel Traian
Todose Daniela
Emilia_titan@yahoo.com

Abstract:

During the European Council Reunion in Lisbon, in March 2000, it has been established an ambitious goal: that Europe must become, in 10 years at most, the most competitive knowledge-based economy, the action-plan for reaching this objective having three main elements: informational society, the education and the research.

In this paper we present some of the statistical methods and informatic solutions for analyzing a knowledge-based economy, using non-parametric statistical tests, in order to reveal the dimension of research-development activity in European countries.

Keywords: knowledge-based economy, knowledge management, research-development activity, non-parametric test, R&D personnel, R&D expenditure.

The knowledge economy and the knowledge management

The international cooperation in scientific field between the European Union member countries and the non-member countries has more and more significance (the "European Research Area" concept). This is a way of solving major problems, through intensifying the common efforts, in research activity. These ample projects will be financed, in order to increase the competitivity of European economy, creating real research networks.

It is obvious that mankind is on its way between a technology-based era and a knowledge-based era; it has been created the "knowledge-based society" concept and the "knowledge-based economy" concept. The knowledge based era has the following characteristics:

- the intensive technology developments;
- technologies became more and more accessible;
- the spectacular increasing of the performance/price ratio, in information technology and communication domain;
- technology is based on science in a greater proportion;
- integration of the research-development activity in education, training activities and in technology-innovation transfer activities;
- the limitation of the science-development and utilization caused by the insufficiency of the human resources.

Despite the ambiguity associated with the concept of the Knowledge Economy (KE), a working definition provides some insights into its Human Resources Development dimensions. The definition provided by APEC Human Resources Development Working Group is:

"The Knowledge Economy is that strategic combination of organizational changes, policy, settings and capacity building based on the innovation and creativity promoted by expanded international trade and global networked information technologies, which achieves sustainable economic growth and social wellbeing."

The intention of this definition is to encompass five interrelated features of the Knowledge Economy, beyond the technical dimensions of Information and Communication Technology (ICT):

- The organizational changes, particularly in management thinking and work organization that follow the adoption of advanced technologies.
- The capacity building required to equip people to respond effectively to these technologies. People must have the capacity to manage the KE.
- Human resources development in relation to the KE, is a strategic issue, extending far beyond training and education provision.
- The significance of policymaking and implementation in supporting the introduction of these technologies (particularly in relation to fiscal policy and trade and investment openness).
- The relationship between economic growth and social welfare that emerges in the KE.

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In the Knowledge Economy, the *Knowledge Management* became more and more popular in the practices of private and public organizations, as long as it is capable to manage the risks in the new technological and economical context.

The economy became more and more immaterial. In an organizational context, data represents facts or values of results, and relations between data and other relations have the capacity to represent information. Patterns of relations of data and information and other patterns have the capacity to represent knowledge. For the representation to be of any utility it must be understood, and when understood the representation is information or knowledge to the one that understands. The following associations can be made:

 – **Information** relates to description, definition, or perspective and entails an understanding of the relations between data (*what, who, when, where*).
 – **Knowledge** comprises strategy, practice, method, or approach and embodies both a consistency and completeness of relations which, to an extent, creates its own context (*how*).
 – **Wisdom** embodies principle, insight, moral, or archetype and arises when one understands the foundational principles responsible for the patterns representing knowledge being what they are (*why*).
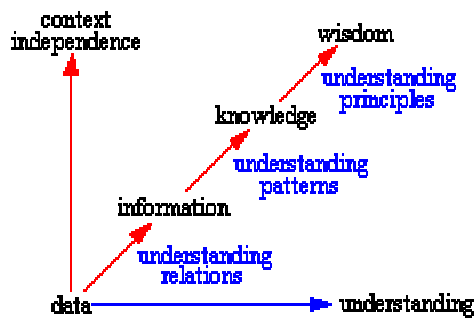

Figure 1 – Knowledge economy

In an organizational context, data represents facts or values of results, and relations between data and other relations have the capacity to represent information. Patterns of relations of data and information and other patterns have the capacity to represent knowledge. For the representation to be of any utility it must be understood, and when understood the representation is information or knowledge to the one that understands. Yet, what is the real value of information and knowledge, and what does it mean to manage it?

Resolving non-parametric tests with software statistical product STATISTICA for Windows

We present several statistical techniques and their applications with software statistical product STATISTICA for Windows, tests that may be used as alternatives to parametric tests, when the variables are measured on an ordinal, interval or ratio scale, and the assumption of normality is questionable. These tests can be used instead of Student's t-ratio.

STATISTICA is a true powerful analytics platform with more than two decades of history in delivering successful business results, a global user base of more than 600.000 users. STATISTICA Data Analysis Software Product provides the most comprehensive array of data analysis, data management, data visualization and data mining procedures. Its techniques include the widest selection of predictive modeling, clustering, classifications and exploratory techniques in one software platform.

 a. ***Mann-Whitney U Test procedure*** provides a powerful nonparametric statistical method for independent two-group designs. It is commonly used when we wish to avoid the assumptions regarding the normal distribution of the populations and that the standard deviations are equal.

We consider two groups of European Union member countries: the older E.U. member countries and the recent E.U. member countries. The data we are analyzing refer to the proportion of the employment in the research-development (R&D) activity in the total labour-force (%). We test if the population distributions from which the two samples were drawn are the same.

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Proportion of research-development (R&D) personnel of the labour force: R&D personnel include all persons employed directly on R&D sector, plus persons supplying direct services to R&D, such as managers, administrative staff and office staff. Head count data measure the total number of R&D personnel who are mainly or partly employed on R&D. R&D personnel in head-count are expressed as a percentage of the labour force (comprises of population aged 15 and over who are employed or unemployed but not inactive). The calculated Mann-Whitney test value, computed with STATISTICA for Windows is U=12, which means that, for a significance level of p<0,001 the two groups of European Union member countries have a significant different average proportions of the R&D personnel in the total labour-force.

Mann-Whitney U Test (mu.sta)					
Continue...	By variable STATUS Group 1: 101–Old Group 2: 103–New				
variable	Rank Sum Old	Rank Sum New	U	Z	p-level
RD_PERS	209,0000	67,00000	12,00000	3,286921	,001014

b. ***Spearman's and Kendall's Rank Correlation Coefficients*** provides a procedure for studying if there exist an association between two variables measured on an ordinal, interval or ratio scale and which are not normally distributed. The two variables we selected are: the share of R&D personnel in total labor force and the percentage of R&D expenditures in GDP.

Proportion of R&D expenditure in GDP: R&D expenditure include all expenditures for R&D performed within the business enterprise sector on the national territory during a given period, regardless of the source of funds. They are shown as a percentage of Gross Domestic Product (GDP).

Applying the STATISTICA product we found a Spearman's Rank Correlation Coefficient of 0,926 and a Kendall's Rank Correlation Coefficient of 0,788, which allow us to conclude that there is a rather strong direct dependence between the two variables included in the study.

Spearman Rank Order Correlations (spearman.sta)					
Continue...	MD pairwise deleted				
Pair of Variables	Valid N	Spearman R	t(N-2)	p-level	
%RD_PERS & %RD_EXP	24	,926288	11,52999	,000000	

Kendall Tau Correlations (spearman.sta)					
Continue...	MD pairwise deleted				
Pair of Variables	Valid N	Kendall Tau	Z	p-level	
%RD_PERS & %RD_EXP	24	,787660	5,392333	,000000	

c. χ^2 ***test procedure*** provides a classification of variables on various categories and computes the χ^2 test value. The procedure compares the observed frequencies with the expected, theoretical frequencies, for each category, in order to test if all categories contain the same proportion values or each category contains a certain user specified proportion value. To be specific, we tested if there is a significant difference between the average proportion of R&D expenditures in GDP, for European countries with different status (in relation with European Union: old E.U. member

countries, new E.U. member states, non-E.U. member states, candidate E.U. member states). In order to respond to this question, we grouped the European countries after two variables: one categorical (nominal) variable: country status in relation with European Union and the other, a numerical variable: the percentage of R&D expenditure in GDP. The data consists of frequency counts, that are placed in a 4x4 table (table no. 1 – observed frequencies and table no. 2 – expected frequencies):

Table no. 1 Observed frequencies

Country status	Percentage of R&D expenditures in GDP (%)				Total
	0-1	1-2	2-3	3-4	
Old E.U. member states	2	7	4	2	15
New E.U. member states	8	2	-	-	10
E.U. candidates countries	3	1	-	-	4
Non-E.U. member countries	-	1	1	1	3
Total	13	11	5	3	32

Table no. 2 Expected frequencies

Country status	Percentage of R&D expenditures in GDP (%)			
	0-1	1-2	2-3	3-4
Old E.U. member states	6,09	5,16	2,34	1,41
New E.U. member states	4,06	3,44	1,56	0,94
E.U. candidates countries	1,62	1,38	0,63	0,38
Non-E.U. member countries	1,22	1,03	0,47	0,28

The computed χ^2 test value is 19,225, so we can conclude that the proportion of the R&D expenditures in GDP depends on the European country status, for a significance level p<0,2038.

Computed Pearson's Contingency Coefficient value is:

$$CC = \frac{\sqrt{\dfrac{\chi^2_{comp}}{N + \chi^2_{comp}}}}{\sqrt{\dfrac{L-1}{L}}} = 0,69 \tag{1}$$

Where χ^2_{comp} is the computed χ^2 test value, obtained from analysis, N is the total number of observations in the RxC table, and L is the smaller value of R or C. We found the Pearson's Contingency Coefficient value 0,69, which means that there is a medium-intensity association between the proportion of the R&D expenditures in GDP and the European country status.

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DATA SECURITY IN BANKING INFORMATICS SYSTEM

Țarcă Naiana

University of Oradea, str. Universității nr.1, cod: 410087, 0259408796, ntarca@uoradea.ro

Abstract. A great role inside the banking informatics system is given to the security policy, having an important role in the assurance of the information integrity and confidentiality. Data security assurance implies access to the information only for the authorized users, protection against message tampering, identification of the person that currently communicates and the type of access granted, messages authenticity assurance. To assure the network security, the following issues are implemented: block access procedures at the network level, security policies at the resource access level through operating systems applications, data codification techniques to insure data transportation through the network without the possibility of being intercepted and read by unauthorized receptors, specific mechanisms at the physical level. Banking informatics system assures secured access to: internal resources (databases, e-mail servers) and external resources (national interbanking communication network, SWIFT network, REUTERS network, INTERNET). To insure secure access, in informatics system three zones are delimited: private zone which assures secure access inside bank's private network; demilitarized zone which assures controlled access from other networks; unsecured zone which assures the Internet access.

Keywords: virtual private network, backup, disaster recovery center

1. Introduction

The evolution of the bank activities informatics has been strong marked by the Romania transit toward market economy.

Before 1989 few specialized banks existed, and their data were processed at the territorial computing centers. Nowadays a significant number of banks exist; they have units spread all over the country and their data are processed inside their own informatics departments.

The newest concurrently conditions, which exists after 1989 and massive penetration of personal computers on Romanian market conducted towards the forsaken of data processing inside computation territorial centers and toward the creation inside banking societies of specialized compartments to realize this task.

Informatics system is a main component of every banking society. It assures the processing (recording, processing, outputting, data holding and controlling) and transmission of the information needed for a good banking activity, quick and safety access to these information.

A bank informatics system is conceived in such a manner that it has to be able to automate the highest possible set of current operations and to assure tactic, strategic and operational information needed for decisional process. It has the following components:

- human resources, which includes both the users and the specialists
- hardware components, which includes all the equipments: servers, workstations, printers and equipments for data transmitting-receiving: routers, hubs, switches, modems, cables, etc.
- software components, such as operating systems, informatics applications, etc.
- data, organized in databases. These, after operations such recording, data holding, processing, analyzing, are used for daily operations but also as decisional elements in managerial strategy.

A great role inside the banking informatics system is given to:

- the security policy, having an important role in the assurance of the information integrity and confidentiality
- real-time operation of data between bank locations
- assurance of continuity in function
- assurance of the connectivity between the factors implied in banking activities.

2. Banking informatics system – data security assurance

In the first phase of personal calculator use in banking activity, they were used as standalone computers, on which specific software was running (such as accounting computers, accrediting computers, etc). Data transfers between computers were made through external memory devices, such as diskettes.

The next step was the use of the banking informatics systems having local connectivity, based on local networks.

Local connectivity offers a series of advantages, among which we mention:

- data are introduced in the database at the moment and at the place where it occurs – the bank counters, the functional compartments
- the front-office operations are quicker and more flexible
- deposit and cash refund operations have mainly a front-office character
- decisional factors have on-line access to the decision underlying information
- credit inspectors have access to the latest data regarding financial state of the credit applicant
- balances, account card, statements are instantly attained, based on transactions operated at the counters.

Local connectivity improves the operations which do not imply interaction with external banking system. Unfortunately, at this moment, the majority of banking activities suppose this kind of interaction. Thus, banking informatics systems with global connectivity became necessary, based on wide area network, which interconnects local networks of the banking unities.

Banking informatics systems assures the transmission, data holding and processing of the entire information of the banks assuring the integrity and confidentiality of the data. They are based on the client/server technology, each client using a graphical interface, having associated a connecting protocol to the database and specific rights associated to the stored procedures.

Depending on the functional and development strategy of a certain bank, it can use either an informatics system with a central database or an informatics system that uses a distributed database. No matter whether it is centralized or distributed, the database keeps all the information regarding the clients, their accounts, products and operations of that bank.

The central database assumes that both the main office and local offices of a bank uses a single database. This database contains all clients' data, accounts, operations, bank products, etc.

Among the use of a central database advantages it can be mentioned:

- unique administration, at the main office location; it doesn't need administration at the local offices
- database querying is quick and easy
- aggregate data access is very quickly.

Among disadvantages a high grade of investment is needed for:

- main server, which has to assure the continuity in duty in case of hardware errors
- communication system. It needs terrestrial lines, doubled through radio back-up. The bandwidth needs to assure the whole traffic generated by the user connection to the database.

The use of the distributed database assures the independence of the local offices in function. If a communication breakdown occurs or in case of temporarily out of order of the central server, the local offices activity is not affected.

Among disadvantages, it can be mentioned:

- local administration of the database
- slow access at the time of parallel queries which uses more local offices databases.

Electronic processing of the data and their transmission using networks needs a special attention on bank part regarding security issues.

Network security issues deals with:

- access to the information only for the authorized users, and totally access denied to unauthorized users
- protection against message tampering
- identification of the person that currently communicates and the type of access granted
- messages authenticity assurance.

To assure the network security, the following issues are implemented:

- block access procedures at the network level (firewall, intrusions detection system)
- security policies at the resource access level (servers, workstations, e-mail, web) through operating systems applications such as the Microsoft® Windows 2000 Active Directory
- data codification techniques to insure data transportation through the network without the possibility of being intercepted and read by unauthorized receptors
- specific mechanisms at the physical level (physical protection of the transmission lines) which generally is very expensive and difficult to achieve.

2.1. Secured access in distributed database informatics system

The distributed database of the banking informatics system assures secured access to:

- internal resources – databases, e-mail servers
- external resources:
  o national interbanking communication network, which is a private network which allows communications between Romanian banks, BNR for reports and also the access to the Automat Clearing House component of the Electronic Payment System
  o international interbanking communications networks: SWIFT (Society for Worldwide Interbank Financial Telecommunication), through which huge amount of money are transferred between banks throughout the world; REUTERS network, which allows online access to the financial data and information, and also the access to the dealing applications used in interbanking operations; INTERNET

To insure secure access, in informatics system three zones are delimited (figure1):
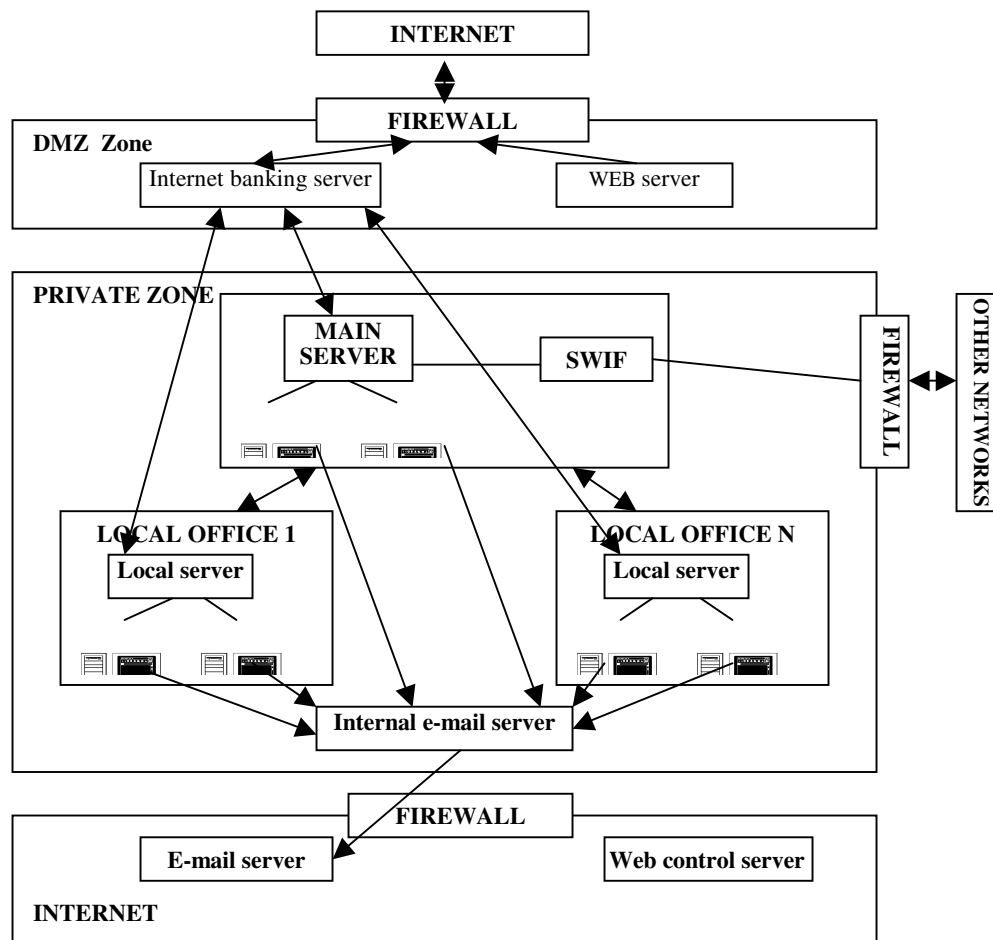

Figure 1. Distributed database of the informatics system structure

- private zone (VPN – virtual private network) includes the main server, local servers, internal e-mail service and assures secure access inside bank's private network
- demilitarized zone (DMZ ZONE) – includes the WEB server, Internet banking server and assures controlled access from other networks
- unsecured zone – includes WEB control server, e-mail server and assures the Internet access.

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2.2. SWIFT net data transmission security

Regarding SWIFT net, through which all around world banks are able to make electronic operations using standard messages, information transmission security is a priority. Thus banks have separate departments for this service with dedicated software and hardware structure in which the same strictly security policy is respected throughout the world. As a fact, SWIFT network assures:

- data confidentiality, guaranteed by the messages authentication and coding procedures
- short time for the message transmission
- massages archiving in special centers at specific locations in different parts of the world, so this way the loose of a message is practically impossible; copies of the message can be received at any moment by the members of the net. Through these huge backup centers SWIFT system assures also the DISASTER RECOVERY CENTER needed by the nowadays banking system and imposed by globalization, but only for international transfers.

2.3. Disaster recovery centers

Together with the Electronic Payment System, Disaster Recovery Centers became compulsory n Romania.

These centers are situated at long distances from the bank central office, usually in other geographical zone, strategy through which the risk of data losses through natural disasters (especially earthquakes in our country) or major incidents (fire, terrorist attacks) is minimized. The most of the banks in our country have a Disaster Recovery Center placed in zones with low natural calamities risks.

Disaster Recovery Center assumes a great investment effort for banking societies because they need to be fitted with hardware and software components able to assume in a short period of time all the affected bank activities. For such events, data regarding clients and transactions are continuously updated in these backup structures.

The most suitable are mirrored informatics systems capable to quickly assume the affected basis infrastructure and substitute them. Even though it is considered that such an investment does not double the informatics network costs of a bank, the costs for hardware increases with approx. 80%.

3. Conclusions

Information security in a banking informatics system assumes the following priorities:

- resources integrity, which means their availability, regardless hardware or software defects, or illegal information abstraction or information modifying attempts
- database access control

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SOLUTIONS USED TO CREATE LOYAL CLIENTS - CRM SOFTWARE

Țarcă Naiana

University of Oradea, str. Universității nr.1, cod: 410087, 0259408796, ntarca@uoradea.ro

Abstract. Spread of the Internet over the world increases the decisional power of the buyers. Through mouse clicks buyers chooses their products and implicitly the producer. In these conditions is more difficult for a company to attract new buyers and keep the elder ones. They must orient toward solutions that assures long relationships with customers to make them loyal. Thus, Costumer Relationship Management offers a complex system of methodologies strategies and software applications in order to help the company in organizing and efficient administration of its relations with customers.

Keywords: CRM technology, client satisfaction, loyal clients

1. Introduction

The principles on which relational management relies are old; they were applied for a long period of time on small business.

In spite of that customer relationship management (CRM) became popular only at the middle of the 90's. And this is because the early 90's brought major changes of the way in which the companies approach the market.

Because the globalization of the world economy, companies have been constrained to find new market places for their products, in competition with other companies, in a wide area of cultures and economic media. Free market, the activities diversification, the globalization of the ways used to gratify the needs, have simulated an exacerbate raise of the competition. A lot of companies have oriented themselves toward the manufacture of their own products all over the world, and in the meantime they changed their structure in such a manner that their products should be sold all over the world.

Quick changes of the companies' environment bring pressure on them. As a fact fundamental changes were made in the structure and the activity of the companies. They were forced to move from an approach based on product to an approach centered on client.

Customer relationship management is based right on the idea of situating the client in the center of the company's culture and activity. It assumes a long-term relationship with client, fated to assure high profits and competitive advantages to the company. From the classical 4P (price, product, promotion, place) a move toward 3C (customer value, customer satisfaction, customer loyalty) takes place.

As the quality of products and services increases similar offers are more difficult to be differentiate. Is more difficult for a buyer to distinguish between let's say two marks of soap for example. Meantime the expectations and the claims of the clients constantly increase.

Certain companies during time fought to create brands based on high quality and low prices for their products. What has changed was the impact of the decisional power of the client on company sales.

Apparition and spread of the Internet over the world increases the decisional power of the buyers. Through mouse clicks buyers chooses their products and implicitly the producer.

In these conditions is more difficult for a company to attract new buyers and keep the elder ones. They must orient toward solutions that assures long relationships with customers to make them loyal.

Thus, Costumer Relationship Management offers a complex system of methodologies strategies and software applications in order to help the company in organizing and efficient administration of its relations with customers.

2. CRM software solutions

According to recent studies, middle size companies looses yearly between 20% and 50% of their clients. Meantime it has been turned out that maintaining an old client is less expensive than to attract a new one.

In these conditions more companies take into consideration the possibility of CRM software integration in their activity.

According to a study conducted by Conference Board regarding the implementation of the CRM solutions in 96 companies, 52% of them already uses CRM type software[6].

The most frequent motivations were (figure 1):
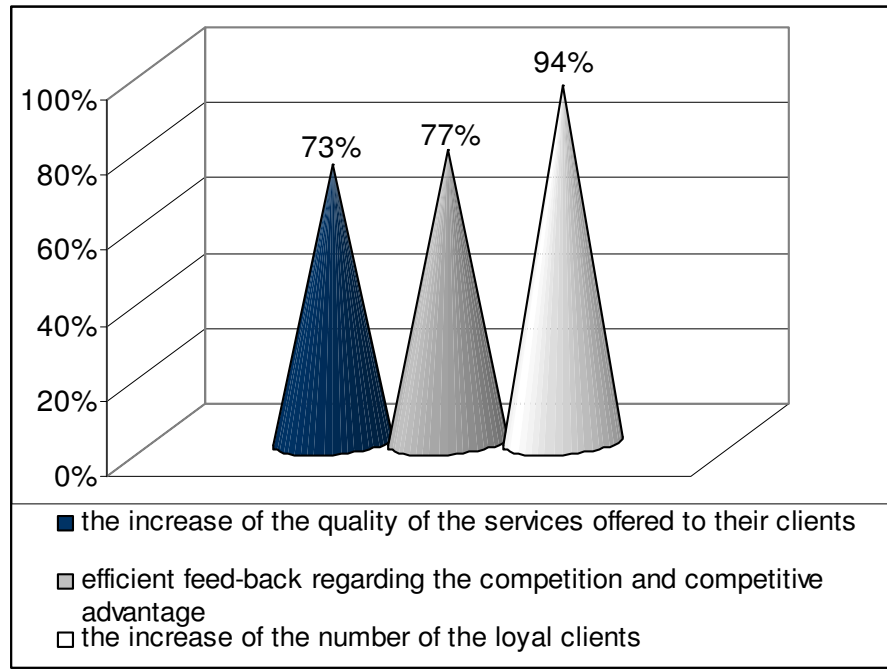
Figure 1. The top three strategic motives

- the increase of the number of the loyal clients;
- efficient feed-back regarding the competition and competitive advantage regarding concurrence;
- the increase of the quality of the services offered to their clients;

CRM software solutions evolved from an older technology - Computer Integrated Telephony. According to this technology after a phone call, a computer monitor offers a personalized message. This way attention was accorded to the clients, making him to feel important.

CRM application market boomed in recent past time and has a wide variety.

The common point of all application is the fact that the client remarks that he is individually treated, with consideration, and all wishes, expectations and dissatisfactions regarding offered products and services. "The most important thing is that the client remarks that he is treated with consideration, his problems are known and sometimes he is redirected to the same operator, thus creating an almost personal relationship". This operator should be perceived as a close person if for example client's birth date and zodiac, details about family, children or photo are screened on the monitor during conversation [1].

In the meantime, any of the CRM applications assure:

- communication support;
- marketing opportunities identification
- correct sale strategy selection
- collected information analysis and correct tactical decisions regarding the customer relationship improvement
- clients needs, expectations and wishes gratification in post sale activities
- global vision of the whole business

3. Company-client interaction through websites

CRM software uses the databases potential and is based on the Internet. Thus it facilitates the interaction with clients through the speediest and most efficient communication media – the Internet (figure 2)[6].

An increasing number of companies use websites, so that the Internet begins to capture the managerial thoughts interest. A website is important for a company activity, because:

- It permits the clients and potential customers to achieve information about the company activity and to permanently interact with it;

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- It permits data collection about the site visitors (name, e-mails, preferences, etc), in order to transform them in clients;
- It permits data collection about the company's clients in order to create a database. This database is useful to a better understanding of the client in order to make him loyal to the company;
- It permits the creation of client services specific problems database

The infrastructure provided by the Internet offers the companies the possibility to communicate with their clients in the same manner they communicate through phone or fax.

The technologies and applications specific to the Internet offer new communication methods and cooperation with clients.
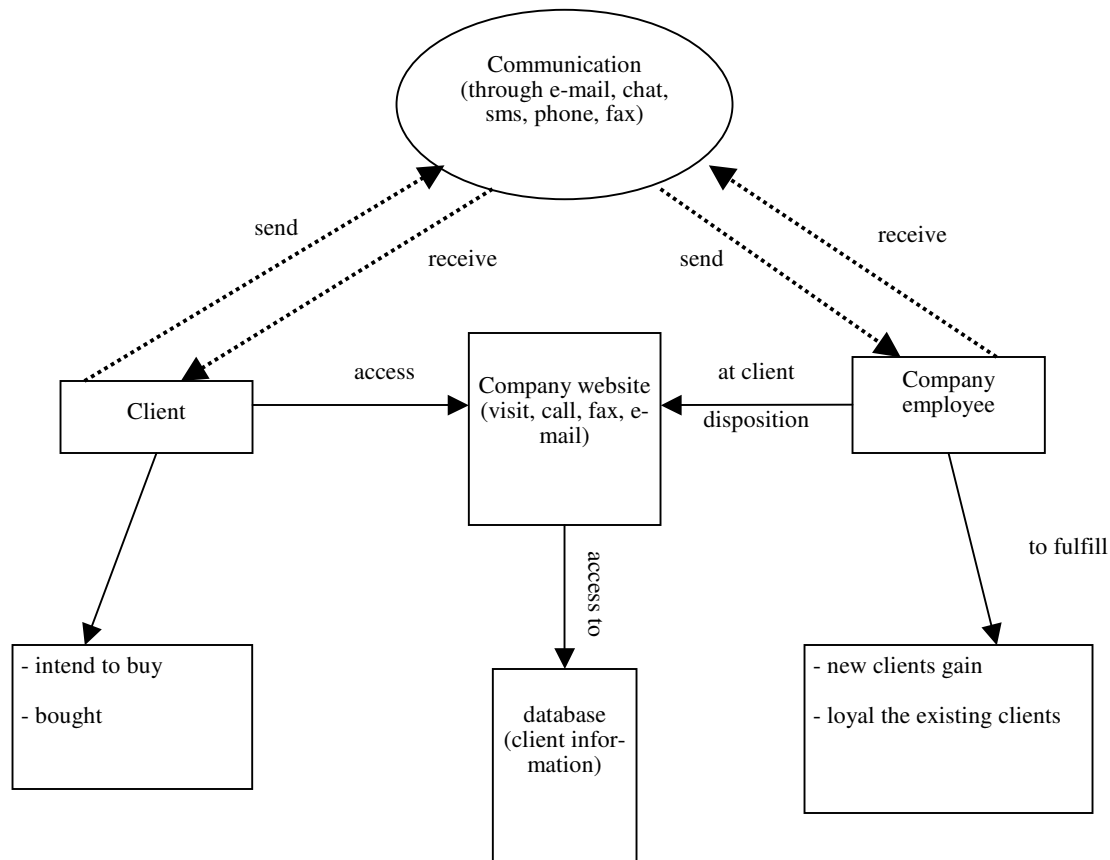
Figure 2. Interaction between company and client through Internet

The complexity of the interaction with clients through multiple channels (direct correspondence, phone receive center, fax, e-mail, chat, sms, etc) indicates the fact that the modern technology can reduce the employees effort and saving of costs.

At the moment a lot of companies consider that the main advantage offered by the websites consists in the fact that its visitors can inform themselves, can find by themselves answers to their questions, thus minimizing the company efforts and increasing their efficiency.

Mainly, websites contains answer pages to the most frequent questions of the buyers. Through a simple mouse click anyone interested can obtain the desired information.

In the case of the companies that use systems, complex software solutions, clients questions are analyzed being than searched in "the information base" possible answers. The intelligent software solutions "learn" from the solved cases. They add in "the information base" the newly achieved information.

It has been noticed that a major part of the buyers prefers a direct communication with the company employees. Regarding this, software solutions of the CRM type, even they are based on the Internet, include facilities which permits a client to be contacted or to contact directly, through phone, company agents. In case of the integrated informatics systems the call center instantly identifies the client and accesses the history of his interaction with the company. The operator can use this information in the conversation with the client so that the client can notice that is treated with consideration, that he is important to that company.

Multiple possibilities of communication take into account client wishes for the preferred communication channel.

4. The importance of the CRM strategy

CRM software market is huge and permanently increases. Anyhow, in many situations the implementation of such software doesn't conduct toward the achievement of the wished objectives.

The main cause consists in the lack of the way in which the relationship client-company is seen. Inadequate use of high performance software doesn't assure the expected results.

When CRM software is implemented, the client-company relationship notion needs to be redefined in the context of that specific company, also taking into account cultural differences between different zones of the world. The company has to develop its own business strategy oriented toward clients. Only in such way the chances of success increases.

According to Gartner, the companies that will develop adequate CRM strategies will obtain until 2010 financial results increased by at least 25% comparative to those that will not take into account this aspect.

Some things need to be taken into account by the company:

- to construct its own personalized model of the client relationship management
- to take into account the CRM strategy, not only the CRM technology. A company needs to look after: the increasing of the client satisfaction in order to make them loyal, the client relationship expansion, the costs minimization, the income maximization, brand consolidation;
- to facilitate the communication with the clients through a variety of means:
  - the use of the websites, thus reducing the costs needed to administrate the relationship with the clients;
  - technical assistance, information regarding products and use instructions on websites, available 24 hours a day 7 days a week.
  - the use of the internet cookies to find customers wishes, preferences, interests, in order to personalize the product offer
  - friendly mechanism of client reclamation recording. An unknown client dissatisfaction cannot be solved thus transforming it into an important source of client dissatisfaction
  - an efficient mechanism to permit the client's discontentment solving. A quickly solved discontentment conducts toward the increase of the client satisfaction.
  - Identification of the way in which the clients perceive the quality notion, in order to assure personalized services, corresponding to their expectations and demands.
- to invest also in innovation not only in CRM technology infrastructure. Conducted studies reveals that 30% of the funds allocated to IT development should be used for innovation
- to invest in dashboard development, as it is known that they a significant impact on company performances.

For satisfactory results of the CRM software implementation at the market level and to the economic demands a total involvement of the company is needed. At any moment a client can turn on to the products of another company if they satisfy his expectations, tastes and wishes. This is why the company needs to know exactly what to offer its clients, when and how should it offer its products.

A small or medium sized company can quickly adapt itself to the market changes. The CRM strategy and its sustaining technology need to be flexible adaptive to continuously changing conditions.

5. Conclusions

CRM uses strategic planning, personalized marketing technology and techniques to permanently optimize the company relationship with its clients.

CRM is a business strategy which puts the client in the center of company processes and practices.

In a competitive market a company success cannot be assured only by the diversity of its products, but also by the difference between the services they offer their clients.

To bring benefits, CRM implementation needs to take place only when the company product-centered market approach moves toward a client-centered market approach.

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AN OVERVIEW OF THE DIGITAL REFORM IN ROMANIA

Vatuiu Teodora

„Constantin Brâncuşi" University, Tg-Jiu, Romania, 0253218222, e-mail: vatuiu_teodora@yahoo.com

Lungu Ion

Academy of Economic Studies, Bucharest, Romania, 021319.19.00, e-mail: ionlungu_ase@yahoo.com

Abstract: The informational society is an objective of development, not an end in itself; it represents an essential component in the political and economic governmental program for development and a major condition for integrating Romania in the Euro Atlantic structures. The technological support of the informational societies is assured through the convergence of three sectors: the technology information, the technology of communications and production of electronic content.

Keywords: Digital reform, Communications and information technology, e-government, E-procurement

1. INTRODUCTION

In the past years, Romania has undergone substantial political and economic transformation, designed to establish a free-market economy by privatization of state-owned enterprises and deregulation of the economy. Becoming a member of the EU has been the top priority among national objectives, and even nowadays sustainable effort is made for the complete integration.

The Government has assumed as a priority objective of its term in office the completion of the process of economic transition and has embarked upon an ambitious attempt to bring the Romanian economy to the stage of operating within the framework of a functional and successful market, capable of withstanding the demands of the competitive environment of the European Union, that Romania has joined in 2007.

Communications and information technology were declared national priorities in the beginning of 2001, as it is considered they can be the development engine of the Romanian economy. One of the most important issues that the Ministry of Communications and Information Technology of Romania has concentrated upon in the last years is the regulatory framework for the development of the Information Society services in Romania, which was established as predictable, simple and consistent.

Today, the laws concerning the protection of individuals with regard to the processing of personal data, processing of personal data and the protection of privacy in the telecommunications sector, the electronic signature, the cyber crime, the electronic commerce, e-procurement and e-tax are already in force. Also, a new legislative package regarding electronic communications was approved in 2002, which is in line with the newest European Directives in domain - a European premiere.

2. THE STRATEGY OF IMPLEMENTATION OF THE INFORMATIONAL SOCIETY IN ROMANIA

Romania has a well-developed communications infrastructure, which offers great potential for introducing new services and also facilitates the reduction of the digital divide within the country. The total liberalization of the telecom market on January 1st, 2003 set the conditions for the availability of better and diversified services at lower costs for all citizens.

Implementations and developing some electronic links among the administration, citizens and business environment represents one of the main directions of the strategy of implementation of the informational society in Romania. The Romanian system of electronic public acquisitions (e-procurement), built up in 2002 is one of the reference points concerning the e-government in Europe. Its success is proved by the total transactional values, over 1 billion euros with a rate of savings of 21%. Usually over 10,000invitations to auctions are opened, implying 800 of public institutions and over 8,000 suppliers. In 2003 and 2004, launching the projects of e-governments went on, as for example taxes payment through electronic means and the use of electronic signature for the public administration services.

e-Government was aggressively promoted in the past two years as it is considered the best way of organizing public management in order to increase efficiency, transparency, accessibility and responsiveness to citizens, as well as to reduce bureaucracy and corruption, through the intensive and strategic use of Communications and Information Technology in the inner management of the public sector, as well as in its daily relations with citizens and users of public services.

Since 2001, approximately 30 pilot projects were finalized, projects that aimed, in the first phase, to simply prove the benefits of a solution to be extended according to a precise calendar in order to assure better ways of solving problems for as many people as possible. One of these projects, the payment of local taxes via the Internet, is currently used in 50% of the Romanian municipalities. Public acquisitions done through

electronic means is another pilot project, which is now functional at national level, becoming a key component in the process of modernization of public administration.

E-procurement, created in 2002 represents one of the reference points concerning the e-governmental applications in Europe. In the following years 750 million euros will be saved by enlarging the e-procurement in the entire public administration and for all the products and services in public supply.

By procuring electronically, the Romanian Government proved it can lower the cost of inputs, also encouraging the private sector to move to B2B and creating the premises for lowering corruption, reducing bureaucracy and ensuring transparency, in the effort of building efficient and accountable sector of public institutions, capable of sustaining long term development. The implementation of this system is part of the governmental effort of building efficient and accountable public sector institutions, capable of sustaining long term development. The system prepared the ground for going further with the digital reform of the Romanian society.

Thus, only few months ago, as part of an anti-corruption legislative initiative, the Government promoted concrete measures to insure the availability of all public information on line and the possibility to provide on line complex and complete governmental services. The legal obligations of the central and local public administration authorities will be established very clearly in order to have a functional system allowing all citizens' access to public information and services - from filling in different forms to processing them on line. This is the actual "desk reform" and it means that any Romanian citizen will be able to access the Internet, from home or other public place, even from the office, for interacting with the administration. The initiative is meant to improve the access to the information and services of public administration authorities and to simplify the bureaucratic procedures by standardizing the methodologies of work. A few examples of public services, which will be provided by electronic means, according to Art.12 in the chapter dedicated to transparency, are:

– Declaring, notifying and paying local taxes, the contributions to the budget of state social insurances and the budget of the national fund for social health insurances;
– Services to obtain an authorization or a certificate such as: urbanism, construction authorization, on line filling in authorizations and certificates, the payment of different invoices;
– Services to obtain a license, such as: filling in applications, filling in forms and sending through electronic means the documents necessary for the issuance of licenses, payment via electronic means etc;
– Services for public acquisitions made by electronic means, including the payment of different invoices by electronic means;
– Services regarding the setting up of a new business, including the notes in the Register of Companies;
– Services regarding electronic evidence of the population, such as: filling in the forms for obtaining a passport, identity card and driving license, notification of the change of the address, declaration of the theft or lose of such documents;
– Services related to vehicles, such as: the notification regarding the purchase of a vehicle, the reservation of the plates number, filling in the forms in order to register a vehicle, programming or presenting the documents related to registration of a vehicle;
– Services regarding custom-house formalities.

The launching of the electronic national system in 2003, a portal organized as a one-stop-shop in the relation with the Government, that will provide forms for download and on line services, means the beginning of a general digital reform in the Romanian Society. The system will make the overall interaction with the administration more efficient and comfortable, while reducing costs for both public and private entities and increasing the public trust in the administration.

The portal is developed for the public administration with the purpose that every individual or institution with Internet access, both within the country or abroad, could access online to information and services provided by the government without knowing in advance which specific entity has to contact. This service will be available 24 hours a day and 7 days a week.

Also, by the adoption of the anti-corruption Law, a financial disclosure solution is used in Romania since April 2003 (Law 161/2003). By publicizing online the financial statements of public officials, two objectives are served: the first is to monitor changes over time in the economic situation of public officials; the second is to detect and prevent potential conflict of interests between public officials and the private sector.

The initiatives of the Romanian Government promoting the increasing use of electronic means and technologies in reforming the administration, tested step by step, from pilot applications to national programs, based on a clear plan of enforcement and realistic budgeting, having in centre the accountability

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for concrete results, proved successful till now and promise to deliver in short time a new, modern, more efficient and transparent administration in Romania.

www.e-guvernare.ro, it a website that aims to reform the way in which each and every citizen or company interacts with the public administration in Romania and opens the way that will take us to the full reform of the public administration, so that the entire society could benefit more from it. As an unique access point to services and information of the central and local public administration, the development of this portal marks the beginning of the "desk reform", a program by which the Romanian Government propose itself to promote transparency, increase the administration efficiency by reducing costs, to ensure a large permanent accessibility to public information and services, to prevent and fight corruption by electronic means.

EFrauda mission is to address fraud committed over the Internet. For victims of Internet fraud, eFrauda provides a convenient and easy-to-use reporting mechanism that alerts authorities of a suspected internet fraud. For law enforcement and regulatory agencies at all levels, eFrauda offers a central repository for complaints related to Internet fraud, works to quantify fraud patterns, and provides timely statistical data of current fraud trends.

The application is offered to provide a method for Romanian citizens and from abroad to promptly and directly communicate their complaints to Romanian government agencies that are interested in investigating and taking action against internet fraud that is reported. The function's application is to protect the suppliers and consumers of information society services, respecting the law establishment, reducing the bureaucracy, preventing and fighting against cyber crime, increasing the transparency in relation between the citizens and authorities.

3. THE PROGRAM OF DIGITAL REFORM

The program of digital reform was initiated in Romania in 2001. In 2002, the first such project was launched at the national level, the electronic system of public acquisition whereas in 2003 the national electronic system was introduced, a gateway of e-government through the agency of which information and electronic services are offered to the citizens and business environment.

Informatics is shaped like a priority encircled in the steps more complex and more comprising of managerial strategy used within the organization. In this respect the new informational technologies are presented as an indispensable support of redesigning of management systems, in applying the evolved methods and techniques of management, in advanced assisting of the decision.

The Report of European Commission, in November 2003, indicates the fact that Romania "has reached a considerable point of alignment at the communitarian aquis in the telecommunications sector. A significant progress has been done in the last year especially concerning the establishing a regulation authority, market liberalization and giving a new form to the European sector concerning the telecommunication sector".

The statistic surveys offered by the Ministry for Communications and Information Technology confirm the continuous development of IT program. As the domain of .ro concerns, the number of users raised from 16,000 (in 2000) to 57,000 (in 2003). The technological parks host inclusively tens of IT firms. In soft - park in Galați, for example, a location for 50 IT firms, centers of excellence Microsoft, Oracle-Hp, Sun, IBM, center of presentation and technologic transfer, laboratories for software development operates where local specialists work.

Romania and Japan have received The Global Prize of Excellency in Informational Technology for the initiatives e-government, distinction awarded by WITSA (World Information Technology and Services Alliance) at the World Congress concerning Informational Technology. After the votes of 53 national associations WITSA members, Romania's initiatives in the domain of e-government were considered the most performing.

The Ministry for Communications and Information Technology was declared winner at the category *Excellency Prize in Public Sector*. Romania was the only country that won the prize in 2004, a fact that represents a confirmation at international level for the policy of development of the informational technology sector, initiated and coordinated by MCIT.

CONCLUSIONS

The projects developed at national level as the electronic system for public acquisitions, the gateway for e-government services, the electronic system for goods road transportation allowances have proved their efficiency through the value of savings at the state budget, by stimulation of Internet utilization, all of which being indispensable instruments in the process of giving up bureaucratization. The results obtained by Romania were possible due to the competences existent in this domain, in the private sector.

In Romania there are 250 of research centers from which, every year 30,000 of young people graduate, of which 5,000 trained as engineers in IT sector, the number of Romanian graduates being 5 times higher than in Russia and 7 times in India.

The Ministry for Communications and Information Technology developed over 30 pilot projects, of which three operates at national level: the electronic system of public acquisition, electronic payment of local taxes and duties and the national electronic system. Thus more and more Romanians have learned and used the new technologies, being able to interact easier and cheaper with the authorities, wherever they are.

Taking into account the fact that there is a short time until Romania will join the common European administration it is obvious that the state institutions have to regard information not like an obligation, but as a vital necessity. It is not sufficient for existing good and very good solutions, if they are not promoted properly and they are not used by the ones to whom they are addressed to directly.

Operating modern concepts and instruments of management is conditioned decisively by adopting by the organizations of the adequate support of informatics and telecommunications; they imply producing important technological changing which has to emphasize naturally the whole strategy, which regards the rebuilding of each organization managerial system.

The success of an informational society at European level depends on all those implied: common citizens, firms - suppliers of software and public administration, central or local.

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E-LEARNING -AN ALTERNATIVE FOR THE PRESENT EDUCATION

Vatuiu Teodora

„Constantin Brâncuşi” University, Tg-Jiu, Romania, 0253218222, e-mail: vatuiu_teodora@yahoo.com

Ciungu Petre

Free International University of Moldova, 0253211702, e-mail:petrica1951@k.ro

Abstract: *E-learning is a term frequently debated in the last decade, especially in the academic environment. E-Learning cannot be dealt as a separate phenomenon from lifelong learning, because it is part of lifelong learning and this emerges as a recurrent trend in practice: bottom-up on-line informal and non formal learning is dramatically increasing and spill-over effects from e-commerce, e-governance, e-health or simply e-information are having significant implications on the enrichment of people skills and knowledge.*

Keywords: E-Learning, education, knowledge

1. INTRODUCTION

E-learning education is one of the main objectives of the informational society implementations in Romania, which will ensure the access on a large scale for the pupils and students at the international communications and data exchange. To accomplish this objective, a number of actions have been financed and completed as the implementing the computer assisted educational systems in high schools and universities. In 2003 all Romanian schools were equipped with laboratories for the computer science.

E-learning is learning based on information technologies, and particularly based on the Internet. E-learning educational system has a lot of advantages, such as flexibility, availability, time and resources savings and it respects the individual learning rhythm of each of the students.

Using a virtual educational platform is a must for every university or organization that aims to assuring quality e-Learning services to their students. Developing personalized platforms is the best choice, unfortunately this is a lot of resources spending option and it may be applied only by a small number of e-Learning providers with large budget.

E-Learning is primarily recommended by its advantages:

1. Course attendants can benefit from on line courses anywhere, anytime;
2. Course attendants can benefit from latter-day information;
3. Information can be received and understood better using multimedia means;
4. It provides a multitude of sources of information for a certain theme;
5. Larger groups of course attendants can be managed more easily.

If in the United States there is an attempt of attaching e-Learning an essential role, in Europe its adoption is far from what it was anticipated, being influenced by:

− the capability of institutions of setting e-Learning as a main information source and of correlating existing organizational models with new ones and with its experiences;
− the nature of e-Learning technologies which are available within the organization.

Another element which may influence the e-Learning's evolution is that of demographic growth. If Europe confronts an ageing of the population, in Asia, especially in India, there is foreseen a growth of the young people with the age between 18-22 years (11 million students, approximately double, given the present situation), who will have access to a higher level of education.

Concordant to these foreseeing, there will be a spectacular growth of the number of students in China, approximately 20% given the present situation, which means 240 million students.

e-Learning can substantially contribute to employability, provided that research and practice efforts are concentrated on the quality of e-Learning and that further research is conducted into the extent and nature of measurement of benefits of e-Learning should not just be based on the assessment of learning outcomes and e-learners satisfaction, but also evaluated in relation to the career development of e-learners, although many other factors and constraints intervene. Last but not least, a lot could be done to market the benefit of e-Learning in terms of employability towards the employers. In fact the successful completion of e-Learning not only could enhance the competences related to the contents of the e-Learning courses, but requires as pre-requisites many "core employability skills" such as ICT literacy, self-management and especially "autonomous learning competences".

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The modern-day learner demands knowledge and content that is more sophisticated, dynamic, interactive and more relevant. They, and the organizations that depend on them, need to learn new skills quickly and at the right time. While classroom-based training was delivered at a certain time and in a certain place, sometimes weeks or months before the learner could apply what they'd learnt, e-Learning can be delivered "just in time".

Course developers and instructional designers have been adapting to developing and delivering e-Learning. Many of them accepted this challenge with reluctance and uncertainty of how they would adjust. Fortunately many companies were willing to facilitate the adjustment by providing tools and to make it as easy as editing a document on a word processor. Still the whole process of developing self-paced courseware online took on a whole different approach to instructional design.

The process has been complicated with innovative approaches to learner interactions within the online courseware. The interactions may have been produced easily with tools such as Macromedia Flash, or they may have been produced by programming in Java, JavaScript, ASP, XML, etc. Whatever the case may be, the fact remains that developing an e-learning course is becoming more and more like developing software. The whole e-learning development process needs to become more of a marriage between traditional instructional design and software development methodology.

2. EDUCATION INNOVATION BASED ON E-LEARNING

E-learning is a kind of education which takes place through the Internet. The learning solutions based on the Internet become more and more popular, offering more rapid results at low prices, a large access at learning and a clear accountability for all the participants at learning process.

E-learning supposes using the informational technologies and communications and the environments to deliver the educational materials and for improving the processes of learning, acquisition of knowledge and habits and assessment of pupils and students. E-learning includes:

– Research concerning the using of Internet (World Wide Web, WWW), electronic libraries and online data base;
– Materials for interactive learning (sometimes multimedia) simulations included;
– Group learning activities (electronic conferences, chat in real time or discussions through electronic mail;
– Classes or discussions through video conference;
– Management of online classes.

In the present dynamic culture, the organizations which implement the Web learning give, the participants within the knowledge act, the possibility of valorizing the change to their advantage. Internet learning assures the responsibility, accessibility and opportunity. It allows the students and the organizations to keep the pace with worldwide economy, which is evolving now with the Internet speed.

E-learning is the solution of learning and communication problems arisen by digital economy and refers to Internet assisted learning. The process has begun being used in learning departments of the companies, schools and universities, as supplement in traditional teaching methods. E-learning contains modern methods and tools, based on ITC technologies (multimedia processing and synchrony or asynchrony communication) and which conduct the user to obtain new skills in a particular domain. In this mode, e-learning is a component part of the computerized society. A computerized society assumes the access of its members to the ITC technologies, used for obtaining new knowledge and for other activities solving economical and social problems etc.).

Through the fast access to the knowledge database, the educational software is alternative way of classical learning (blackboard, chalk, notebook, pencil etc.) or the only solution, when classical methods are unusable, like the problem that we will approach in this paper. In a simple approach, the educational software divides in:

– Educational computerized applications projected for easier, faster and more efficient teaching of the same knowledge that can be told in the classic mode too;
– Computerized applications that approach subjects that cannot be told by classic methods; in this class are also included certain themes about the administration of a computer network, when the students don't have the administration rights.

Do we know to apply a software engineering approach to instructional design? First we need to review a high-level overview of each to have proper frame of reference. For this phase, we can use instructional design model, which consists of:

1. Identify Instructional goal
2. Conduct Instructional Analysis

3. Identify Entry Behaviors and Characteristics
4. Write performance objectives
5. Develop criterion referenced. Test Items
6. Develop Instructional Strategy
7. Develop and/or Select Instructional Materials
8. Design and Conduct Formative Evaluation
9. Revise Instruction
10. Design and Conduct Summative Evaluation

The model starts with identifying the instructional goals of the course, which are used as input into conducting an instructional analysis and identifying the behavior and skills that students exhibit prior to training. The result of the analysis and entry behaviors is then used to develop performance objectives or the expectation of business results from the course. The performance objectives are then used to develop criterion *tests*, which are designed to test that the student can achieve the expected performance objectives. The course design is then tested in a pilot class, and an evaluation of the course design is reviewed and finally, is delivered to the masses and evaluated on its effectiveness.

3. ENGINEERING E-LEARNING

The learning technician combines projecting of the documents delivered on the Internet (web), programming and designing for learning in order to realize teaching-learning materials delivered online.

So, how do we apply the software engineering approach to instructional design? As in both cases, we must start with a set of requirements. The process from this point forward assumes development of asynchronous e-learning in which the learner is guided through an instructional design by electronic means.

A storyboard is developed to organize the presentation of the content in a logical flow. The storyboard would represent the pages or screens that display to the learner and any interactive exercises or assessments that might be included. If the learner can successfully answer a specific question or set of questions tied to a particular topic, that topic can be eliminated from the course automatically so that the learner is only presented with unfamiliar material. The post-test for each module would then validate that the learner understands the content and record a completion status for that module.

Considering the recent trend that almost all students carry their own mobile terminals, this study relates to a learning system that utilizes mobile terminals as an ancillary tools for debate. Students are divided into groups making use of the information of answers by the students against questionnaires presented beforehand.

On this occasion, information necessary for grouping and results of grouping are transmitted together with contents of each of answers to mobile terminals of the students. Students are then requested to form groups based on these information and to initiate debates in each group. In other words, this system is one sort of blended learning in which face-to-face debate is carried out utilizing electronic educational information communication. In this study, algorithm for grouping based on information of answers by the students is dealt with.

There are many factors that go into this initial stage, particularly on how the software will function on multiple platforms or multiple operating systems. Finally, the software itself is developed, typically with multiple programmers coding simultaneously, which introduces the need for a source-code control environment for parallel development?
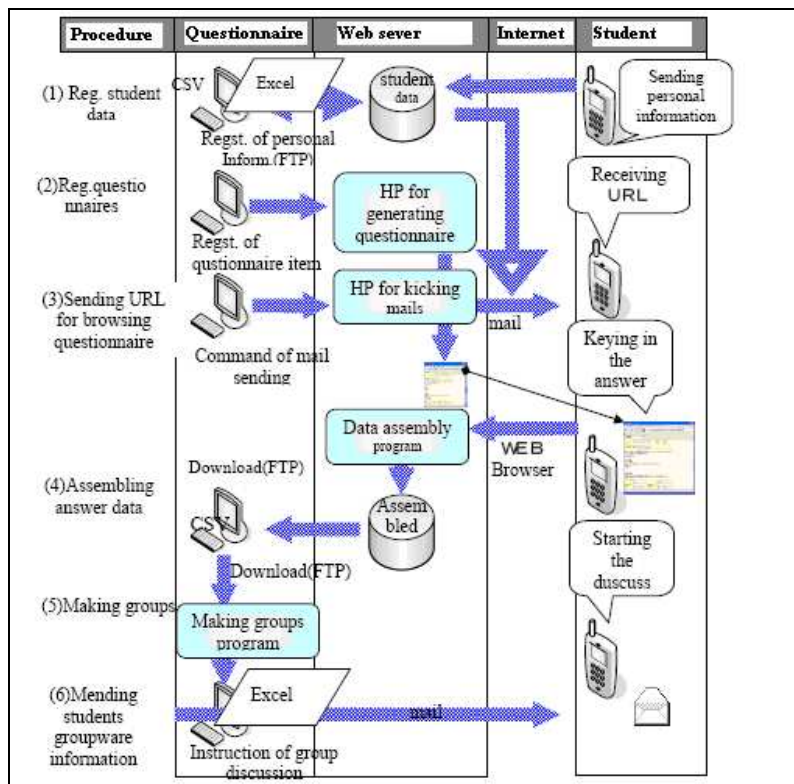
Fig.1 System flow

CONCLUSION

Through our endeavor we have brought some examples, which show the efficiency of using the Internet, by demonstrating the wide possibilities of E-learning, that it seems it had an unexpected impetus upon the contemporary society. It is already known how many people have access, utilize and retransmit thus the information.

Throwing a useful light upon the educational sites allows solving two problems that are in front of their owners: attracting the visitors on server as well as belated attraction repeatedly. The initial server visiting depends on the group of servers that manage the traffic, due to which the visitor has the possibility of learning about the server.

E-Learning is having a substantial impact on personal development and citizenship, and it can do even better, provided that the human factor is not neglected within e-Learning, since this is a necessary (although not sufficient) condition to achieve enriching e-Learning experiences. This means concentrating investment, research and practices on two priority areas: the personalization of e-Learning solutions, encouraging such developments as the bottom up production of content, the capacity of e-Learning to fit many different learning styles and the emergence of technologies that increase the flexibility in fruition, and the "humanization" of e-Learning, embodied by such developments as the diffusion of game-based elements, new possibilities for learners' interaction and empowerment, the community building aspect of e-Learning.

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