ICT Training Strategies in European Context

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1. The role of ICT in developing the Information Society

The term ***Information Society*** describes an economy and a society in which the access, acquisition, storage, processing, transmission, spreading and using knowledge and information plays a decisive role.

The advance towards the *Information Society*, based on knowledge, is worldwide considered, as a necessary evolution to ensure the *durable development* in the context of "new economy", mainly based on products and intellectual-intensive activities, as well as for achieving an *advanced socio-human civilization*.

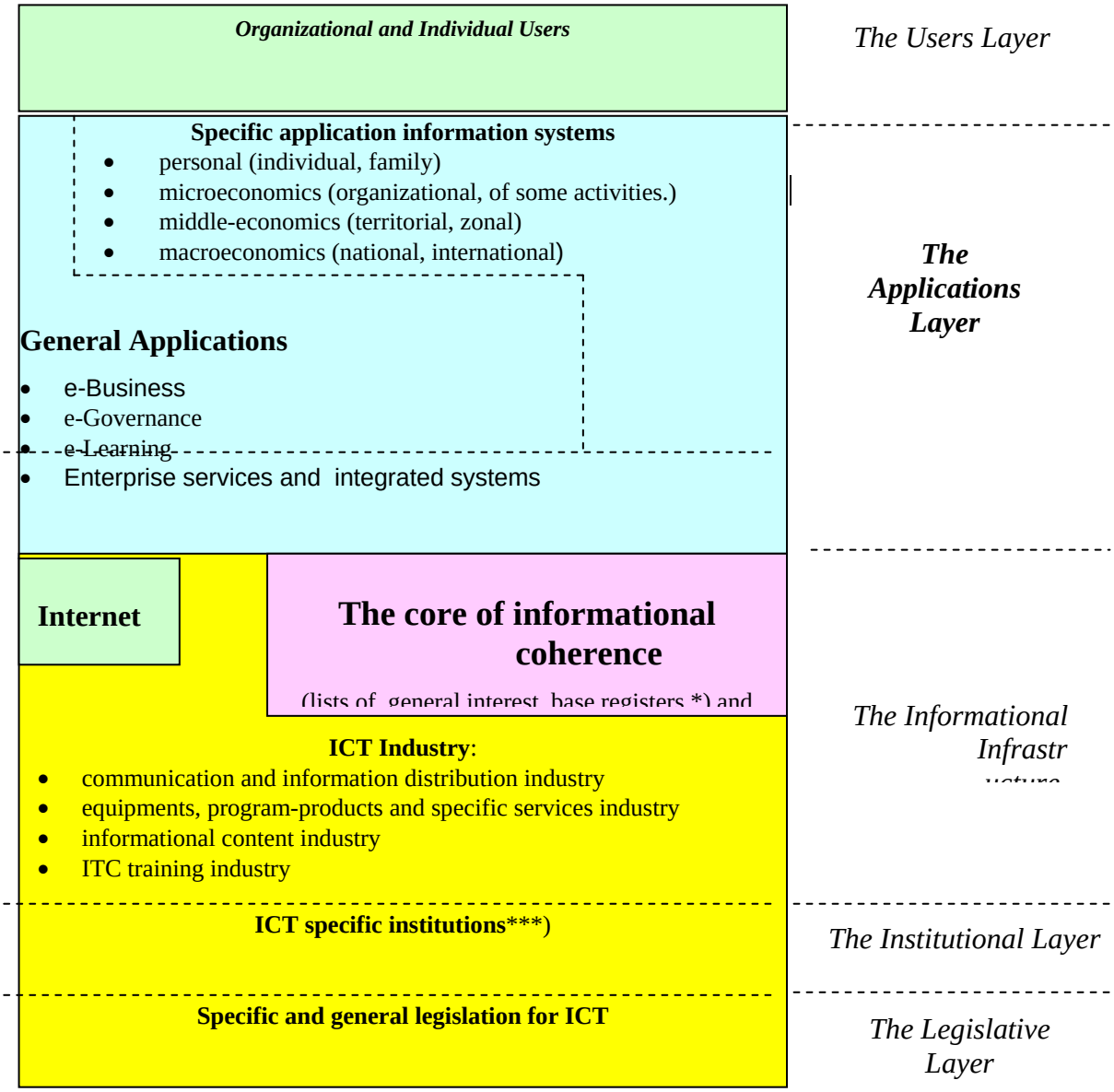
The Informational Society based on knowledge is the *progress of technology and of communication and computer applications*, but also the integration of the *economic, cultural, ambient and social* dimensions.

A structure of the *Information Society* is shown in Figure 1[5]. The *Information* Society is made of five layers: Users layer, Applications layer, Information infrastructure layer, Institutional layer and the Legislative layer. The Applications layer also accentuate (sets off) groups of distinctive (characteristic) applications: e-Business, e-Learning şi e-Governance, including enterprise services and integrated systems. They have in common platforms based on advanced databases and Internet. The Information infrastructure layer constitutes the support on which the information society is build: Internet, the core of information coherence (lists of general interest, base registers *), specific databases of general interest and the ICT (Information and Communications Technologies industry.

In developing the ***Information Society*** the State has a triple role:

- Acting as a **catalyst**, he must be aware of the business environment and the citizens regarding the importance and opportunities offered by the Information Society;
- As **settlement organism**, the State must ensure the obedience of the rules and the economic growth;
- As **major element on the market**, the State must modernize (update) its own operations and improve the interaction between the public and the private sector.

[5] source: http://www.academiaromana.ro



On an international level, the benefits of implementing the Information Society forces the governments to pursue with priority the following **fields**:

- Developing the informatics culture, training all citizens to ensure their access to the new technology;
- Democratizing the use of information, for the purpose of enforcing (ensuring) the right of the citizen to have direct access to information;
- Developing the information systems of the Public Administration with the main goal to improve the services for the citizens;
- Developing the communication infrastructure, by reaching standards of quality, response time, coverage and availability, cost reduction (minimizing);

- Developing the trust in the informatics systems, ensuring their security and protection of personal data;
- Developing the electronic commerce for the purpose of profitable participation in the global economy;
- Creating a transparent economic environment for the development and sustenance of businesses, as well as ensuring the administration of public funds and the transparence of their use;
- Developing of a stable and safe society by using ICT in the management of crises, environment protection, and last but not least, by ensuring the social security of the citizens.

The politic will for promoting the Information Society in Romania is dignified by the **specific ICT legislation in force**:

- HG 271/2001 – establishing GPTI with the role of integrator and coordinator of trans-zonal solutions from the IT field;
- Law 332/2001 regarding (concerning) the promotion of direct investments with significant impact in economy;
- Law 133/1999 regarding (concerning) the stimulation of private entrepreneurs for establishing and development of Small and Medium Enterprises;
- OUG 65/2001 regarding (concerning) the constitute and functioning of the industrial parks;
- OUG 94/2001, OG 7/2001 and the orders of application – regarding (concerning) the tax exemption of programmers;
- Packet of laws for creating the frame that ensures the functioning and the development on good terms of the IT sector: the Law of the electronic signature (Law 455/ 2001); The Law of personal (private) data protection (Law 677/November 2001); Law of the electronic commerce (in debate in Parliament); Law regarding (concerning) free access to public interest information (Law no. 455/2001); Law 8/1996 regarding (concerning) the copyright; OUG 124/2000 concerning the establishment of the Computer Programs Register (Registrului de Programe pentru Calculator);
- OG 24/2002 concerning the collect through electronic means of local taxes and tolls;
- OG 20/2002 regarding public acquisitions;
- HG 182/28 February 2002.

The above show the gradual removal of the legislative obstacles legislative and, more importantly, the involvement of executive management of the state in the matter of the informational society.

2. CLASIFICATION OF SPECIFIC ICT ACTIVITIES - CAEN CODES

Through HG 656/1987 published in the Romanian Official Monitor (Monitorul Oficial al României), Part I no. 301 of 5 November 1997 the Classification of Activities in the National Economy – **CAEN** was approved.

The Classification of Activities in the National Economy – CAEN ensures the identification of all activities and their encoding in a unitary system. This allows the organization, rationalizing and information of the social-economical informational fluxes (flows), creating the processing facilities for the integration in the international and national systems of presentation and analysis of information.

The CAEN contents ensures the compatibility with other systems of information circulation (flow); similar classifications developed by ONU and CEE, as well as other classifications of goods(products), services and foreign trade with large transparency.

The activities in the **field of ICT** are situated in the following categories of **CAEN codes**[6]:

- 300 Production of means for computing and office technique
- 321 Production of electronic tubes and of other electronic components
- 322 Production of radio-television transmitters, telephony and telegraphy equipments and apparatus
- 323 Production of radio and TV receptors; apparatus for recording and reproduction of audio and video
- 642 Telephony, telegraphy, data transmissions
- 643 Radio communications
- 644 Other telecommunication activities unclassified elsewhere
- 721 Consultancies in the field of computing equipment
- 722 Development and providing of programs
- 723 Data processing
- 724 Data banks related activities
- 725 Maintenance and repairing office and accounting machines, and of computers
- 726 Other informatics related activities

[6] source: Romanian Government Decision (Hotărârea Guvernului României) no. 656/1997 concerning the approval of the Classification of Activities from National Economy – CAEN

At the end of 2000, a number of 4257 companies (firms) have lay down the balance sheet (audit) according to the above CAEN codes. Their distribution in CAEN codes is shown in the graph from **Figure 2.**[7].

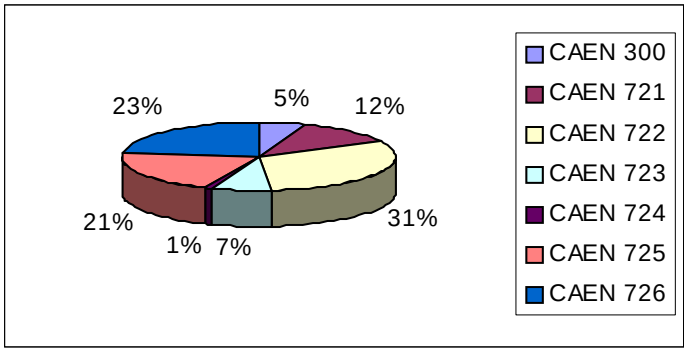


Figure 2. – Distribution of companies from the ICT fields in CAEN codes

These companies total a number of 14.843 employees. The distribution of these figures in CAEN codes is presented in the following.

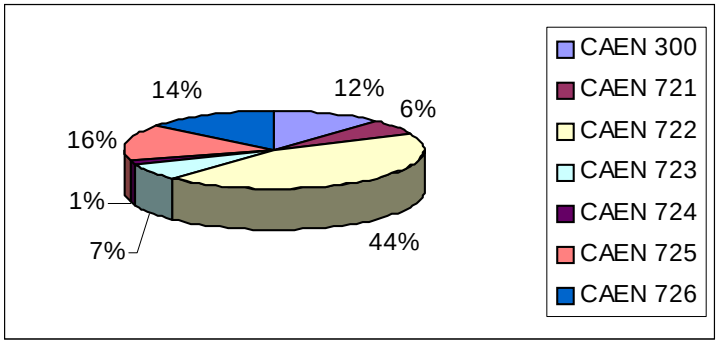


Figure 3. Distribution of number of employees in CAEN codes

The above highlighted companies are those companies that have as **main** object of activity one of the previous enumerated CAEN categories. Activities in the field of Information Technology and Communications are also se deploying in companies that don't have as **main** area development of activities according to the previous mentioned CAEN codes.

Of the companies with the above mentioned CAEN codes, 38% are situated in Bucharest, 7,4% in Cluj county, 4,5% in Braşov county, 4,1% in Timiş county, 2,9% in Iaşi county, 2,9% in Sibiu county, 2,6% in Constantza county, 2,6% in Bihor county, 2,3% in Dolj county, the rest of the counties having a percentage below 2%.

According to data provided by the **National Institute of Statistics** 77% of the total companies presented above are companies with mostly private capital (fund), these making **97% of total exports** in this field. 57% of the total number of employees of these companies work in the private sector, those having a 23% greater average rate of salary expenses for an employee then the companies in the field that have mostly state capital.

[7] source: http://www.mdp.ro/

3. CLASIFICATION OF SPECIFIC ICT OCCUPATIONS IN ROMANIA - COR CODES

In commercialism **standard classification systems** are used, which constitute the base components of the **economic informational system.** These constitute themselves in indispensable instruments for ensuring in a unitary manner the gathering, storing, processing and data analysis.

Their ensemble represents the **unitary system of classifications and lists,** which functions at macroeconomic level.

The elaboration of the new classifications of occupations in Romania (COR) had as a main goal the alignment with the international standards developed by the European Community (ISCO-88-COM) and UN (ISCO-88), thus ensuring the transparence of the social-economic information in the field of resources and using the labor force.

The Classification of occupations is the operation of systematization of occupations (jobs and crafts) of active population, in which an occupation is classified one time only.

Based on **HG no. 575 bis/1992,** regarding the "Implementing unitary lists of general interest provisioned in the general conception of information in Romania", the Ministry of Work and Social Solidarity – together with the National Commission for Statistics, the Ministry of Research and Education and the Ministry of Resources and Industries – has the responsibility of developing and "up to date" maintenance of classification of occupations (jobs – crafts) from Romania.

In Romania, the **ICT training** is done on different *grades of preparation*, for the formation of personnel in occupations with the following in **COR codes**:

Long-term university studies, with or without a master's degree:

- Computers 213101, 213102, 213103, 213104
- Automatics and industrial informatics 214402
- Applied Informatics 213101, 213102, 213103, 213104
- Mecatronics 214406
- Industrial robots 214402
- Applied electronics and communications 214406
- Economical informatics 213101, 213102, 213103, 213104
- Bookkeeping (Accountancy) and business (commercial) data processing 244109
- Mathematics + Informatics 232101, 213101, 213102, 213103, 213104
- Audio-Visual Communications 214406

Short-term university studies:

- Information Technology 213101, 213102, 213103, 213104
- Computer assisted technologies 213101, 213102, 213103, 213104
- Office computing 343101

- Electronic processing of economical data 213101, 213102, 213103, 213104
- Audio-video, multimedia 214406
- Technical Informatics 213101, 213102, 213103, 213104

Continuous forming / schools of masters (foreman) – with/without higher (superior) studies in other domains:

- Computer Consultant 213104
- System Engineer 213901
- Databases Administrator 213903
- Network Administrator 213902
- Chief-operator in industrial robots 312301
- Shift leader in computing centers or offices 312202

Post-high school course, refresher course:

- Computing equipments and networks technician 312203
- Computing systems maintenance technician 312203
- Technician-operator in industrial robots 312302
- Analyst-programmer assistant 312102
- Electronic computer and networks operator 312201

High school – technological or informatics course, vocational school:

- Programmer assistant 312101
- Computing equipments electrician-serviceman 724201
- Electro mechanic networks cables 724404
- Telecommunications electrician 724407
- Telecommunications fitter, adjustor; signaling, centralization and blocking installations724410

4. ICT EDUCATION AND TRAINING

As the real evolution of national economy, on a long, medium and short term evaluation, is clenched in the ties of a „vicious circle" of perpetuation and even deepen the gaps (postponements) of productivity and life standard compared to the European Union, „**The medium term National Strategy for economic development of Romania**", *proposes itself to ensure the attenuation and the gradual removal of the gaps towards the advanced countries*, the *modernization of our country keeping pace to the exigencies of transition towards an international-cultural economy* where the *educational chapter* represents the keystone of our social and economic development.

The main purpose in this domain is promoting the educational reform, both at the base level, as well as to the superior level, through modernization of the education system placing the stress on:

- Decentralization of the national education system;
- Promoting the contractual relationship between the education units and local communities;
- Organization of the national system of forming the managers from the education system;
- Developing (Encouraging) the use of information technology and communication in the educational process;
- Expanding of the national system of distance education;
- Applying the national program of adult education and the „*second chance in education*" program;
- Continuous professional forming, in respect with similar policies from EU, creating equal chances of access to information, research, technological-development, education and continuous forming;
- Restructuring of financing in education.

Starting from the fact that there is no field of activity where no processing and no information transmitting is done both inside and outside that particular field, education must be concerned with the gaining of knowledge and skills in using Information and Communications Technologies (ICT) by scholars and students. Introduction of ICT in education leads to the development of abilities of using ICT resources, to using these resources in learning other disciplines, to the development of skills related to accessing, interpreting and presenting information, to modeling and event control, to understanding the implications of ITC in society.

In Romania, the **ICt training** is done in **state and private institutions**.

Institutions accredited by the Ministry of Research and Education to achieve training in ICT field are part of the Pre-University and University Education System.

There are private institutions, accredited by the Ministry of Research and Education, by the Center for Training in Informatics or unaccredited, which have in their object of activity ICT training.

Regardless of the type of institution, state or private, accredited or not, in the perspective of **standardization at European level**, the ICT training is done according to the following levels:

- Long term university studies, with or without a master degree;
- Short term university studies;
- Continuous forming / schools of foremen (masters) – with/without higher (superior) studies in other fields;
- Post-high school course, refresher course;
- High-school – technological or informatics course, vocational school.

The professional forming programs ensures the gaining of **professional qualifications** according to the nation-wide acknowledged occupational standards approved by the **Council for Occupational Standards and Certification (Consiliul pentru Standarde Ocupaționale and Atestare), HG 779/1999, act of establishment. COSA**, national organism for certification of

professional qualifications ensures the quality of the system by authorizing the evaluation centers, by monitoring their activity, by evaluating and certification of evaluators.

According to the proceedings of the Law 151/1999, **qualification certificates** come as complement of the graduation degrees, which certify the fact that one person followed a training (forming) course and confirms the qualifications gained (obtained).

Professional qualifications are gained through initiation, qualification, specialization, re-qualifications (art. 5), and after sustaining and promoting the evaluation tests (set of practical and/or theoretical tasks) for professional qualifications, certificates are issued as follows: (art.30, 31)

- Certificates of professional qualification for initiation strategies and courses;
- Certificates of professional qualification for qualification or re-qualification courses;
- Certificates of professional qualification for perfection or specialization strategies and courses;
- Certificates of professional qualification for apprenticeship courses at place of employment;

The Decree provides (art.31, pct.3), that in case of professional forming programs structured on modules, at the completeness of each module, after sustaining the evaluation test, a certificate of professional qualification is issued.

The occupations of the – **high school course – technological or informatics, vocational school** level and of the – **post-high school course, refresher course** level are found in the educational offerings of the Pre-academic Education theoretical and technological ways.

The Level – Continuous Forming/ foremen (masters) school – with/without higher studies in other fields is accomplished mainly in private education institutions.

The above-mentioned levels are mainly achieved from institutions from the pre-academic education: high schools, vocational schools and foreman schools. It is observed that the most seek schools are those that have in their educational offer occupations din ITC field and are followed by the best students.

Creation of a policy and of a legislative frame for technical and professional forming and education face great hardness's in this moment in Romania. **MEC is facing with an extremely changeable market** from the viewpoint of the skills necessary to graduates in the regard of hiring; în parallel great pressures are made at political and economical level for the resolving of the problems generated by unemployment and the current recession. For example, in this moment, there are no policies or legal provisions that allow the continuous development (in next place) of the professional forming and education in Romania. **The offering is spontaneous**, coming as a response to the immediate needs and to the available resources in that particular moment, especially financier resources provided by external sponsors (donors). Following the adoption of *Law no. 76/2002 - Law regarding (concerning) the insurance system for unemployment and the stimulation of labor force occupation"*, published in The Official Monitor, Part I, no. 103, the *Ministry of Work and Social Solidarity* through *County Agencies of Labor Force Occupations* took the responsibility for the organization of the training courses for unemployed or other courses solicited on the labor force market. Training courses are organized by:

- Centers of the Ministry of Work and Social Solidarity (MWSS).
- Training centers established with foreign financial aid and now partially in responsibility of MWSS.
- Education institutions (vocational schools, universities etc.).
- State centers, private training institutions, consulting and training companies and NGOs.

MWSS holds a list with institutions "able" to organize training courses and, when are solicited, courses in a field for which its centers do not offer training, a local auction is held. The courses may last up to nine months and are organized by local employment of labor force offices at the express solicitation of companies.

Long or short-term university studies ensure high qualification in the ITC field. These studies are provided by: Universities, Technical Universities, Institutes, University Colleges and Post-University schools. In addition, individual (private) institutions offer **permanent education** courses (up to a year long and focused on certain qualifications required by the labor force market), **advanced studies for university graduates** (master's programs up to two years long), **post-university studies** (up to two or three years log for offering a higher professional specialization) and **doctorate studies** (from four to six years, for those institutions authorized by the National Council for Certification of the Academic Tittles, Diplomas and University Certificates (Consiliul Național pentru Atestarea Titlurilor Academice, Diplomelor si Certificatelor Universitare).

High qualifies human resources are worldwide acknowledged – 116 universities cu 36 faculties de Computers; in 1999 – 300.000 IT specialists (according to RACTDG).

Referring to the field of Information Technology and Communication, the "Porter's diamond" model, is presented in Figure 4.

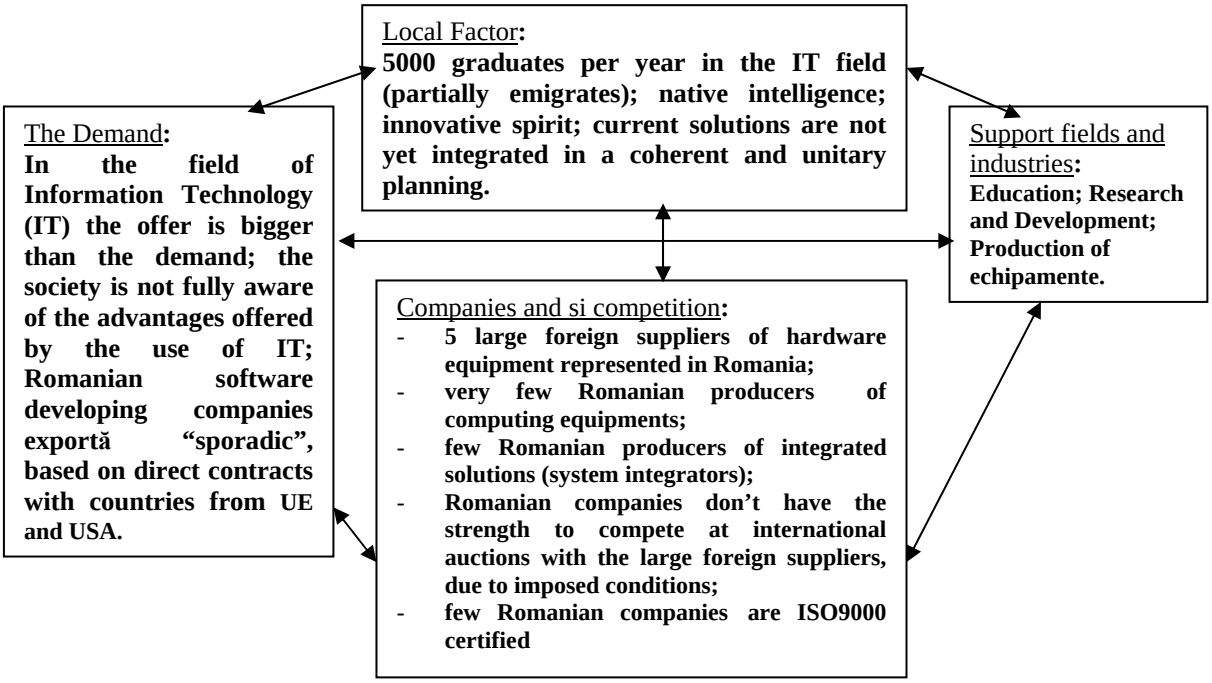


Figure 4. Porter's Diamond for the ICT industry

According to the above analysis, we note that a **competitive advantage of Romania** in this field might be the existence of **human resources** trained for ICT field.

5. CONCLUSIONS

Romania has yearly about 5000 students graduating in ICT's specialties, among the over 30000 engineers. The BrainBench Global IT IQ Report for 2001 positions Romania as the first country in Europe, and the sixth worldwide, in the classification of geographical areas with the highest concentration of certified professionals in 30 of the most critical information technology skill areas. The total number of ICT specialists is 63.600 of which 45.444 are working in the private sector,

of which 18.800 are software developers. Estimates indicate that 21,5% of the employees in the public sector use ICT tools in their work.

Starting from July 2001, the Romanian Government approved the income tax exception for the software developers, which, in about an year had as effect an average increase of 40% of the personnel engaged in these activities. The personal migration decreased during this period from 15% to 2% and were registered numerous cases of Romanian specialists who came back after few years spent abroad. The number of ICT specialists working in the private sector has increased during the last two years with 82%.

In 2001 the Romanian Government approved through Governmental decision the introduction of 500.000 computers in all Romanian schools and high schools, accompanied by the provision of Internet connection and educational software. The value of the project is about USD 260 million and is expected to be finalized until the end of 2004.

In Romania there are 2499 companies registered as software development companies, 2365 companies active in the IT services' sector and 288 companies registered in communications field. The export of software products grew in 2002 with an average of 45% and is comprised by IT products, as well as IT services.

6. References

[1] EUQuaSIT, www.euquasit.net.

[2] ESIS II Report: Information Society Indicators in the CEEC countries, www.eu-esis.org/esis2proj/

esis2index.htm

[3] IDC, www.idc.com.

[4] Romanian Ministry of Communications and Information Technology, Bucharest, Romania, www.mcti.ro.

[5] Romanian Government Decision (Hotărârea Guvernului României) no. 656/1997 concerning the approval of the Classification of Activities from National Economy – CAEN

[6] http://www.academiaromana.ro

[7] http://www.mdp.ro/

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