ANALYZING THE DEMAND IN THE INFORMATION AND COMMUNICATIONS TECHNOLOGIES SECTOR: THE CASE OF GREECE

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ABSTRACT

The rapid evolution of the information and communications technologies (ICT) and their catalytic effects on the economic activities gives particular research interest to the exploration of its labour market characteristics. This work focuses on the analysis of the demand for ICT workforce. The methodology used consists of recording and analysing the total of the relevant published advertisements in Greece during a period of 12 months. Extensive statistical analysis is carried out in order to identify the existing effects and associations among the key variables portraying demand. The research findings identify the demand's crucial characteristics and mirror the existing socioeconomic framework.

Keywords: Demand, labour market, information and communications technologies, multidimensional scaling, multivariate associations

1. INTRODUCTION

The information and communications technologies' (ICT) labour market presents particular investigatory interest due to its dynamics, which reflects into society and economy the tremendous evolution of informatics and its relevant technologies. Furthermore this sectoral market constitutes a fundamental resource for organizations of all types: profiteering and not profiteering ones, public and educational (Lindsay, 2002). The European Commission (2000) points out that the rapid technological rearrangements will have a direct impact to the labour market regarding the demand for specialized personnel. Thus this market has to be conformed as soon as possible in order to avoid the lack of highly specialized workforce. However the study of the relevant literature reveals that one of its most important parameters, the demand for specialized workforce, has not been examined sufficiently.

This research work focuses on the analysis of one of labour market's principal parameters; the demand for ICT personnel. For this purpose a two-stage model is introduced and implemented at national level in Greece. The first stage consists of the quantification of the total annual demand as it is presented in 1807 advertisements published in the daily press. The second stage contains the extensive statistical analysis of demand's characteristics and the relevant inferences.

Regarding the contents of the paper the next section is devoted to the literature review of the most important relevant published research works. The third section sets out the research objectives as well as its contribution and implications. Successively the methodology adopted is described and the topics of analysis are indicated. The main part of the paper is dedicated to the descriptive and analytical statistical elaboration of the collected data. The final section comments on the findings and the conclusions drawn.

2. LITERATURE REVIEW

The lack of correspondence between work offer and demand in the labour market has been considered since the decade of the '80s as the main generative cause for unemployment (Dantine at al., 1990). Katsanevas (1997) identifies four different kinds of this discrepancy: qualitative, quantitative,

geographical and related to time. As qualitative lack of correspondence is defined the existing difference between demand and offer in particular professions, specializations and skills. The existing numerical difference between the number of those seeking for work and the number of necessary workforce is considered as quantitative lack of correspondence. The geographical and time discrepancies express the existing differences related to location and time period. It has also been noted that the workforce's allocation in every profession reflects both; employees' personal selections as well as the structure of the total demand (Lenz, 1996).

Comparative data of 17 European countries (15 countries-members of the European Union, Norway and Switzerland) referring to the numerical comparison between supply and demand in the ICT sector during the year 2002 end up in a common conclusion: in all these countries the demand from the enterprises is significantly higher than the supply of the workforce (International Data Corporation, 2003). Regarding the ICT employees' skills required by the labour market four intersected requirements have been identified: the education, the experience, the technical skills as well as the professional and general skills (Information Technology Association of America, 2001).

Very few papers investigate exclusively the Greek ICT labour market. Most of them examine mainly the sector's professions; their nomenclature and their prospects, and secondarily the occupation areas, i.e. the vocational directions of the ICT enterprises (Kostoglou and Paparrizos, 2003).

Nevertheless it is apparent that the Greek ICT sector overstepped the three-year period (2001-2003) of demand lowering which marked nearly the whole labour market after the 'golden' period between 1998 and 2000. The first semester of 2004 was good with increasing demand for specialized personnel mainly due to the Olympic Games of Athens. The presence of imbalance in the next time interval is probable, as it will be difficult for the market to absorb a substantial number of executives who are out of work (KPMG, 2004). Despite these promising estimations a recently published survey has found out a substantial decrease, up to 30%, of the sector's vacancies during the last two years. The overproduction of graduates, the enterprises forced landing after the great expectations of the golden period, the long-drawn-

out economical recession have been recorded as the most important causes (newspapers "Express" and "Imerisia", 2005). This survey also notes that there is a lack of correspondence between the production of specialized personnel from the higher education and the creation of new assignments.

Regarding the methods used by the private sector for searching personnel, the most commonly used ones in the decade of '90s were the recommendations by company's employees, the connections with universities and bodies of professional training, the advertisements in newspapers, the commercial and professional editions, the local offices of the manpower employment organization, the co-operation with private employment agencies and the communication with companies reducing their workforce (Xirotiri-Koufidou, 1997; Skoulas and Oikonomaki, 1998). In a recent survey addressed to the ICT enterprises at national level the three main identified sources for ICT personnel employment are the recommendations by colleagues, the announcements in newspapers and those via a website (Kostoglou et al., 2004).

In a recent research carried out by the Federation of Greek Industries (2004) on a sample of 374 enterprises, 31 peak specializations requiring post-secondary or higher education are recorded, for which the largest demand increase is expected during the period 2005-2007. Amongst them are included the ICT graduates from Universities and TEI (expected demand increase 15%) as well as those from the Institutes of Vocational Training (increase 5%). Furthermore a large national survey on 6228 enterprises, ordered by the Greek Ministry of Labour (2002) and carried out by the consulting company "Metron Analysis", has shown that that in Attica, the most populated region of Greece, the computer programmers possess the second place regarding workforce demand, whereas at national level they lie in the ninth place.

Some published papers show that there is skills gab in the Greek ICT sector as in most European countries. The Greek Economical and Social Committee (2002) detected significant lack of highly skilled workforce supply and the existence of about 50000 relevant unoccupied positions. Another investigatory study has found out that enterprises face the largest difficulties in finding new graduates for employment for the specialities "persons with professional activity in the IT sector" and in "Informatics' technologies" (Klimopoulos et al., 2001). Moreover in the annual research of the Federation of Greek Industries (2001)

is reported that 19% of the enterprises are unable or face great difficulties to find ICT executives. Finally Bibby (2001) has also reported certain findings of a study by the International Data Corporation, which forecasted that in 2003 the ICT skills shortage in Greece will reach 11%.

3. RESEARCH OBJECTIVES AND CONTRIBUTION

Any sectoral labour market includes several effecting variables and its overall clear picture is shaped after the analysis of all of them. This work focuses on a rapidly altering, and therefore interesting, market, the ICT labour market. Its main objective is to examine thoroughly one of the most important variables, the demand for specialized personnel. All main parameters describing the demand are independently analyzed and furthermore some of their interactions are examined.

The results and the conclusions inferred are novel as this research, carried out at national level, is the first of its kind accomplished in Greece, and to the extent of our knowledge in any other country. The sole found similar study examines the dynamics of the engineers' labour market for a large period of seven years, based however on the advertisements on one major weekly bulletin (Goutsos et al., 2000).

This study's practical implications derive from the importance of the demand for both labour market's poles; workforce and employers. Newcomers as well as experienced employees will learn about the real labour market's needs and demands: which skills, general or professional, are required and which are unimportant, which is the profile and the location of the main employers, which is the demand's seasonality and - most importantly - which the ICT professions mostly wanted are. On the other hand employers will get informed about the present situation of the demand for ICT workforce at national level. They will also understand the existing deficiencies related to the syntax of advertisements for new personnel, a knowledge that will equip them with experience for their future employments.

This research is also useful for several countries having adopted information technologies in a similar way with Greece. The methodology applied here can be implemented in a nearly identical manner to any county or region as well as for any professional sector.

4. METHODOLOGY

The model adopted for the analysis is based on the assumption that the current sectoral labour market can be represented as far as the demand for workforce is concerned by the total of the advertisements seeking for ICT personnel, published in the press during a certain time period. Thus the analysis is based on the detailed elaboration of all the advertisements, which were published in the vast majority of the daily and weekly Greek newspapers during 12 consecutive months (1/1/2004 until 31/12/2004).

Principal source of information were the relevant detailed records of the Careers Service of the Technological Education Institute of Thessaloniki Greece, created on daily basis through a long-lasting cooperation with an indexing company. All ICT advertisements were tracked down and thoroughly tested for any multiple registrations, which were deleted. The advertisements were then classified according to their publishing date and registered using the spreadsheet MS-Excel. Totally 1807 advertisements corresponding to 5237 ICT vacancies were coded.

Twenty-three variables corresponding to the parameters portraying the ICT demand are identified and analyzed. The time and geographical spreading of the demand, the profiles of the employers, the characteristics of the vacancies, the required knowledge and skills of the candidate ICT workforce are the main investigated variables. Additionally the demand of the most popular ICT professions is explicitly examined.

5. ANALYSIS AND MAIN RESULTS

The statistical analysis was accomplished with the use of SPSS 12.0, the statistical package for the social sciences (SPSS, 2003). The analysis includes the calculation of descriptive statistics for the identification of the existing patterns in the advertisements for ICT vacancies. Multidimensional scaling is also used to identify the associations among the key research variables. Furthermore cross tabulations of the variables, which appear to be associated in multidimensional scaling is carried out, providing the distribution of the vacancies by critical independent variables.

5.1 The profile of the advertisements and vacancies

The monthly occurrences of advertisements and vacancies are presented in table 1. June, July, November and December present peaks regarding advertisements occurrence. The same table shows also the monthly distribution of vacancies. One third of all the vacancies are advertised in August. This feature will be further interpreted in a later section and is attributed to the offering of numerous secondary education teachers' vacancies just before the opening of the school year. January and November also present demand peaks. Furthermore, in most of the cases each advertisement describes one vacancy, while 11% of them describe two or three and almost 5% describe more than five vacancies.

TABLE 1: ADVERTISEMENTS AND VACANCIES CHARACTERISTICS

Monthly advertisements	(%)
January	8.5
February	9.4
March	5.9
April	6.8
May	5.5
June	10.2
July	9.0
August	6.6
September	7.7
October	7.4
November	12.0
December	11.0
Monthly vacancies	(%)
January	10.9
February	3.5
March	3.6
April	5.7
May	4.8
June	9.6
July	5.2
August	32.5
September	3.6
October	3.3
November	10.6
December	7.0
Vacancies per advertisement	(%)
1	80.6
2	7.8
3	3.2
4	1.8
5	1.7
>5	4.8

Regarding the candidates' characteristics table 2 presents the vacancies breakdowns by gender, age, degree, work experience, required ICT and foreign languages skills as well as military service fulfillment.

TABLE 2: PREFERRED CANDIDATES' CHARACTERISTICS IN THE ADVERTISEMENTS

Vacancies by gender	(%)
NS[*]	93.7
Male	1.5
Female	4.8
Vacancies by age	**(%)**
NS[*]	90.2
<=25	0.7
26-35	7.3
> 35	1.9
Vacancies by degree	**(%)**
University degree (Informatics)	31.5
TEI degree	24.1
Secondary education (general)	17.3
NS[*]	16.2
Higher Education Institute degree	3.8
Vocational Training degree (informatics)	3.8
Secondary Technological Education degree (informatics)	2.7
Master or PhD	0.5
Specialization certificates	0.1
Vacancies by experience	**(%)**
NS[*]	87.6
1 year	1.9
2 years	3.1
3 years	1.8
4 years	0.3
5 years or more	0.4
Required but not specified	4.9
Vacancies by military service fulfillment	**(%)**
NS[*]	96.8
Required	3.2
Vacancies by ICT skills	**(%)**
Operating systems	6.8
Databases	5.9
Networks	5.4
Other	5.4
MS-office	5.0
Programming	5.0
Web development	2.6
Hardware	2.0
Multimedia	1.9
Web use	0.9
Accounting software	0.9
Vacancies by foreign language requirement	**(%)**
NS[*]	89.7
Knowledge of one foreign language	1.2
Knowledge of English language	7.7
Excellent knowledge of English language	1.4

(*: NS = Not Specified)

The most interesting feature is that the majority of vacancies do not present details for several of the above characteristics. For example, most of the advertisements do not mention gender, age, experience, foreign language knowledge or ICT skills requirements. It seems that either the employer organizations lack of the expertise to describe vacancies adequately or the job positions are irrelevant of these characteristics. However, the vacancies are associated with a degree or diploma that seems being taken into serious consideration by the employers. More than half of them seek for Higher Education Institutes' (HEI) graduates: Universities or Technological Education Institutes (TEI). Secondary education graduates are placed third in offering positions while about 16% of the vacancies do not specify the degree.

TABLE 3: ICT JOBS' AND EMPLOYING ORGANIZATIONS' CHARACTERISTICS

Vacancies by offered job	(%)
Secondary education professor	29.1
Computer operator	20.4
NS[*]	14.7
Other	11.3
Computer programmer	8.6
Computer technician	3.1
Computers engineer	2.6
Higher Education Institutes professor	2.5
Private schools professor	2.0
Telecommunication and networks engineer	1.7
Telecommunication and networks technician	1.7
Informatics specialist	1.3
Web programmer/designer	1.0
Vacancies by employing organization	(%)
NS[*]	10.6
Public sector	49.7
Organizations attached to public sector law	3.8
Organizations attached to private sector law	4.4
Local authority organizations	9.9
Private sector (not ICT enterprises)	17.4
Private sector (ICT enterprises)	4.1
Vacancies by employing organizations' region	(%)
NS[*]	51.0
Athens	31.1
Thessaloniki	6.5
The rest of Greece	11.4
Vacancies by offered work status	(%)
NS[*]	39.1
Permanent employment	41.7
On contract basis employment	17.7
Tenure track employment	0.7
Part-time employment	0.7

(*: NS = Not Specified)

Table 3 portrays job descriptions and employer organizations characteristics. Regarding the ICT jobs, it should be noted that for reasons of economy only the densest categories are reported. Secondary education teachers and computer operators are the most populous categories among them, reaching jointly half of the offered vacancies. Almost 15% of the vacancies do not specify the exact job positions. Regarding employer organizations characteristics, the public sector offers half of the vacancies, the local authority organizations about 10%, whereas the private sector offers more 20% of the jobs.

5.2 Multivariate associations among key variables

This section strives to present the associations among all the variables presented earlier because it is of interest to explore which of them jointly affect the vacancies offer. Job description is considered to be a core variable for the analysis. Multidimensional scaling (MDS) is used to represent the associations of all the variables. From a non-technical point of view, the purpose of multidimensional scaling is to provide a visual representation of the pattern of proximities (i.e. similarities or distances) among a set of objects. The analysis usually produces a two-dimensional common space in which all the variables are placed. The axes are in themselves meaningless and the orientation of the picture is arbitrary. However, the interesting part of the application is the calculation and representation of the proximities of the variables in the common space. Two variables that are close to each other present a high association link according to a specified measure. In the present application of the method and since all the variables are categorical, Phi-square measure is used: first Chi-square measure is calculated based on the chi-square test of equality for two sets of frequencies; next Phi-square measure is calculated from chi-square measure normalized by the square root of the combined frequency. Table 4 exhibits the distances among variables. The smaller the distances are the greater the association between two variables. For example, regarding the core variable "job" it is obvious that it is closely associated, thus affected by, with "month", "region" and "organization". Table 5 presents the two dimensions coordinates of the variables, while Figure 1 illustrates graphically the common space. The next section uses cross tabulations of the data to describe in detail the associations between the variables.

TABLE 4: DISTANCES AMONG KEY VARIABLES

	Month	Organization	Work status	Sex	Degree/diploma	Age	Army service	Region	Language	Experience
Month	0.00									
Organization	0.24	0.00								
Work status	0.84	0.97	0.00							
Sex	0.90	1.13	1.05	0.00						
Degree/diploma	0.56	0.78	0.51	0.57	0.00					
Age	0.80	1.04	0.70	0.36	0.29	0.00				
Army service	0.60	0.80	1.09	0.42	0.59	0.59	0.00			
Region	0.22	0.43	0.65	0.77	0.35	0.61	0.56	0.00		
Language	0.46	0.30	1.27	1.26	1.02	1.24	0.87	0.68	0.00	
Experience	0.63	0.57	1.47	1.21	1.12	1.29	0.79	0.83	0.32	0.00
Job	0.14	0.27	0.96	0.89	0.64	0.85	0.53	0.32	0.39	0.51

TABLE 5: COMMON SPACE COORDINATES IN MULTIDIMENTIONAL SCALING

|	Dimension 1	Dimension 2
Month	0.06	-0.03
Organization	-0.12	-0.19
Work status	0.84	-0.33
Gender	0.60	0.69
Degree-diploma	0.60	0.12
Age	0.76	0.36
Army service	0.20	0.55
Region	0.28	-0.01
Language	-0.40	-0.08
Experience	-0.52	0.22
MS-office	-0.66	0.43
Operating systems	-0.19	0.30
Programming	-0.37	0.67
Networks	0.41	-0.31
Databases	-0.58	-0.24
Web development	-0.42	-0.66
Web use	0.03	-0.59
Hardware	0.54	-0.64
Multimedia	-0.06	-0.83
Accounting software	-0.87	-0.16
Other	-0.07	0.67
Job	-0.04	0.07
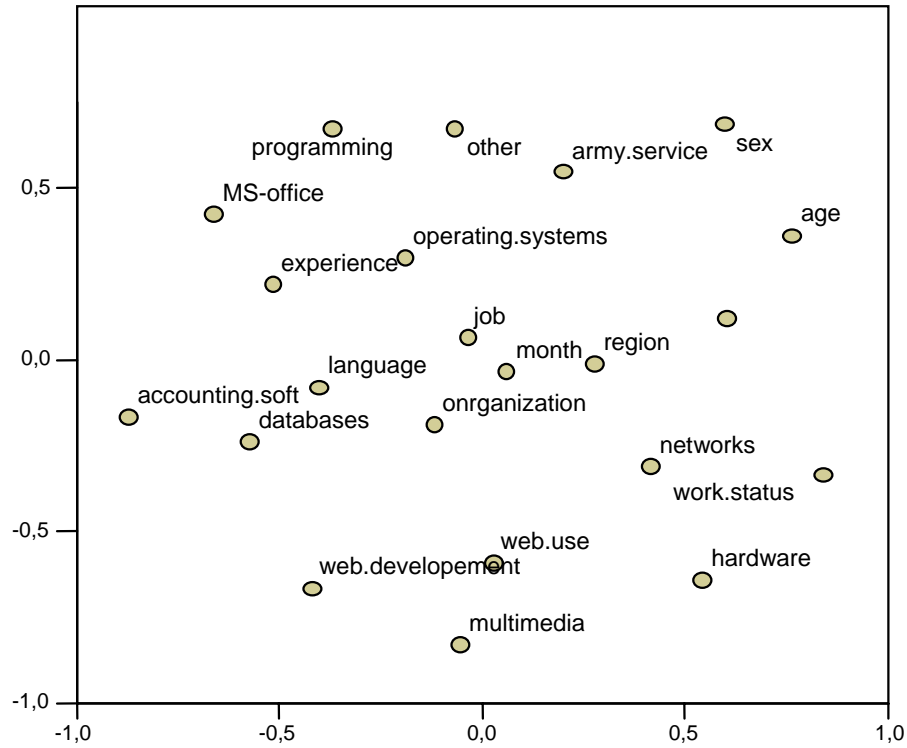
FIGURE 1: COMMON SPACE PRODUCED AFTER MDS OF KEY RESEARCH VARIABLES

5.3 Bivariate associations of the key variables

Regarding the representation of figure 1 some variables of particular interest are placed close together. The high proximities of the variables are indicative of the high associations between them; that is they interact to each other. Four variables; namely job, month, region and employing organization, are both closely associated with each other and crucial for the exploration of the vacancies distribution. The six association tables produced by all the combinations between the variables are presented in tables 6, 7, 8, 9, 10, and 11.

Table 6 presents the vacancies in relation to month and employing organization type. Some values appear striking since they reflect seasonal trends of job offering. For example, almost all of the vacancies published in August come from public sector organizations, while the local authority organizations place their vacancies in May and the private sector places it's vacancies in January and September. Regarding

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the relationship of vacancies to the month and the region of the employing organization (table 7) it is interesting to notice that most of the vacancies in August do not specify the organization region. Regarding the relationship between organization type and region (table 8) more than three thirds of the Public sector organizations do not specify region while local authority organizations are almost equally divided between Athens and the rest of Greece. Thessaloniki, the second largest city of Greece situated north, presents high values of private sector vacancies, along with Athens. Advertisements of organizations attached to public sector law mainly concern Athens or they do not specify region.

TABLE 6: VACANCIES BY EMPLOYING ORGANIZATION AND MONTH

	NS[*]	Public sector	Organizations attached to public sector law	Organizations attached to private sector law	Local authority organizations	Private sector (not ICT specializations)	Private sector (ICT specializations)
January	7.2	7.2	1.2	1.6	24.9	53.1	4.9
February	22.1	32.6	0.6	1.7	9.4	23.2	10.5
March	25.7	19.3	1.1	27.8		16.6	9.6
April	3.7	46.6	17.6	9.8	11.1	9.5	1.7
May	10.4	19.3	2.0		59.0	7.6	1.6
June	6.0	55.8	11.7	4.4	9.7	9.1	3.2
July	14.3	20.5	9.9	8.4	25.6	10.6	10.6
August	0.9	92.1	1.0	0.5	2.3	2.9	0.3
September	10.7	18.2	3.2	9.6	8.6	40.1	9.6
October	11.6	33.1	6.4	4.7	3.5	24.4	16.3
November	24.5	22.6	0.5	7.8		40.1	4.5
December	35.6	44.9	2.7	3.8		7.1	5.8

(*: NS = Not Specified)

TABLE 7: VACANCIES BY REGION AND MONTH

	NS[*]	Athens	Thessaloniki	The rest of Greece
January	53.6	15.6	4.7	26.1
February	1.7	46.4	26.0	26.0
March	18.7	39.6	5.9	35.8
April	52.7	33.1	4.1	10.1
May	1.2	69.9	4.0	24.9
June	53.0	37.5	5.4	4.2
July	26.7	48.7	8.4	16.1
August	90.9	3.6	2.8	2.6
September	7.5	50.3	33.2	9.1
October	36.0	30.2	20.3	13.4
November	33.2	55.2	3.2	8.3
December	6.0	75.1	5.8	13.2

(*: NS = Not Specified)

TABLE 8: VACANCIES BY EMPLOYING ORGANIZATION AND REGION

	NS*	Athens	Thessaloniki	The rest of Greece
NS*	9.7	54.0	13.1	23.2
Public sector	76.9	14.2	2.2	6.7
Organizations attached to public sector law	50.3	45.2	2.5	2.0
Organizations attached to private sector law	44.3	21.7	8.7	25.2
Local authority organizations	1.2	55.4	4.2	39.2
Private sector (not ICT specializations)	43.3	42.0	11.4	3.3
Private sector (ICT specializations)	6.5	65.7	27.3	0.5

(*: NS = Not Specified)

Tables 9, 10, and 11 demonstrate the associations between job and month, organization and region respectively. Table 9 reports percentages calculated within each month. One of the findings is directly connected with previous ones concerning job description: August advertisements mainly report vacancies for secondary education professors. September and October present higher percentages of vacancies for private schools teachers. Computer operator vacancies are advertised highly from April to July as well as in November and December.

TABLE 9: VACANCIES BY JOB AND MONTH

	January	February	March	April	May	June	July	August	September	October	November	December
NS*	23.5	11.6	16.6	30.7	22.1	13.5	15.4	1.5	24.6	10.5	23.1	29.9
Secondary education professor								89.5				
Private schools professor	0.5	3.3	2.1	0.3	1.2	1.8	2.6	0.9	10.7	13.4	2.3	
HEI professor	0.2	25.4	4.8	6.8	6.8		2.9	0.4	0.5	5.8	1.1	1.4
Computers engineer	0.5	4.4	0.5	0.7	3.6	1.2	7.7	0.6	12.3	1.2	5.6	5.2
Telecommunic. and networks engineer	8.1	1.1				1.0	0.7	0.5	1.1		3.1	1.6
Web programmer/ designer	0.7	1.7	4.8	1.7	0.8	1.2	0.4		4.3	1.2	0.5	1.9
Computer programmer	4.6	17.7	31.6	4.1	9.2	7.4	9.5	0.9	15.5	13.4	15.2	22.5
Computer technician	5.8	13.3	3.2	2.4	2.8	1.8	8.8	0.2	7.0	4.1	2.5	4.1
Telecommunic. and networks technician	0.7	3.3		3.0	0.4	1.0	3.3	0.4	2.7	1.7	6.3	1.6
Informatics specialist			0.5	1.4	0.4	1.8	7.0	1.1	1.6	6.4	0.4	0.3
Computer operator	12.8	2.8	14.4	41.6	50.2	59.2	24.5	3.2	3.7	8.1	35.0	23.0

(*: NS = Not Specified)

Table 10 demonstrates that secondary and higher education professors are exclusively employed in the public sector. Vacancies for computers engineers, telecommunication and networks engineers, web programmers/designers, computer programmers, computer technicians and telecommunication and networks technicians are placed in high percentages by private organizations. On the other hand, vacancies for Informatics specialists and computer operators are highly offered by public sector organizations.

TABLE 10: VACANCIES BY JOB AND EMPLOYING ORGANIZATION

	NS[*]	Public sector	Organizati-ons attached to public sector law	Organizati-ons attached to private sector law	Local authority organizati ons	Private sector (not ICT specia-lizations)	Private sector (ICT specia-lizations)
NS[*]	2.3	44.1	6.8	9.9	23.4	10.5	2.9
Secondary education professor		99.9				0.1	
Private schools professor	18.3	1.0				64.4	16.3
HEI professor		100.0					
Computers engineer	12.6	14.8	10.4	6.7	17.8	31.9	5.9
Telecommunication and networks engineer	9.1	19.3	6.8			61.4	3.4
Web programmer/designer	34.0				4.0	36.0	26.0
Computer programmer	46.4	3.3	0.4	10.3	2.9	24.8	11.8
Computer technician	16.0	21.5	1.8	0.6	3.1	35.6	21.5
Telecommunication and networks technician	12.4	20.2	3.4	1.1	1.1	49.4	12.4
Informatics specialist	20.3	39.1	8.7	7.2	8.7	14.5	1.4
Computer operator	16.2	35.0	9.3	6.1	26.6	6.9	

(*: NS = Not Specified)

In Table 11 it is interesting to notice that no vacancy regarding secondary education teacher position specifies the region. Private schools positions are mainly offered in Athens and Thessaloniki, while half of the University and TEI professor vacancies are offered in the rest of Greece and the other half is almost equally divided to vacancies in Athens and Thessaloniki. The greatest portions of vacancies for computers engineers, telecommunication and networks engineers, web programmers/designers, computer programmers, computer technicians, telecommunication and networks technicians, informatics specialists, and computer operators are those for Athens. One quarter of the web programmer/designers vacancies is offered for Thessaloniki, and the relevant percentage is slightly higher for informatics specialist. One out of five computer programmers' vacancies are offered from organizations located in the rest of Greece.

TABLE 11: VACANCIES BY JOB AND REGION

	NS[*]	Athens	Thessaloniki	The rest of Greece
NS[*]	17.8	55.1	6.1	21.0
Secondary education professor	99.9	0.1	0.1	
Private schools professor	5.8	42.3	46.2	5.8
Higher education institutes professor		23.8	20.0	56.2
Computers engineer	11.1	64.4	7.4	17.0
Telecommunication and networks engineer	55.7	37.5	6.8	
Web programmer/designer	20.0	56.0	24.0	
Computer programmer	10.9	57.6	11.2	20.3
Computer technician	16.0	57.1	18.4	8.6
Telecommunication and networks technician	34.8	49.4	14.6	1.1
Informatics specialist	20.3	40.6	27.5	11.6
Computer operator	42.0	36.4	2.7	18.9

(*: NS = Not Specified)

6. CONCLUSIONS

This paper focused on the analysis of the annual demand in the information and communications technologies sector. The methodology introduced was applied at national level in Greece. Extensive statistical analysis was carried out in order to identify the bivariate and multivariate associations among the key variables, which portray in detail the sectoral demand. This analysis led to some interesting findings.

Numerous published advertisements describe an about triple number of vacancies ranging through a broad spectrum regarding general and professional skills, educational background and geographical distribution. However the majority of the advertisements address very little information to potential employees regarding crucial characteristics of the offered jobs. The job description and the required degree of studies are the characteristics that are usually addressed to the public. On the contrary ICT skills and several other characteristics such as gender, age and required working experience are hardly reported. This pattern could be attributed either to the lack of relevant know-how by the employing organizations or to the fact that these characteristics are considered by the employers as irrelevant to their vacancies.

Half of the vacancies derive from the public sector. This feature mirrors the structure of the Greek socioeconomic framework where the state has a great share of the employment. Also a third of the ICT

vacancies are offered in Athens. This is also particular to the pattern of urbanism occurring in Greece since about half of the total population resides in the capital.

Although the monthly distribution of the ICT advertisements is relatively smooth, the actual number of published vacancies presents very high seasonality. This feature is not that interesting by itself since seasonality is a consequence of different occupations, job types and work offer. However the fact that this specific seasonality appears exclusively due to the pattern of the public sector vacancies makes a significant difference.

Finally, in our point of view it would be useful to carry out this ICT demand analysis at international level, that is to say implement this model simultaneously in more countries. A comparative study of the partial national results would present particular interest. Furthermore among our aims is the continuation of the ICT advertisements' analysis covering the next five-year period in order to investigate whether the current patterns of the demand are preserved or significant changes are noted.

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