THE IMPLICATIONS OF COMPUTERIZATION IN THE CHANGES OCCURRING IN THE ROMANIAN HIGHER EDUCATION VARIATION AND STRUCTURE

Hapenciuc Cristian Valentin

„Stefan cel Mare" University, Suceava, Romania, expresedinte@yahoo.com

Zaharia Marian

Romanian - American University, Faculty of Internal and International Economy of Tourism, Bdul. Expozitiei nr. 1B, sector 1, Bucharest, Romania, zip code 012101, marianzaharia53@gmail.com

Zaheu Ioana

Romanian - American University, Faculty of Internal and International Economy of Tourism, Bdul. Expozitiei nr. 1B, sector 1, Bucharest, Romania, zip code 012101, ioana.zaheu@gmail.com

Nowadays, education represents a decisive factor for the general progress with deep impacts at spiritual, social and economics levels.

The transition to a market economy in Romania calls for the necessity of knowledge and analysis of the structure and dynamics of higher education, widely known for its special contribution to society's development.

The present paper tackles some aspects concerning the variance analysis of higher education network, as well as of the structural and dynamic modifications at its level, with reference to extending computer science process at this level of education.

The conclusions obtained takes into consideration the causes and the objective changes which refer to the reform of the higher education and its future development.

Computerization, Progress, Higher Educatin

General Overview of Romanian Higher Education

Since 1989, taking into account the transition to the market economy, Romania has undergone significant changes and shifts in all fields of activity.

Education, a decisive factor in the overall progress of Romanian society, entails deep implications at social, cultural and economic levels.

Higher education, as an integral part of the educational system, has undergone all-out changes through its entire system, dating back to 1990-1991, resulting in a reorganization included, in time, in the educational reform.

Private universities, established after 1990, have brought a significant contribution to the development of higher education.

The organization and operation of higher education is regulated through the legislation. Thus, in 1990, through Government Decision no. 225, some higher education institutes are turned into universities; in 1993 Law no. 88 referred to the accreditation of higher education bodies and to degree recognition, whereas in 1994, through law no. 117, state college graduates were allowed to carry on their university education within full-time education studies throughout the academic year 1994-1995.

In 1995, law no. 71 enabled private high school graduates and postgraduates, as well as higher education graduates to seat for their graduation exams within similar public institutions, while later on the same year, higher education was given new dimensions through an education law that would speed up the changes initiated by the reform.

This education reform has been known under three formulae:

- Reform by writing off at the level of kindergartens, schools, high schools or universities
- Educational system reform

−   Speeding up initiated changes, only to peak, in 1997, with designing an all-encompassing reform known as competitive reform.

The progress in achieving and putting into practice the reform of education entails a mindset change from passive, determined by a distributive status, to a mentality likely to favor initiative, project development and competitiveness on the market of qualifications and technical and scientific innovation.

Elements pertaining to this regional development can be approached and established starting from an analysis of its structural and variance changes, in relation to both the number of institutions and the number of students and faculty.

Structural Fluctuations of Higher Education

Structural changes of the number of communities comprising private and public higher education institutions, per historical provinces

In order to perform a structural and variance analysis of Romanian higher education per communities, subsequently spread out per Romanian historical provinces, we have established 64 centers that throughout the academic years 2001/2002 – 2006/2007 have evinced significant activities, thus obtaining the necessary data for processing and interpreting, in relation to the network of higher education units and the number of students and faculty.

These 64 communities are distributed per counties, as to their distribution per historical provinces, table 1, annex 1 outlines the community structure as follows:

−   Transylvania ranks first with its 20 communities and the highest percentage of 31.25 %;

−   The next three positions are taken by Oltenia with 17.18%, Moldavia with 14.06% and Crisana Maramures with 12.5%;

−   The last three ranking provinces are Muntenia (10.94%), Banat (9.38%) and Dobrudgea, with only 4.69%

The situation of communities with a better situation concerning private higher education, yet only for the past two academic years, is only slightly different from their structure per historical provinces.

Transylvania still ranks first with 21.74%, although only 5 cities actually have better organized private universities, likely to develop high quality academic activities.

Crisana–Maramures, Moldavia and Oltenia rank next with 17.39% each, due to the 4 cities on record housing such private universities.

As with private university distribution per Romanian regions, the number of private ones is very low in Banat and Dobrudgea, which has been outlined by the low percentages of only 8.7%, respectively 4.35%.

Structural changes of the number of university schools, students and faculty per historical provinces in 2001/2002 as opposed to 2006/2007

The structural analysis of higher education per historical provinces starts with an outline of the structural fluctuations regarding the number of institutions per two types: public and private, for the academic year 2006/2007.

Historical provinces	*Types of ownership (%)*	
	public	*private*
Banat	9.62	10.64
Crisana - Maramures	7.69	8.51
Dobrudgea	3.85	2.13
Muntenia	3.85	2.13
Moldavia	15.38	17.02
Oltenia	36.53	40.43
Transylvania	23.08	19.14

Table 1 – Distribution of higher education institutions per provinces and types of ownership

After 2000, private education has undergone a vast expansion, manifest at a territorial level as well, which has featured in the structure set up per historical provinces. Thus, graphics 1 and 2 outline the identical distribution per historical provinces of public and private higher education institutions ranking Oltenia ranks first in the structural classification with 36.53% for public institutions and 40.43% for private ones, whereas Dobrudgea and Muntenia are last with only 3.85% for public institutions and 2.13% fore private ones.

The structures thus established reflect the fact that at territory level the distribution of private higher education institutions is somewhat balanced and tightly connected with that of state education.

Based on the data regarding the number of university schools, students and faculty per historical provinces, throughout the academic years 2001/2002 – 2006/2007, a structure per provinces has been established, in 2001/2002, respectively 2006/2007 in order to be able to compare, so as to outline the changes occurring throughout academic years.

Historical provinces	*Structure in 2001/2002 (%)*			*Structure in 2006/2007 (%)*		
	schools	*students*	*faculty*	*schools*	*students*	*faculty*
Banat	8.94	8.16	9.71	7.71	6.83	9.64
Crisana - Maramures	10.32	6.03	5.59	11.44	6.75	7.22
Dobrudgea	4.40	4.31	3.25	4.65	4.21	3.30
Muntenia	5.50	6.83	5.07	5.85	4.84	4.92
Moldavia	15.13	15.34	16.55	15.16	12.68	15.23
Oltenia	33.70	37.95	38.96	32.98	44.69	38.77
Transylvania	22.01	21.38	20.87	22.21	20.00	20.92
Total	100	100	100	100	100	100

Table 2 – The structure of the number of university schools, students and faculty per historical provinces, throughout the academic years 2001/2002 – 2006/2007

Although at the level of Romania we record an increase in the number of state universities during academic years 2001/2002 – 2006/2007, by comparing their 2006/2007 structure to that of 2001/2002, we notice a change, in the sense of decreasing the percentages for the first and last ranking provinces, from approximately 34% to 33% in the case of Oltenia, and from approximately 9% to 8%, for Banat.

The other historical provinces outline slight percentage increases, the highest in the case of Dobrudgea, gaining 0.25% in 2006/2007 as opposed to 2001/2002, whereas Moldavia records only 0.03% in ranking, for the last academic year under analysis.

As to structural changes related to the number of students and faculty for 2006/2007 as opposed to 2001/2002, these are similar to the number of university schools in the sense of a decreasing trend for Banat, Muntenia and Moldavia, and of an increasing trend for Crisana – Maramures. Dobrudgea and Transylvania are facing a declining number of students outlined through a difference of 0.34%, respectively 1.38%, and an increase of 0.05% of faculty in both provinces, as opposed to other provinces facing decreasing numbers of faculty.

Analysis of the Evolution of the Higher Education network and Global Information Society

Developed at world level, the global information society has become increasingly significant along the years in all economic structures. The influence of this so-called "informational trend" has been felt at national and regional levels with reference to the evolution of higher education, as well.

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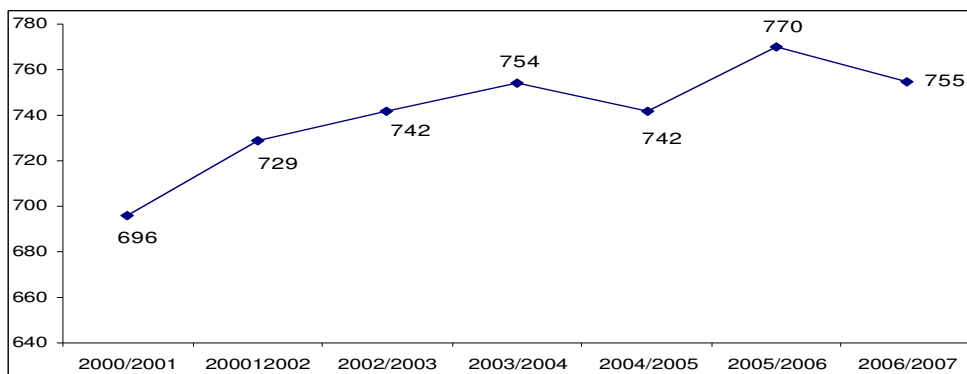
Graph **1** *– Evolution of the number of university schools between 2000/2001 and 2006/2007*

The time line outlines the fact that the evolution trend of the higher education network throughout the academic years 2000/2001 – 2006/2007 is overall increasing, with an average of approximately 10 university schools per year, which results in an average increase of 1.37%, with an average number of schools of 744 set up annually.

The development of higher education towards shaping up the information society at national level also comprises components related to the correlation that can be established between the number of students, the number of internet users and the number of registered personal computers in Romania after 2000.

Between 2000 and 2006, graph 4 outlines an evolution of the number of internet users in Romania with a constant growth and a spectacular boom in 2003, the necessity and significance of information and information technology introduction and extension came into focus at national level, for the country's development and economic growth.
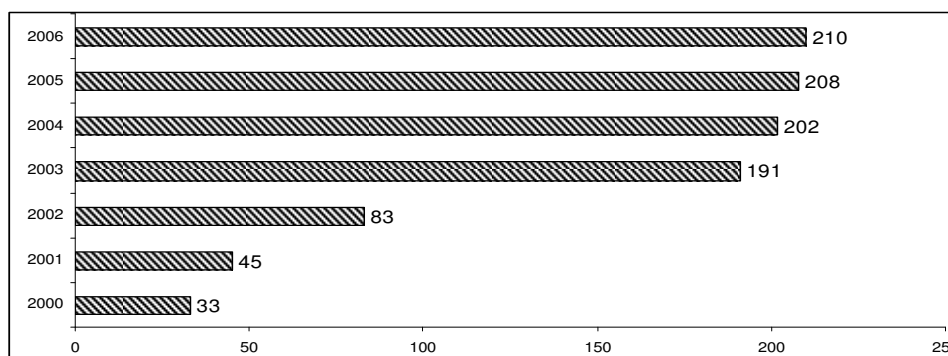
Graph 2 – Evolution of the number of internet users between 2000 and 2006

With an average of 142 internet users per 1000 inhabitants in 2000-2006, we can outline an annual average growth of 30 internet users per 1000 inhabitants, which represents an annual average growth of cu 36.13%.

The evolution of personal computers in Romania is also graphically reflected below, based on absolute values processed and centralize at national level.

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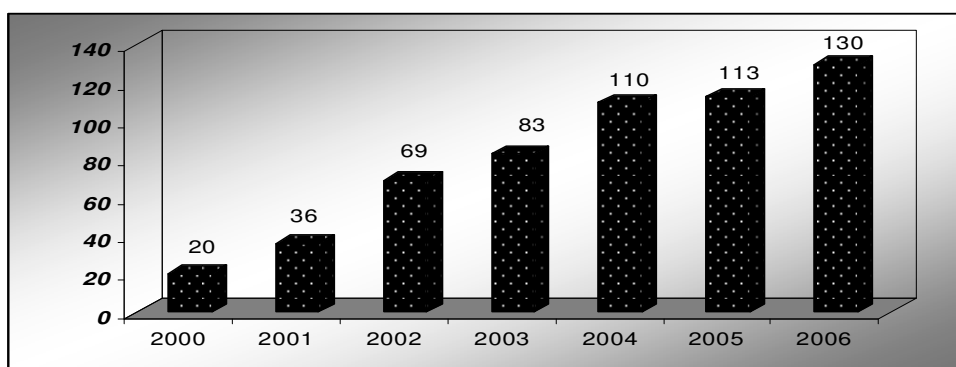
Graph 3 – Evolution of the number of personal computers between 2000 and 2006

The number of personal computers follows the average growth trend of other indicators, with 18 personal computers per 1000 inhabitants, representing an average annual growth of 36.61%, setting up an average number of 81 personal computers per 1000 inhabitants.

In relation with the evolution of the other two indicators, we raise the question of determining the connection between the number of students and the numbers of internet and personal computer users.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.931382
R Square	0.867472
Adjusted R Square	0.801208
Standard Error	38249.06
Observations	7

ANOVA

	df	SS	MS	F	Significance F
Regression	2	38304427769	19152213885	13.09113724	0.017563702
Residual	4	5851963367	1462990842		
Total	6	44156391136			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	481766.2	34298.65208	14.04621345	0.000149066	386537.8634	576994.5
Internet users	-468.604	590.9744284	-0.792934521	0.472194705	-2109.412084	1172.204
Personal computers	2794.795	1168.24316	2.392305592	0.074979801	-448.7683587	6038.358

Table 4 – Correlation between the number of students and the numbers of internet and personal computer users

The correlation between the number of students and the numbers of internet and personal computer users evinces a strong intensity (R = 0.93), 86.75% representing the influence of the two factors on the number of people attending university studies.

Test F is computed in this table, pertaining to the validity of the regression model. Since F=13.09, *Significance F* amounts to 0.01756 (under 0.05), then the regression model thus set up is valid and can be used in analyzing the dependence relation between variables.

Conclusions

The low structural fluctuation in 2006/2007 as opposed to 2001/2002, concerning both the number of university schools and the number of students and faculty, outlines a low quantitative development of these variables in their regional distribution per historical provinces.

It is a sign that higher education has also undergone a period of transition, which has mainly comprised transformations pertaining to its internal structural reform and to a lesser degree, to its regional expansion.

Establishing the homogeneity of this network per main historical provinces reflects the need to focus on the development of higher education in Dobrudgea and Crisana-Maramures.

The strong correlation identified between the number of students and the number of internet and PC users primarily confirms the concern with the quality development of education, following the transition to a comprehensive educational reform which entails the following, for the academic environment: curricular reform, reorganizing education based on problem-solving and scientific research reform, setting up a new interaction between education and the economic and social environment, improving infrastructure and the connection to information network, academic management reform, advanced international cooperation.

Issues pertaining to this regional development can be approached and established starting from an analysis of its structural and variance changes, concerning both the number of institutions and the number of students and faculty.

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