The Macedonian Information Technology (IT) Workforce Demand Survey 2005

MASIT - Macedonian Association of Information Technology

http//:masit.org.mk

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The Macedonian Information Technology (IT) Workforce Demand Survey 2005

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Letter from MASIT

Letter from MASIT

Toni Petreski, President
Ljubisav Lazarevic, Deputy President

Dear *MASIT IT Workforce Demand Survey 2005* Reader:

MASIT IT Workforce Demand Survey 2005 is the flagship publication of the Macedonian Association of Information Technology (MASIT), a consortium of 58 leading Macedonian IT industry companies. *MASIT IT Workforce Demand Survey* is the benchmark study measuring the Macedonian IT workforce, providing government leaders, industry executives, media, and academics with unparalleled information on the current situation with the IT professionals.

MASIT is excited to partner for this 2005 edition with the e-Business Department of the Economic Faculty from the University of St. Cirrilus and Methodius in Skopje, a leading research institution for this kind of survey.

You will be excited to learn that our 2005 edition for the first time includes Macedonian IT workforce analysis, and forecast data through 2006. Taking into account the dynamic and rapidly changing IT market environment, we will be also extremely pleased to provide online updates to *MASIT IT Workforce Demand Survey 2005* data every twelve months, available from the MASIT website, www.masit.org.mk

We trust you will enjoy this unique report.

Sincerely,

Toni Petreski, President
Ljubisav Lazarevic, Deputy President

About MASIT

Macedonian Association of Information Technology (MASIT) is a volunteer, non-profit association of private companies. The association was founded in 2000 as an initiative of the top fifteen Macedonian IT companies.

Today, MASIT is the voice of the Macedonian IT industry. The association represents 58 companies in all IT sectors including internet services, IT consulting services, software and electronic content. MASIT members represent about 80% of the domestic IT market.

MASIT is governed by a fifteen member Managing Board which is elected by the General Assembly. The Managing Board includes the President, Vice-President, four Committee Deputy Presidents, and the IT Experts Council Deputy President.

Work Committees, as defined in the MASIT Strategic Plan, are covering the following activities:

Committee for Institutional Development
Committee Regulations: number of members, action plans, budgets, incentives;
Internal Regulations: internal documents, business plan, marketing plan (PR tools), activities planning & monitoring;
Introduction of "Member of MASIT" logo;
Inter-Cluster Cooperation: enhancing networking among IT stakeholders (Faculties, Government, Financial Institutions…)
Networking: providing members with access t o their peers in nearly every geographic region in the world – MASIT became WITSA member on 5.05.2005; next: EITA membership);
Self-sustainability: New demand-driven services introduction.

Committee for Local Market Development & Events Planning;
4th SEEITA & MASIT Open Days & **IT Conference**: IT vendors, MNCs, domestic corporations, IT companies – 11-12 May 2006, Skopje, Macedonia;
Regional Cooperation Projects: fostering the regional cooperation (SEEITA conference, EU projects…)
IT Public Procurements Project: based on WITSA IT Procurement recommendations (During 2006…).

Committee for Competitiveness;
IT Cluster Facilitation: Macedonian Competitiveness Activity (USAID funded project) ends in September 2006;
IT Industry Survey: IDC/EITO Methodology – IT market size, 6 sectors SWOT analysis, relative position of the IT industry within the economy (revenues, value added, employment, foreign trade), October 2005 – March 2006;
Financial Institutions: IT guarantee fund.

Committee for Education & Workforce Development;
IT Workforce Demand Survey: based on Education Round Table (2.06.2005) with the 6 IT Faculties to develop internship programs & IT education curriculum (October 2005-March 2006);

Today, MASIT is the voice of the Macedonian IT industry. The association represents 58 companies in all IT sectors including internet services, IT consulting services, software and electronic content.

About MASIT

Training Programs: CMMI (IT Mark), Project Management, Product Management & Marketing, Technology Sales…;
Inter-Cluster Project Development: ex. joint participation with the IT cluster stakeholders;
Introduction of the ECDL – European Computer Driving License.

Committee for Software and Export
IT Awards: introduction of **"MASIT Annual Awards"** based on WITSA Annual Awards;
Quality Standards: **CMMI (IT Mark)** Certification, **PMI** Certification;
Conferences Participation: CeBit, Systems (Germany), Orbit-EX (Switzerland), CBI (Holland), Regional IT conferences…

IT Experts Council
- 48 IT Experts Council members (individuals)
- Action Plan in accordance with the MASIT Action Plan

The governing bodies also include an Advisory board, an Ethics Committee, and IT Expert Council. Salaried staff includes Executive Secretaries.

MASIT participates in events related to the IT industry and promotion of the accomplishments of the members in the area of IT software and services development. MASIT representatives participate in the definition of the IT regulatory framework and help to define national IT standards. MASIT facilitates the IT through different public-private-partnership initiatives.

MASIT fosters the international cooperation with other associations, and in that MASIT became a member of the World Information Technology and Services Alliance (WITSA) in May 2005.

Among the number of activities undertaken by MASIT, some of the most important ones and also some of the annual ones as:
Important events in which MASIT actively participated:
- World Summit of Information Society –WSIS, November, 2005, Tunis
- ISIS Conference, November, 2004, Istanbul, Turkey
- Systems 2004 /2003 / 2002 , October, 2004 / 2003 / 2002,Munich, Germany
- Infosystems, 7-10 October, 2004, Thessaloniki, Greece
- Conference organized by the Macedonian Ministry of Economy, June, 2003, Vienna, Austria
- CeBit 2004 / 2002, March 2004 / 2002, Hannover, Germany
- World Summit of Information Society –WSIS, 9-13 December, 2003, Geneva, Switzerland
- ISIS workshop, October 2003, Belgrade, Serbia, and Sofija, Bulgaria
- IT Star Meeting, June 2003, Opatija, Croatia

About MASIT

Events Organized by MASIT
- 4th SE Europe IT Association (SEEITA) and 3rd MASIT Open Days, 11-12 May, 2006, Skopje, Macedonia
- 3rd SE Europe IT Association (SEEITA) and 2nd MASIT Open Days, 17-18 February, 2005, Skopje
- Presentation of Compuware, December, 2004, Skopje
- Promotion of the Trado portal, March 2004, Skopje (see: www.trado.org)
- MASIT Open Days, 15-17 December 2003, Skopje
- The 1st SEEITA conference, November 2003, Skopje

Today, MASIT:
- Is a financially independent association
- Fully employed staff
- Is the moving force of the Macedonian IT
- The president of MASIT is a member of the National Competitiveness and Entrepreneurship Council of Macedonia
- Active member of the European Union projects for development of the Information society
- Has been formally recognized by the Government of Macedonia as an important partner in the development of the information society in Macedonia. MASIT is a member of the taskforce for the adoption of the National Information Society Strategy of Macedonia, leaded by the Committee for Information Technology of the Government of Macedonia

MASIT - Macedonian Association of Information Technology

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MASIT Members

MASIT Members

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•	Akcent	URL: www.accent.com.mk
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•	Blank	URL: www.blank.com.mk
•	CodEx Computers	URL: www.codex.com.mk
•	Com Trade	URL: www.comtrade.com.mk
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•	Digit Computers	URL: www.digit.com.mk
•	Duna Computers	URL: www.dunacomp.com.mk
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•	Ekonet	URL: www.ekonet.com.mk
•	Enter	URL: www.enter.com.mk
•	Euronetcom	URL: www.euronetcom.com.mk
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•	Inet	URL: www.inet.com.mk
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•	Infinite Solutions	URL: www.infinite.com.mk
•	Infomedia Sistemi	URL: www.infomedia.com.mk

MASIT Members

- ITS Iskratel   URL: www.its-sk.com.mk
- Kabtel   URL: www.kabtel.com.mk
- Login Systems   URL: www.loginsys.com.mk
- Lancom Computers   URL: www.lancom.com.mk
- Macedonian Business Systems   URL: www.mbs.com.mk
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- Netcetera   URL: www.netcetera.com.mk
- Nextsence   URL: www.nextsense.com
- On Net   URL: www.on.net.mk
- Pacom Company   URL: www.pakom.com.mk
- Pexim Computers   URL: www.pexim.net
- Proinfo   URL: www.proinfo.com.mk
- Rema kompjuteri   URL: www.rema.com.mk
- Seavus   URL: www.seavus.com
- Sigma SB   URL: www.sigmasb.com.mk
- Simt   URL: www.simt.com.mk
- Sinerdji   URL:www.accent.com.mk
- S&T Hermes Plus   URL: www.snt.com.mk
- Semos Computers   URL: www.semos.com.mk
- Semos Edukacija   URL: www.semoskoc.com.mk
- SRC SI   URL: www.src.com.mk
- UltraNet   URL: www.unet.com.mk
- Ultra   URL: www.ultra.com.mk
- Zona   URL: www.zona-online.com

Executive Summary – IT Workforce Demand Survey 2005

Executive Summary–IT Workforce Demand Survey 2005

The Macedonian ICT Workforce demand survey was conducted by MASIT (Macedonian Association of Information Technology) in January 2006, according the WITSA (World Information Technology and Services Alliance) methodology. The main goal of the survey was to get inside view of the current and future situation in the domain of the ICT workforce demand and its structures. The survey had 82 organizations respond from different industries classified as IT entities (41), non-IT entities (33) and other organizations (8, public enterprises, governmental institutions and associations). For additional input MASIT and MCA were consulted. These are the main findings:

- The most frequently reported main activity (28%) of the firms is software development/services. 71% of the firms are concentrated on domestic market.
- The majority of IT workforce (30%) are programmers and software engineers, 17% work as technical support and 12% are database designers and administrators.
- The structure of the IT workforce will not change in 2006, but the demand will grow for all types of IT specialist, mostly for programmers and software engineers (39%), IT sales and marketing (17%), database design, development and administration (11%) and system analysis and integration (10%).
- The acceptance rate for the sample is 10.8% and for IT firms is 8.4%. The main employer of the IT workers is and will be IT industry. In the hiring process the most important skills are considered technical skills.
- IT workers in terms of soft skills have highest average mark in personal skills and lowest in transcription and documentation skills, which were seen as not important by many firms.
- The most important rated soft skills in the future according the survey will be interpersonal/ team skills, personal skills and creative thinking.
- According the survey results, Macedonian IT workforce, in terms of business skills, excels at customer service skills and understanding company's goals, which have the highest grades. Concerning the needs for business skills in the future, emphasis is given on the better project management, planning and marketing/ sales skills.
- Self assessment scores show that the highest levels of technical skills were related to database design and development, technical support and programming. The most frequently found skills are network design and programming. Assessment scores show that PC Hardware (technical support), SQL and XML/HTML (programming), LAN/WAN and TCP/IP (network design and technical support), Oracle and Windows OS have the highest level of skills. The most demanded specific technical skills in the near future will be Java (programming) only for IT firms, Oracle (Database design) and Visual basic and SQL (programming).
- There is mutual consensus that it is very important to improve the quality of the higher education and the majority of the respondents stressed out that argument. The recommendations are focused on close cooperation between IT industry and the universities in order to improve the curricula to match the needs for well trained and educated specialist for the future firms' demand.
- From the results the government should speed up and enforce its efforts in full support of the IT industry and information society. Market mechanisms should be created to support healthy business climate and environment for international cooperation.

The most important rated soft skillsin the future according the survey will be interpersonal/ team skills, personal skills and creative thinking.

1. Introduction

The IT Workforce Demand Survey for the Republic of Macedonia was conducted by MASIT (Macedonian Association for Information Technology).

The survey was financially supported by the PSP Project within the German Agency for Technical Co-operation (GTZ) and is based on the WITSA (World Information Technology and Services Alliance) methodology of the similar surveys conducted with USAID's support in different countries. The final report was conducted by the e-Business Department of the Faculty of Economics, University St. Cirrilus and Methodious in Skopje.

The Survey was fully supported by five faculties educating IT professionals in Macedonia: the Faculty of Electrical Engineering – Skopje (provided 11 questionnaires), Faculty of Mechanical Engineering – Skopje (provided 8 questionnaires), Technical Faculty – Bitola (provided 8 questionnaires), Faculty of Natural Sciences – Skopje, Faculty of Economics – Skopje and SEE University - Tetovo.

All data were collected by MASIT during October-January 2006, and the survey report is produced by the Faculty of Economics in Skopje.

The main aim of the survey is to determine the current number and different structures of the IT employees in the Macedonian IT and non-IT companies in order to predict the future size and skills requirements of the country's IT workforce.

The global growth of IT is slowing down due to many well elaborated factors (bursting of the worldwide dot-com and telecommunication bubbles, economic cycles, achieved level of digitalization in some countries, global political and economic situation). However, offshore outsourcing is experiencing constantly rising trend. That trend in directly influencing Macedonian IT industry output and growth, as well as the demand of skilled workers in IT firms. As regards firms and organizations that are not primarily in IT industry, evidenced a steadily rising trend of introducing IT in production and business processes. Also, the government in all levels is doing initial steps in applications of e-government, e-procurement etc. Publicly owned firms are still legging behind the developments. IT enabled services in public firms, medical centers and other organizations are in their primetime, but we are expecting rise of this services in a due time. In all mentioned activities, the demand of IT workers is growing, and in the survey findings that is confirmed.

According to the Survey structure, the report is divided into five main areas:
1) Sample description (Firm's demography)
2) ICT professionals/workers
3) Sourcing of ICT workers
4) ICT workers skills assessment
5) Other questions

All possible and relevant statistical findings will be presented according to those areas.

> The main aim of the survey is to determine the current number and different structures of the IT employees in the Macedonian IT and non-IT companies in order to predict the future size and skills requirements of the country's IT workforce.

2. Survey Methodology

2. Survey Methodology

The survey period covered approximately three months (20.10.2005 – 13.01.2006). The survey was computer assisted and completely web based. The survey was jointly designed by MASIT and MCA (Macedonian Competitiveness Activity, project funded by USAID), in accordance with the similar surveys conducted in Sri Lanka and Philippines.

Sampling frame was based on previous knowledge of MASIT members about the main users of IT services and about the largest employers of IT workforce. The respondents were directly targeted. Having in mind the size of the country, the stratification by industry was not done, although different industries are present in the sample structure. Some industries, for example tourism, textiles, food processing, TV and radio stations, transportation and postal services are not included. Also, education and health industries were not targeted at all. Ministries, like Ministry of defense or Ministry of interior affairs were not part of the sample. Still, the sample consists of main IT firms and financial institutions, as well as the biggest manufacturing firms in some industries. In respect that this is the first research of this type, certain inconsistencies were noticed in the questionnaire and this research will be of great value not only because of the conclusions and estimates originating from it, but also because the achieved experience for the future surveys. The faculties mentioned in the Introduction helped a lot in the creation of the sample due to close cooperation that they have with the business and other communities that are IT workers employers and IT service users.

Table 1.
Survey statistics report

	Count	Completed / Started	Completed / Viewed
Completed	82	28.7 %	18.6%
Started	286		
Viewed	442		

Table 1 explains the following findings: only 19% of those who opened the questionnaire decided to fill it, although almost 30% of those who opened it started to answer at lest the first question. Those percents can be explained by the wide interest about the research, but also by the relatively long and detailed questionnaire.

Besides previously mentioned institutions that helped to collect data, discussions were also conducted with several associations to gather additional information and inputs and to ask their assistance in informing their members about the Survey and its objectives. Those associations are MASIT and AmCham (American Chamber of Commerce in Macedonia).

3. Definition of an IT worker

For the purpose of this survey, IT worker is precisely defined, so there were no dilemmas in answering the related questions. IT worker definition was applied to those individuals employed in the areas of:

- Data base design, development and administration
- Digital media specialist
- Systems analysis and integration
- Network design and administration
- Programmer/software engineer
- Technical support (including IT operators in contact centers)
- Technical writing/ training
- IT sales/ marketing
- Operator in contact center (not related with IT)
- Data encoding/ transcribing
- Other – define

More detailed description of job classification under each category can be found in the Appendix A – *IT Workers*. It is obvious that not all workers who are employed in the IT sector are considered IT workers (i.e. accountants, secretaries, etc). IT workers came from IT and non-IT sectors and other organizations (public enterprises, governmental institutions and associations) (see Figure 1). Detailed description of job categories allowed precise classification of IT workers. From the survey data 78% of the IT workers are employed in IT sector and 15% are employed in non-IT sector.
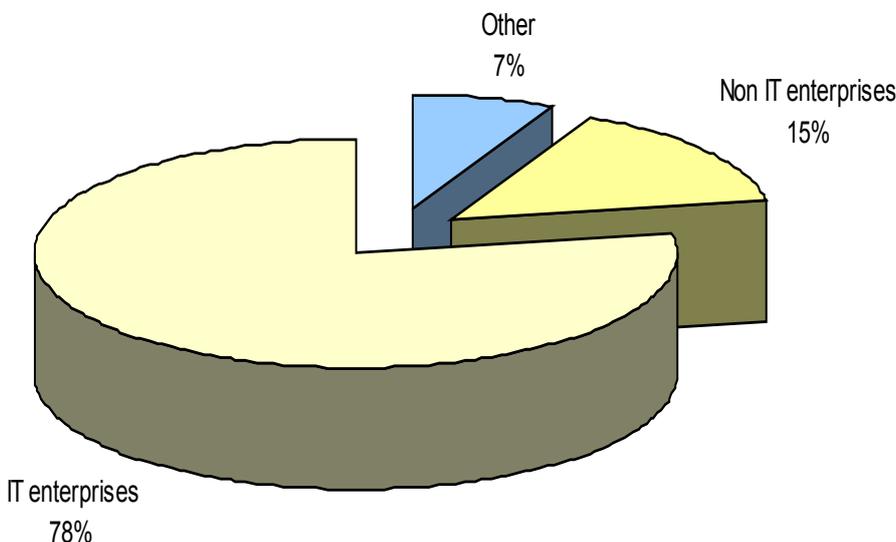
Other
7%

Non IT enterprises
15%

Figure1.
IT workers by sector (IT and non-IT
and other)

IT enterprises
78%

4. Sample description (Firm's demography)

4. Sample description (Firm's demography)

The structure of the people who actually filled in the questionnaire, or the respondents profile according their position in the firms is the following:
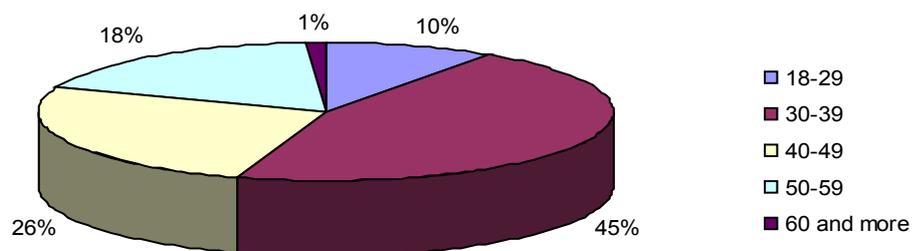
Figure 2.
Survey respondents by position
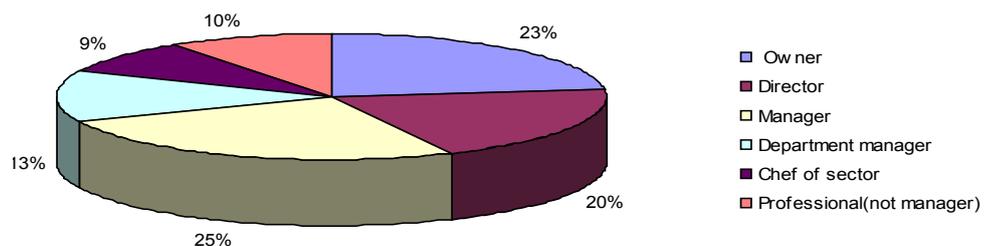
From the Figure 2 one can conclude that the majority of the respondents are actual owners (23%) and managers (25%) as expected, because the most of the IT firms are small. In medium and big firms it is obvious that middle ranked managers filled in the questionnaire.

From the Figure 3 showing their age distribution, it can be concluded that 71% of the respondents are between 30-50 years old, namely they are in their more productive age, and 83% are men, but only 17% are women.

Figure 3.
Age of the respondents

4. Sample description (Firm's demography)

The structure of the sample by the type of the firms/organizations is important to get the whole idea about the demand of IT workforce and from the Figure 4 we can see that 51% of the responses came from IT type of firms and 40% came from non IT type of firms.

From IT type of firms (41), only six are not members of MASIT. Two of them didn't declare any IT employee and 1 firm declared only one IT employee. Alkatel with 32 IT workers and Mobimak with 52 IT workers, are firms from telecommunication sector (their primary activity according the responses is telecommunications) and one firm with 14 IT workers is in wholesales and retail. Taking into account that the majority of the IT firms are members of MASIT, and that the structure of the IT workforce and demand for IT workers is similar for both MASIT and non MASIT members, the final conclusions for the whole IT sector sample are the same for MASIT members too. Because telecommunication companies, are declared as IT firms, for this survey the meaning of the terms IT and IT is identical.
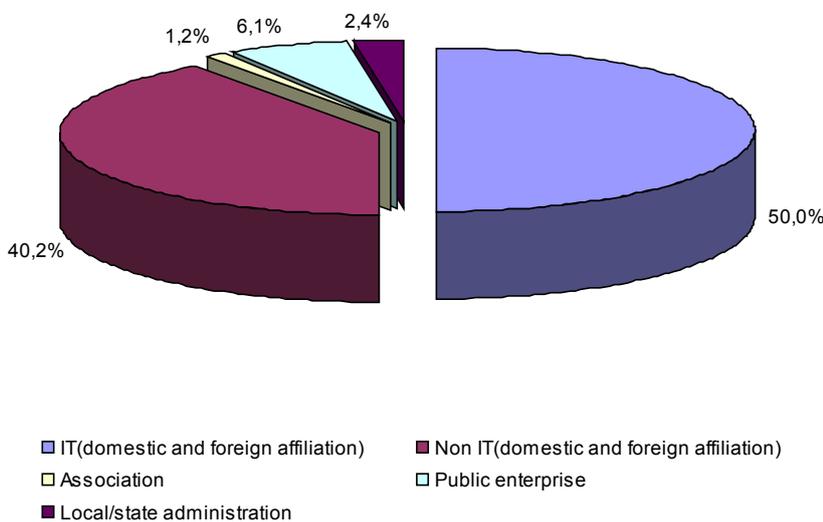
Figure 4.
Survey responses by type of enterprises

1,2%   6,1%   2,4%

50,0%

40,2%

- ☐ IT(domestic and foreign affiliation)
- ☐ Non IT(domestic and foreign affiliation)
- ☐ Association
- ☐ Public enterprise
- ☐ Local/state administration

From the answers about their revenues, the distribution is the following: the majority of firms are small (28), and 18 of them didn't answer that question. Big corporations are 9 (see Figure 5).

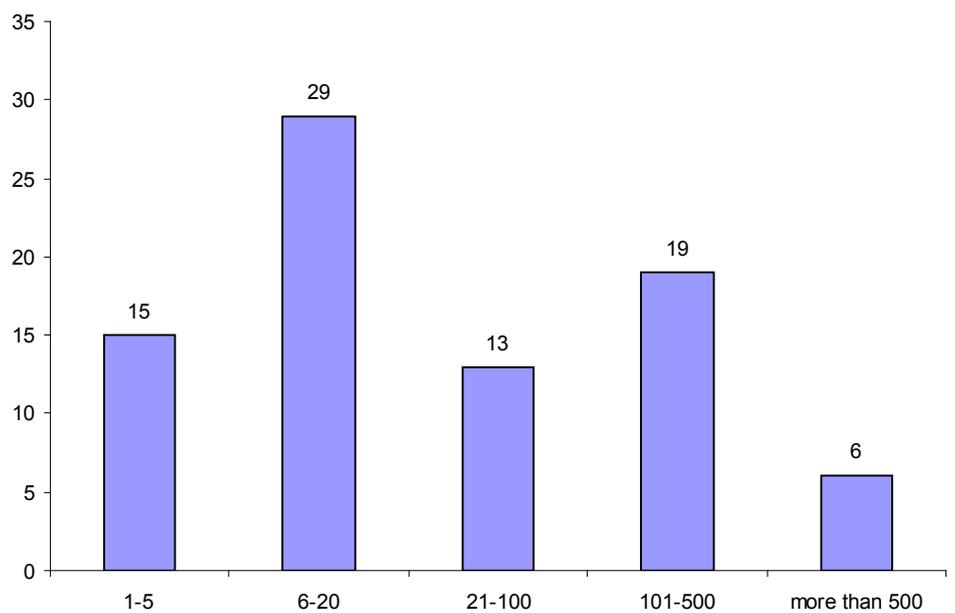## 4. Sample description (Firm's demography)

Figure 5.
Enterprises by revenues
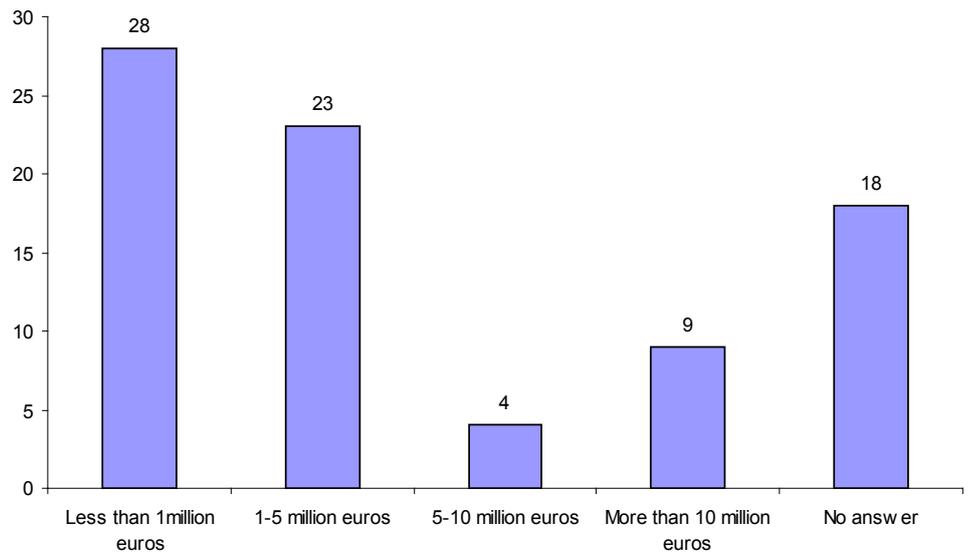
From the enterprises that answered the questions, 44 are small with not more than 20 employees, and only 6 are big firms with more than 500 employees (see Figure 6).

Figure 6.
Size of the firm by the number or employees

As expected, 74% of the firms are established after 1990, and 21% are new firms (see Figure 7).
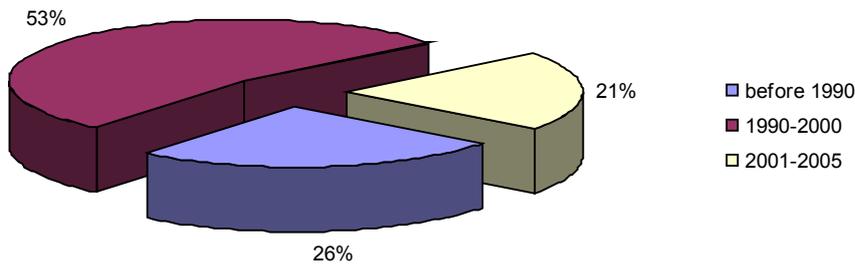
4. Sample description (Firm's demography)

53%

21%

26%

- before 1990
- 1990-2000
- 2001-2005

Figure 7.
Structure of enterprises by the
establishment date

Based on the survey results, 57.3% of the organizations in the sample are focused in one sector exclusively, and the rest of them (42.7%) are active in more than one sector. The distribution presented in Figure 8 about the enterprises' main activity is crucial about the further estimates of the workforce demand.

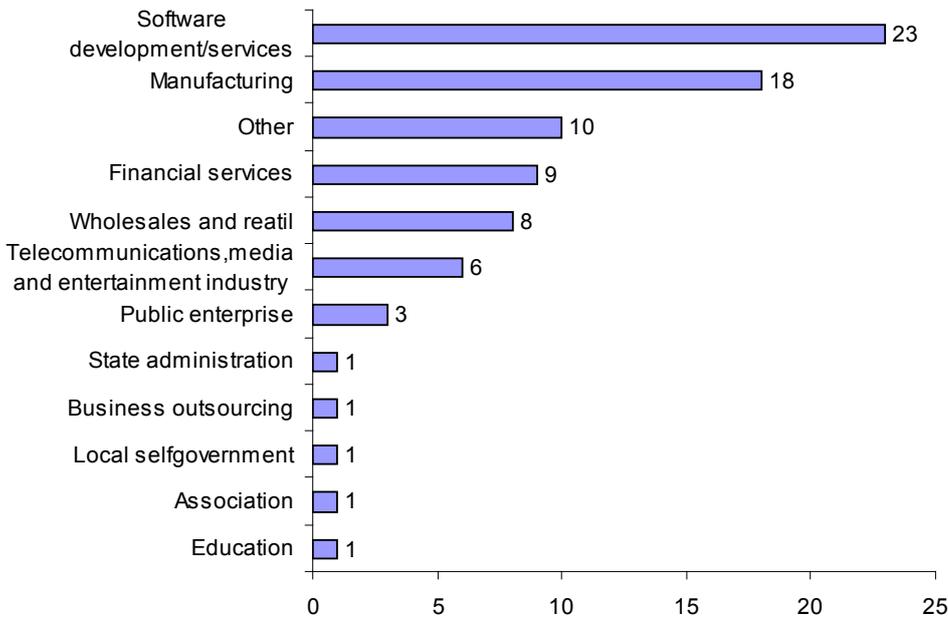| Activity	Value
Software development/services	23
Manufacturing	18
Other	10
Financial services	9
Wholesales and reatil	8
Telecommunications,media and entertainment industry	6
Public enterprise	3
State administration	1
Business outsourcing	1
Local selfgovernment	1
Association	1
Education	1

Figure 8.
Enterprises by their main activity

4. Sample description (Firm's demography)

Of those (10) who answered that they have other main activity 1 is advertising company, 2 are construction firms, 2 are audio-video recording companies, 1 firm is consulting firm and 3 firms have systems integration as main activity; one organization, GTZ REDEM is a project within the German Agency for Technical Co-operation (GTZ).

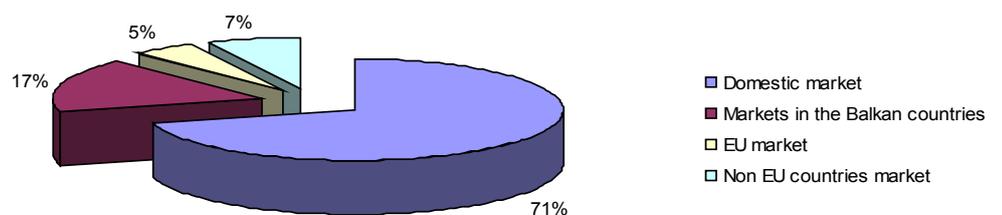*Figure 9*
Enterprises and their main markets

Figure 9 presents the structure of the firms according their main markets. Still, most of them are focused on the domestic market (71%), the Balkans or the regional market is also important (17%) and 12% are working for EU markets and other oversees countries.

5. IT professionals/workers

Based on the survey results, the structure of the IT workforce in 2005 is presented in the Figure 10.

It is noticeable that 30% are programmers and software engineers and 12% are database designers. Those who work as technical support are 17% of the workforce of the sample. The change in the structure of the IT workforce for the surveyed period (2004, 2005, 2006-predITion) can be observed from the Figure 11.
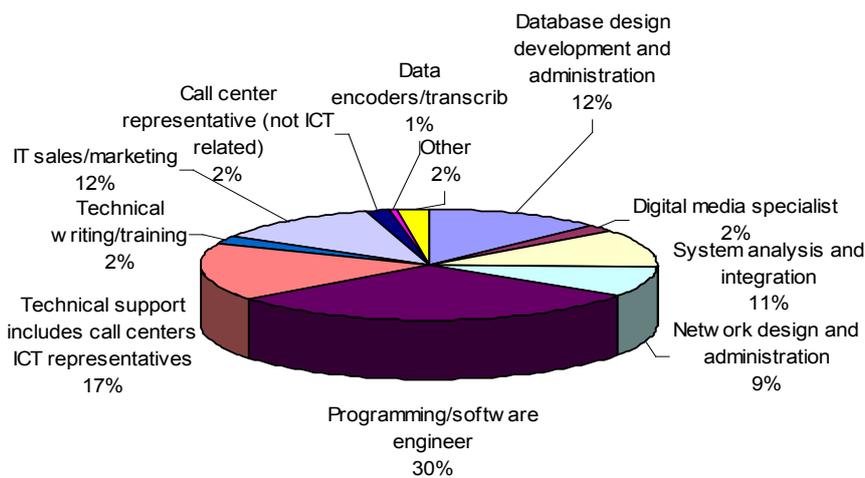

Figure 10.
Distribution of IT workforce by
specialization
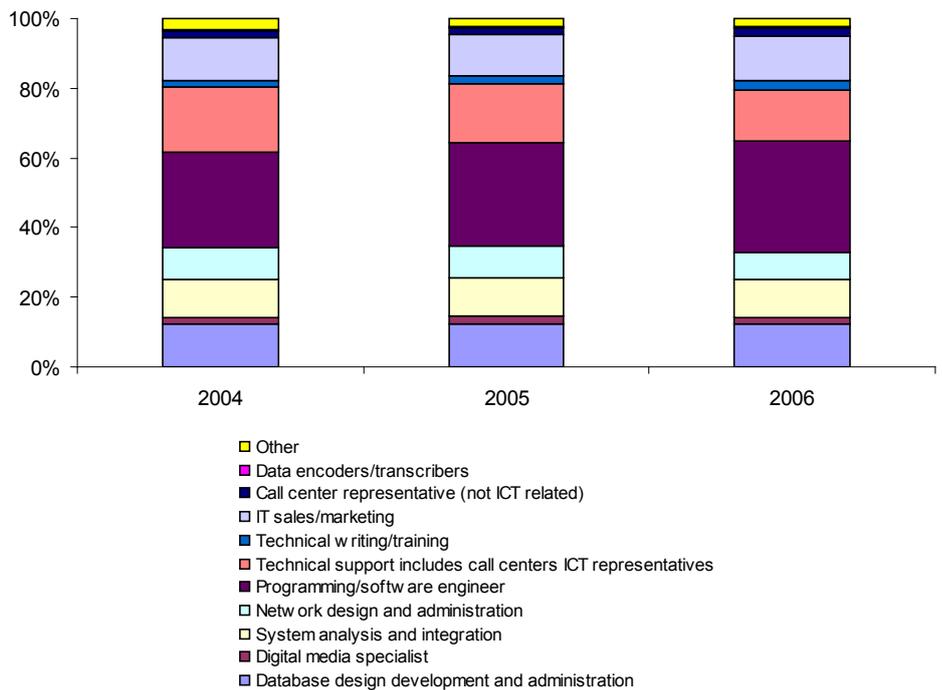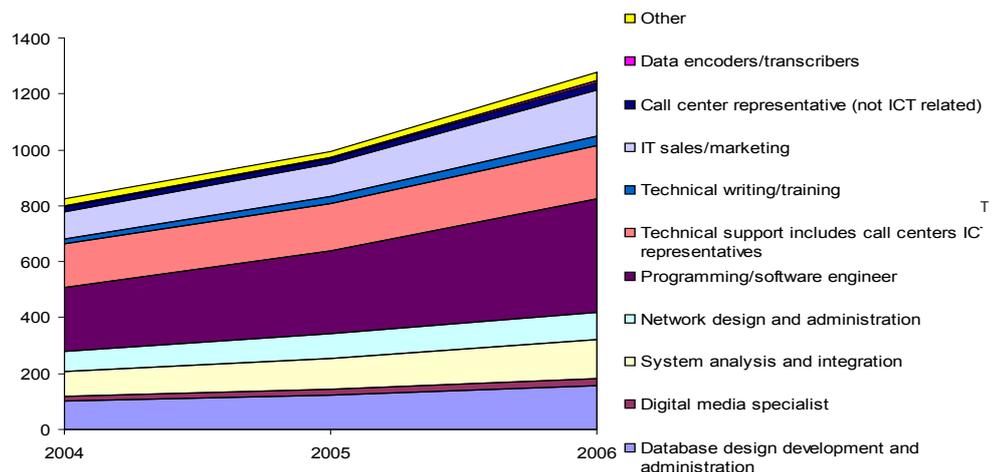
5. IT professionals/workers

Figure 11.
Distribution of IT workforce (2004, 2005, 2006)

Legend:
- Other
- Data encoders/transcribers
- Call center representative (not ICT related)
- IT sales/marketing
- Technical writing/training
- Technical support includes call centers ICT representatives
- Programming/software engineer
- Network design and administration
- System analysis and integration
- Digital media specialist
- Database design development and administration

From the Figure 11 one can see that the structure is not changing almost at all. However, the demand is growing for all types of IT specialists, but mostly for programmers and software engineers. The predITed growth rates are varying among types of IT specialists, and the demand for call centers representatives and IT sales/marketing specialists will grow the most (see Figure 12). The demand for digital media specialists, technical writing/training specialists and software engineers will approximately grow by the rate of 36.5%.

Figure 12.
Number of IT workers from the survey

Legend:
- Other
- Data encoders/transcribers
- Call center representative (not ICT related)
- IT sales/marketing
- Technical writing/training
- Technical support includes call centers ICT representatives
- Programming/software engineer
- Network design and administration
- System analysis and integration
- Digital media specialist
- Database design development and administration

5. IT professionals/workers

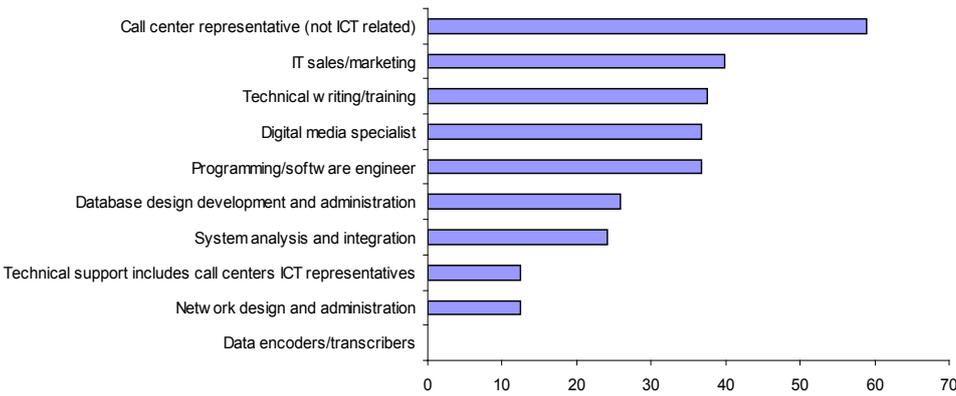|	
Call center representative (not ICT related)	
IT sales/marketing	
Technical w riting/training	
Digital media specialist	
Programming/softw are engineer	
Database design development and administration	
System analysis and integration	
Technical support includes call centers ICT representatives	
Netw ork design and administration	
Data encoders/transcribers	

*Figure 13.
Demand growth rates for IT
specialists*

The structure of the demanded IT workforce for 2006 based on the results from the survey is presented on the Figure 14. Half of the demanded workforce should have specialized knowledge in either programming or software or database design development. According the survey, there will be no demand for data encoders and transcribers.

The main conclusion from the survey data is that there is a trend of growing demand for IT specialists. From the sample structure it would be incorrect to predIT the aggregate demand for 2006, but to stay on the safe side it would not be less than new 500 IT workers.
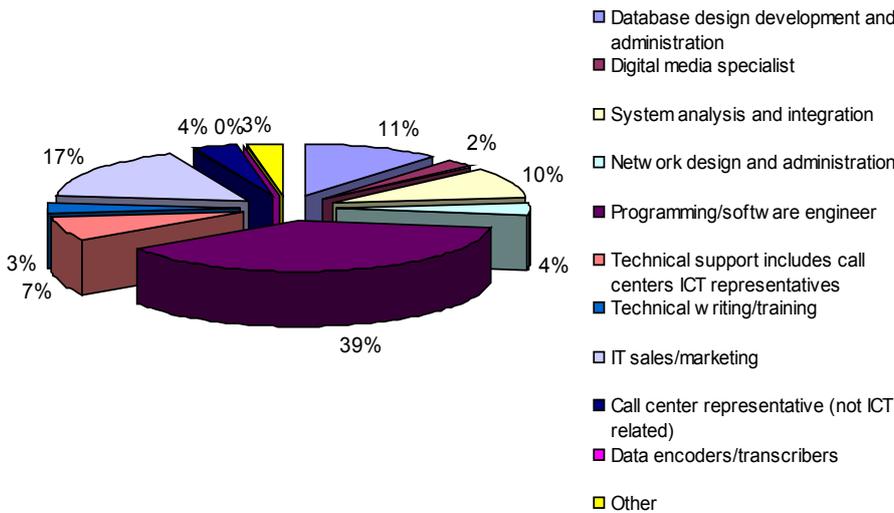

- Database design development and administration
- Digital media specialist
- System analysis and integration
- Netw ork design and administration
- Programming/softw are engineer
- Technical support includes call centers ICT representatives
- Technical w riting/training
- IT sales/marketing
- Call center representative (not ICT related)
- Data encoders/transcribers
- Other

*Figure 14.
Structure of the demanded IT
specialists for 2006*

The distribution of the IT workforce by the type of enterprises (see Figure 15) is changing in years, but as expected IT firms are going to be major employers for new IT workers.

5. IT professionals/workers

Figure 15.
Distribution of IT workers by type of enterprise (IT or non IT)
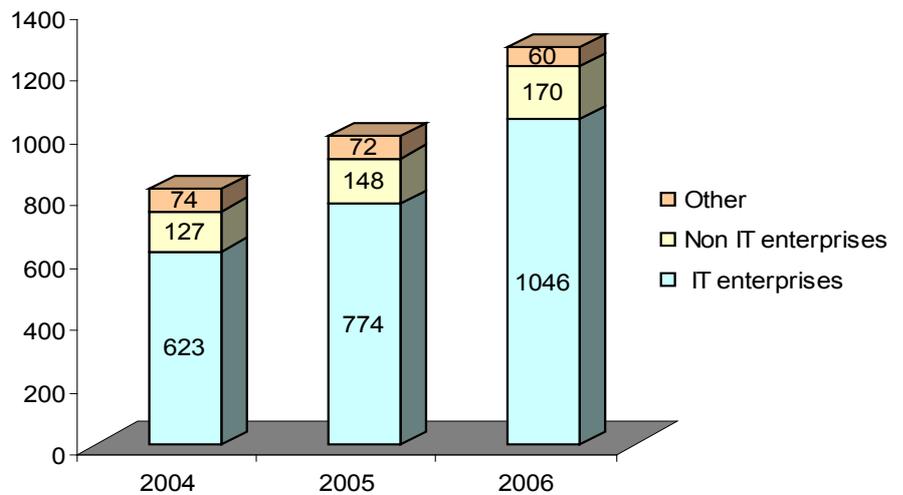
In 2004, according the survey data, 18 firms didn't have IT workers at all (one firm is established in 2005). Surprisingly, but 3 IT firms didn't reported that they employ IT workers, and 12 non-IT firms didn't reported any IT employee. Any type of fluctuation of the workforce occurred in 19 firms, while in 40 firms there were no changes (they didn't employ or lay off any workers). 23 enterprises reported fluctuation of the workforce in both directions (newly employed and fired employees). There are 16 enterprises that only employed new workers, and 3 firms had outflow of workers. According the sex structure, men fluctuated as inflow twice more than women, and as outflow three times more were men than women.

Figure 16.
Structure of IT workforce according the educational levels (%)
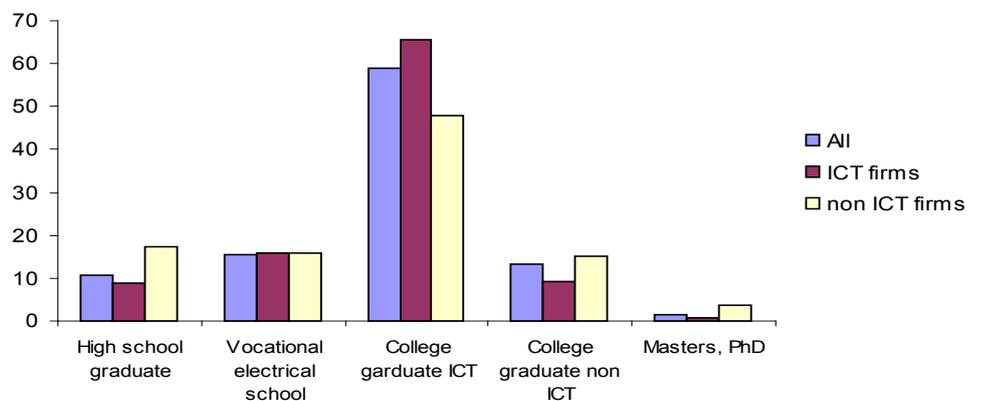
In the Republic of Macedonia, according the survey, 59% of the IT workforce is college graduates from IT departments (see Figure 16). In IT firms this percentage is higher (66%).

6. Sourcing of IT workers

From the survey results it is possible to calculate the acceptance rate. The acceptance rate is surprisingly low, but it can be explained by the fact that fluctuation of IT workers is high and from the fact that the unemployment rate in the country is extremely high (in the last 2-3 years is always above 36%). The acceptance rate for the sample as whole is 10.78%, while for IT firms is 10.35% and for on IT firms is 8.36%. In 2004, more than 1800 people are reported in the survey that applied for an IT job, but only196 were accepted-employed. They were mainly hired in IT firms (154) and only 26 were hired in non IT firms. Based on these results, one can conclude that still IT firms are predominant employers of IT workforce.

In the hiring process, different skills are tested and required from different employers. Respondents were asked to rank three most important skills (six options available) required from new applicants starting from 1(the most important) to 3 (the least important) (see Table 2).

Skills	Average rank		
	All firms	IT firms	Non IT firms
Business skills	2.08	2.00	2.27
Basic(soft) skills	1.81	1.83	1.77
Education	1.86	1.93	1.80
Experience	2.00	2.03	1.82
Technical skills	1.73	1.71	1.60
Other	2.08	2.13	1.50

Table 2.
Average rank for required skills

From the ranks, it is obvious that technical skills are the most valued skills. There is big diversity in answers under category "other skills", such us loyalty, honesty and other answers that can not be characterized as skills.

As a sequence, respondents were asked to rank (from 1 to 3) universities and faculties that are providers of IT college graduates with appropriate skills most wanted on the market. (see Table 3).

Rank	Faculty of Electrical Engineering-	Faculty of Natural Sciences - Informatics	Faculty of Economics	Faculty of Mechanical Engineering
First	60	14	1	
Second	16	46	1	1
Third	1	4	3	7

Table 3.
Ranking of the educational institutions for IT workforce (frequencies)

Faculty of Electrical Engineering was 60 times ranked on the first place, while Department of Informatics at the Faculty of Natural Sciences was 46 times ranked as second important. University of Southeast Europe (SEEU) 17 times was ranked as third, while Technical Faculty in Bitola 4 times.

6. Sourcing of IT workers

When asked about the three educational centers for non-degrees courses that provide adequate IT/computer training, respondents answer that Semos, Nextsense and Aleksandrija are the best in that category. The results are shown in Table 4.

Table 4.
Ranking of the educational centers (frequencies)

Rank	Semos	Nextsense	Aleksandrija	Faculty of Electrical Engineering	Others
First	18	8	6	7	18
Second	14	5	9	2	13
Third	1	1	9	0	16

Certification programs are seen by a large proportion, over (40%) of the respondents as very important in the hiring process and the same percent of respondents that they are important (see Figure 17). Only 5% answered that certification programs are not important.

Figure 17.
How important are certification programs (%)
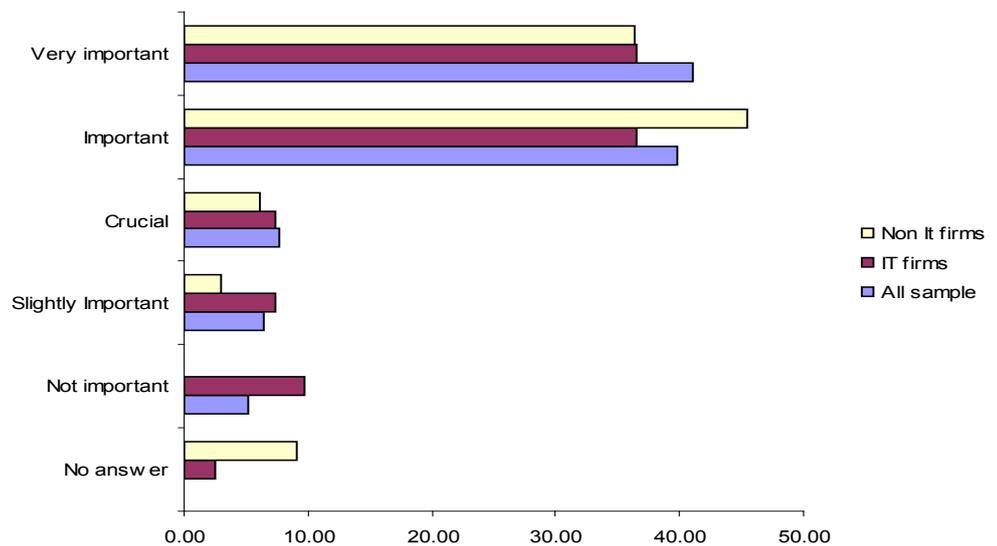
Of the certification programs that were of significance to their employees, Microsoft certification received the most frequent number of responses (44), Cisco is on the second place with 28 responses, Oracle got 18 responses, IBM 14, and others got 37 responses (see Table 5).

Table 5.
Importance of certification programs (frequencies)

Rank	Microsoft	Cisco	Oracle	IBM	Others
First	25	7	5	7	10
Second	9	13	10	1	15
Third	10	8	3	6	12

7. Workers skills Assessment

From their employees, firms expect a combination of technical skills, educational level, business skills and soft skills. Therefore, employers were asked to assess the skills of their current IT employees. The assessment included different type of skills (see List).

List of Soft Skills and Business Skills

Soft Skills
Business Skills

- Oral communication (English)
- Transcription/documentation skills (listening, encoding)
- Written communication (English)
- Planning skills
- Interpersonal/team skills (handling conflIT, motivating others, working with others, negotiating, sensitivity to others)
- Marketing/sales skills
- Personal skills (confidence, action oriented, self motivated, perseverance, ability to handle stress, ability to learn quickly)
- Understanding business functions (HR, finance, operations, production, marketing)
- Presentation skills
- Project management
- Critical thinking skills (understanding and analytical thinking)
- Understanding the company's overall business goals and objectives
- Creative (out of box, innovative thinking)
- Customer service skills

7.1. Soft skills

IT workers in terms of soft skills have highest average mark in personal skills and lowest in transcription and documentation skills, which were seen as not necessary by many firms (see Figure 18). The meaning of the values on the scale is the following: 1 - no skills, 2 - basic knowledge, 3 - competent, 4 - advanced and 5 - expert.
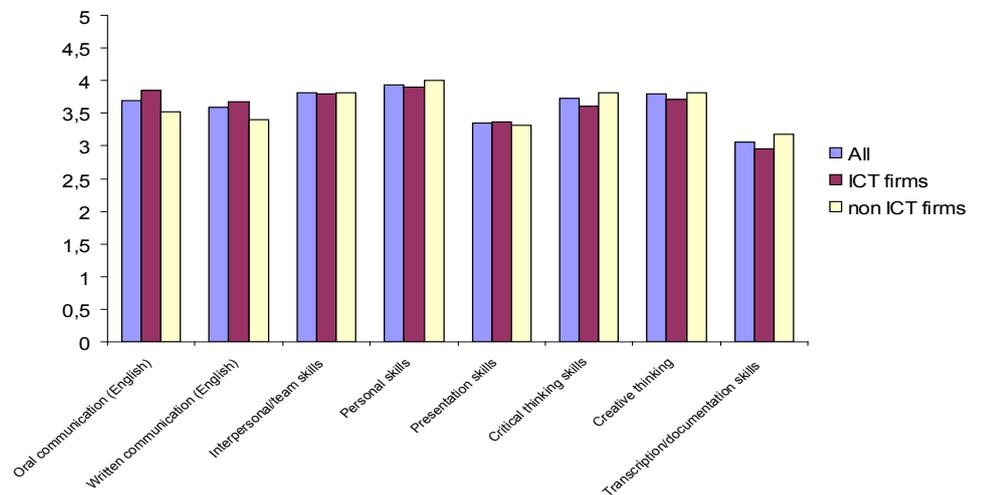
Figure 18.
IT workers soft skills assessment

From the results of the survey it is obvious that English (oral and written communication) is considered as the most prominent feature of the IT workforce in the IT firms.

The most important rated soft skills in the future according the survey will be interpersonal/ team skills, personal skills and creative thinking (see Table 6).

Table 6.
Top 3 soft skills in the future (rank)

Skills	All	IT firms	Non IT firms
Interpersonal/team	1	1	1
Personal	2	2	3
Creative thinking	3	3	2

When respondents were asked to give their opinion on the statement: "English proficiency has declined significantly", 73% disagreed with the statement (see Figure 19). It means that new IT employees have better abilities in English language.
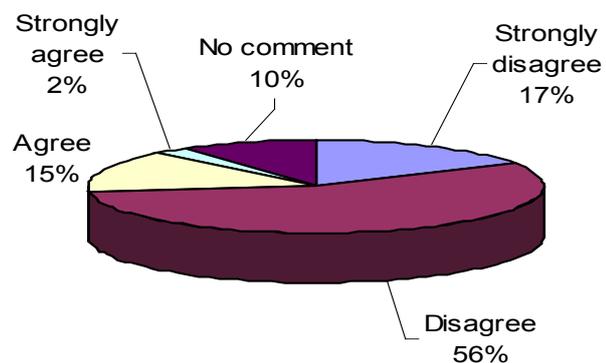
Figure 19.
English proficiency has declined significantly

7.2. Business skills

The role of IT in organizations is changed. IT has active role in performing company's functions and accelerates the integration of different functional areas within the company. Also IT professionals are involved in mixed and cross-functional business teams. IT is the main driving force and facilitator of the business activities. IT is crucial in improving the productivity and efficiency of business processes and in promoting innovation in the enterprises. However, mere investment in IT is not enough, as technology by itself does not automatically lead to substantial efficiency (business) gains. According the survey results, Macedonian IT workforce excels at customer service skills and understanding company's goals (Figure 20), which have the highest grades. The meaning of the values on the scale is the same as in the Figure 17: 1 - no skills, 2 - basic knowledge, 3 - competent, 4 - advanced and 5 - expert.

Concerning the needs for business skills in the future, emphasis is given on the better project management, planning and marketing/sales skills (see Table 7).
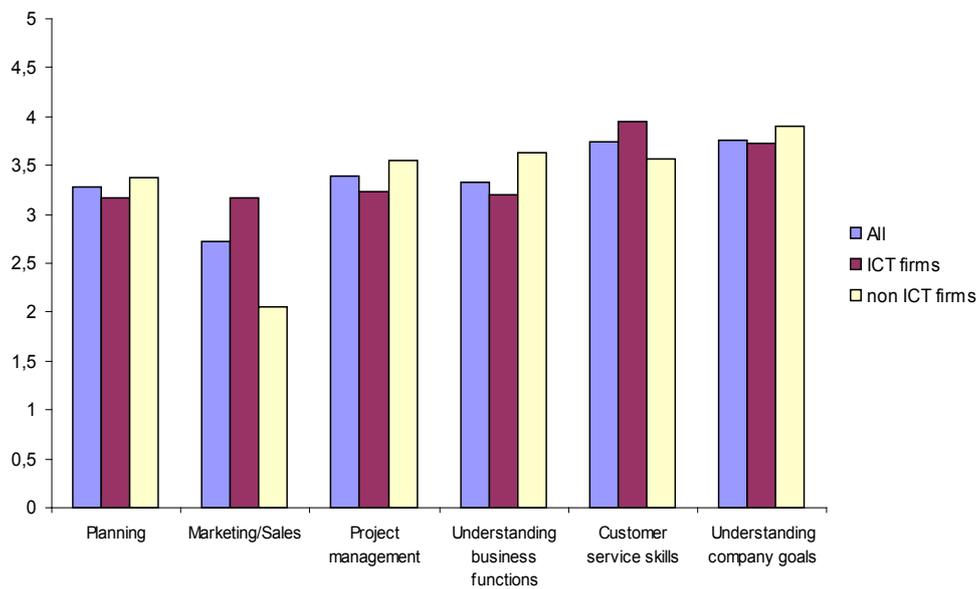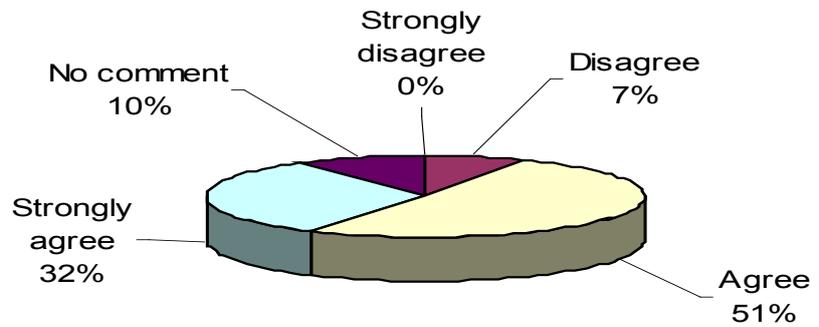

Figure 20.
IT workers business skills
assessment

Skills	All	IT firms	Non IT firms
Project management	1	1	1
Planning	2	3	-
Marketing/sales	3	2	-
Understanding company goals	-	-	2
Understanding business functions	-	-	3

Table 7.
Top 3 business skills in the
future (rank)

7.2. Business skills

When employers were asked their opinion on the statement "Most IT workers today are proficient in technical skills but lacking in soft and business skills", 83% of the respondents agreed, and only 7% disagreed with no one strongly disagreeing (see Figure 21).

Figure 21.
Most IT workers today are proficient in technical skills but lacking in soft and business skills

7.3. Technical skills

IT is one of the fastest changing areas where the most demanded skills sets today may quickly disappear tomorrow.

Half of the respondents (52%) feel that Macedonian workforce has a high level of IT skills (Figure 22), and 39% do not agree with this statement. According the opinion of the respondents, 62% think that Macedonian IT workforce skills are aligned with the global IT services market, while 27% disagree with this opinion (Figure 23).
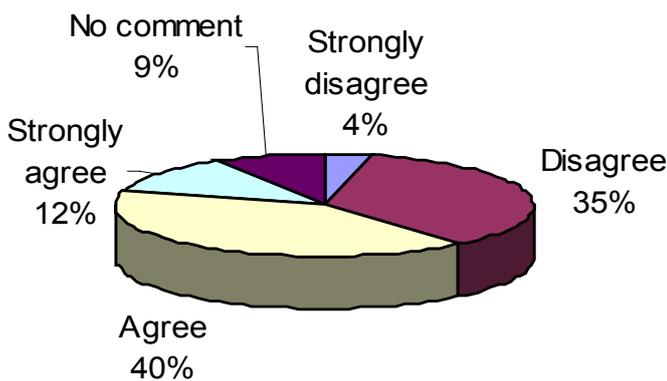

*Figure 22.
The Macedonian workforce
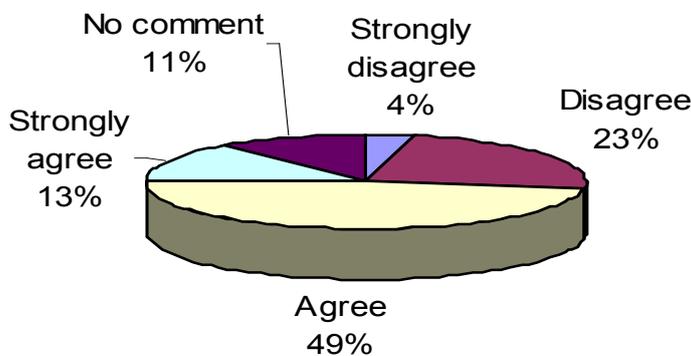has a high level of IT skills*

*Figure 23.
Macedonian IT workforce is
aligned with the global IT services
market*

7.3. Technical skills

Taking into account six major, first level, more global groups, self assessment scores show that the highest level of skills were related to database design and development, technical support and programming (see Figure 24). The most frequently found skills are network design and programming. The meaning of the values on the scale is the following: 2 - basic knowledge, 3- competent, 4 - advanced and 5 - expert.
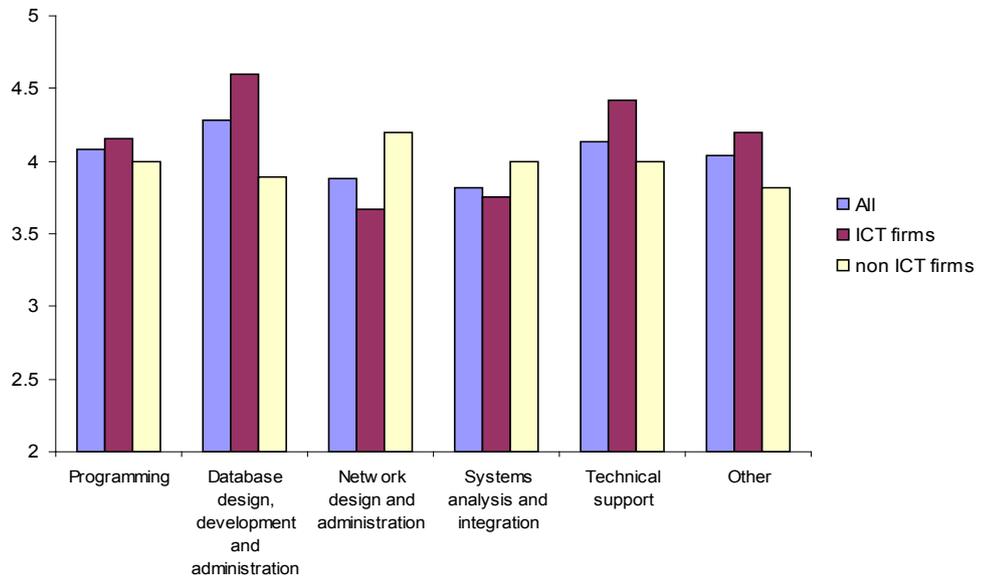
Figure 24.
Assessment of technical skills, firs level grouping

Assessment of the technical skills, classified according the second, more detailed level, is presented in Table 8. Assessment scores show that PC Hardware (technical support), SQL and XML/HTML (programming), LAN/WAN and TCP/IP (network design and technical support), Oracle and Windows OS have the highest level of skills. The most frequently found technical skills are:

1. Windows OS
2. SQL
3. LAN/WAN; TCP/IP; Java and Oracle.

Among IT firms the most frequently found technical skills are Windows OS (technical support), Java (programming) and PC Hardware (technical support). Windows OS is the most frequently found technical skill among non IT firms.

7.3. Technical skills

Technical skills	Average mark	IT firms		Non IT firms	
		Average	Frequency	Average	Frequency
PC Hardware	4.4	4.4	5	0	0
SQL	4.3	4.8	4	3.7	3
XML/HTML	4.2	4.3	3	4	1
Oracle	4.2	4.3	3	4	3
LAN/WAN	4.2	4	3	4.3	3
TCP/IP	4.2	4.3	3	4	3
Windows OS	4.1	3.9	9	4.5	4
Visual Basic	4	4	4	4	1
Wireless	4	4	2	4	1
Java	3.8	3.8	6	0	0
Cisco	3.4	3.3	3	3.5	2
Linux	3.2	3.3	3	3	1
Antivirus	3	3	2	3	3

Table 8.
Assessment of most frequently found skills in the IT workforce

Concerning the needs for technical skills in the future in global groups, emphasis is given on the programming and database design (see Table 9.).

Skills	All	IT firms	Non IT firms
Programming	1	1	2
Database design	2	2	1
Network design	3	4	4
Technical support	4	3	3
System analysis	5	5	5

Table 9.
Top technical skills in the future – global groups (rank)

The most demanded specific technical skills in the near future will be Java (programming) only for IT firms, Oracle (Database design) and Visual basic and SQL (programming) (see Table 10).

Skills	All	IT firms	Non IT firms
Java	1	1	-
Oracle	2	2	1
Visual basic	3	4	3
SQL	4	3	2

Table 10.
Top technical skills in the future – detailed groups (rank)

8. Recommendations

8. Recommendations

From the survey results the growth of the demand for the IT workforce can be forecasted for the coming year. The dominant part of the increased demand is due to increased needs for IT specialist in the IT sector. This conclusion is in accordance with the opinion of respondents for the statement "Supply of the IT degrees and graduates in Macedonia is bigger than the demand". From Figure 25, majority of the respondents (63%) disagree with the statement.
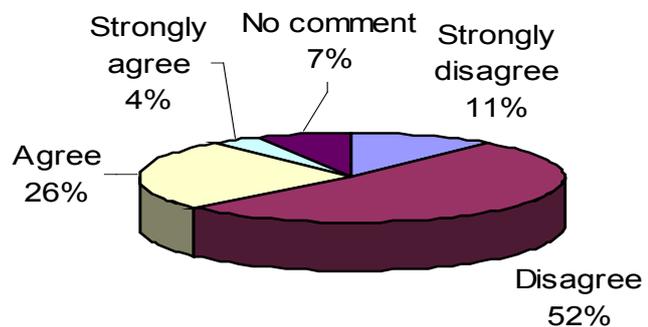
Figure 25.
Supply of the IT degrees and graduates in Macedonia is bigger than the demand

There is mutual consensus that it is very important to improve the quality of the higher education and 25 respondents stressed out that argument. The recommendations are focused on several matters:

1. The academe should train students in what is being demanded by the companies
2. The companies should offer structured value adding internships and on the job training.
3. The IT industry should co-designed the IT curricula of the universities

From the results it can be concluded that both university degrees and IT technical certificates are equally preferred by the employers (see Figure 26).
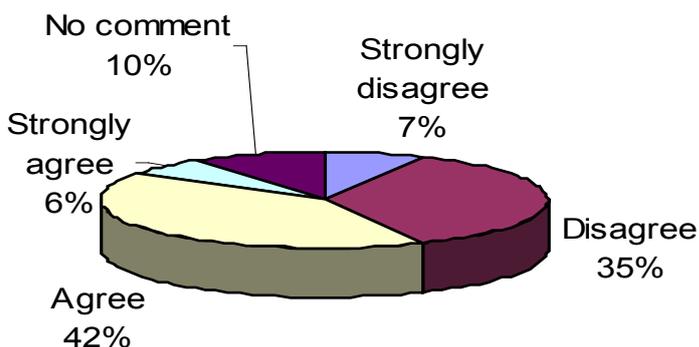
8. Recommendations

No comment
10%

Strongly
disagree
7%

Strongly
agree
6%

Disagree
35%

Agree
42%

Figure 26.
Employers prefer IT workers with
university degrees more than workers
with technical IT certificates

Other important recommendation mentioned by the respondents is close involvement of the government in promoting and supporting the IT industry.
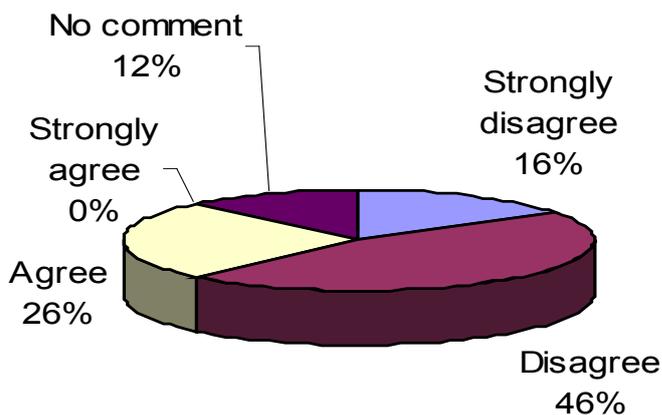

No comment
12%

Strongly
agree
0%

Agree
26%

Strongly
disagree
16%

Disagree
46%

Figure 27.
The government is participating in
promotion of the IT industry

The government should speed up and enforce its efforts in full support of the IT industry and information society (see Figure 27). The first results of the governmental policy are remarkable and after the formal adoption of National strategy for development of information society (2005) there is a clear vision and paved way for achieving the desired objectives.

Based on the recommendations of the firms and their opinion for the statement "Multinational companies can get the competitive IT services in Macedonia", (75% agree, see Figure 28) market mechanisms should be created to support healthy business climate and environment for international cooperation.

8. Recommendations

Figure 28.
*Multinational companies can get the
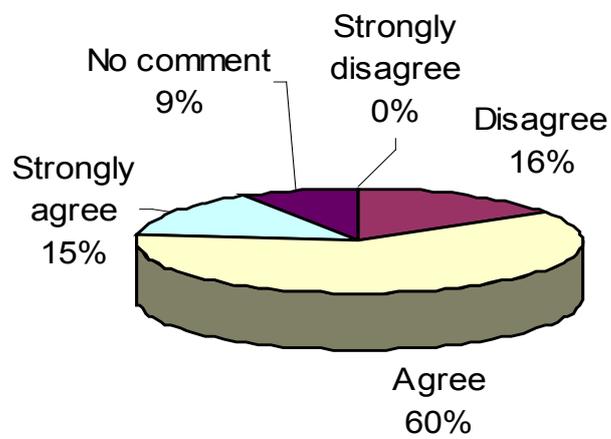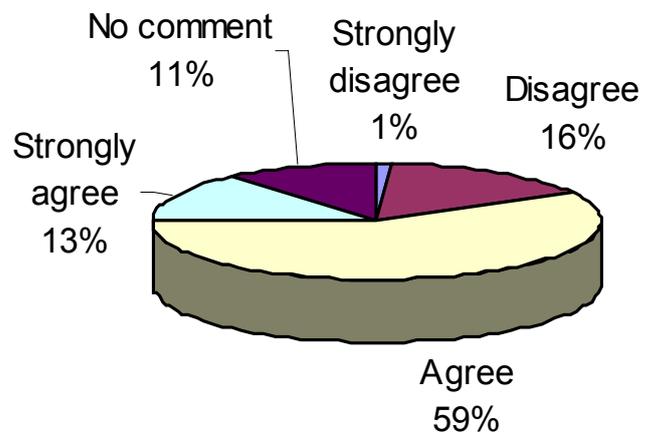competitive IT services in Macedonia*

No comment 9%
Strongly disagree 0%
Disagree 16%
Strongly agree 15%
Agree 60%

Figure 29.
*The information about the demand of
the IT workforce is limited*

No comment 11%
Strongly disagree 1%
Disagree 16%
Strongly agree 13%
Agree 59%

8. Recommendations

The information and conclusions of this survey will contribute to firms' better understanding of the structure and number of the demanded IT workforce. The lack of this kind of information is obvious from the percentage (72%) of the firms who agree with the statement "The information about the demand of the IT workforce is limited" (see Figure 29).

Therefore, the role of the MASIT is important as integrating organization acting as a unified voice of the majority of IT firms.

This type of surveys are planned to be conducted on the regular basis, but as recommendation, public administration on all levels should be included in the sample.

Changes in educational process, which are the main issue of the industry, require time and are evolutionary by their nature. It is well known fact that IT industry is the fastest growing and the most globalized part of the economy. Opportunities are changing quickly, so actions are needed right now and in the right direction. The outcomes of the survey can determine future policies and measures in order to achieve the desired goals of the IT industry in the Republic of Macedonia.

APPENDIX A:
IT Worker Listing

APPENDIX A: IT Worker Listing

Database design, development and administration
• Database developer/architect
• Data conversion specialist
• Database analyst
• Database manager
• Database security expert
• Systems administrator
• Tester
• Knowledge architect

Digital media

• 2D/3D artist
• Animator
• Multimedia author
• Media/Instructional designer
• Web developer/designer
• Programmer
• Virtual reality specialist
• Streaming media specialist
Enterprise systems analysis and integration
• Application integrator
• Systems/Process analyst/architect
• Systems integrator
• eBusiness specialist
• Business continuity analyst

• IT/Security auditor

Network design and administration
• Data communications analysts
• IS planner/operator
• Network analyst
• Network administrator
• Network engineer
• Network manager
• Network security analyst
• Network technician
• Systems administrator
• PC/technical/user support specialist

Programming/software engineer

• Application/systems analyst
• Business/process analyst
• Programmer
• Operating system specialist
• Security specialist
• Software architect
Technical support
• Analyst
• Call center/customer service representative (includes customer care representatives)
• Help desk specialist/technician
• Maintenance technician
• Support specialist
• Technical support engineer/representative
• Testing engineer
Technical writing/training
• Desktop publishing
• Documentation specialist

• Editor

• Electronic publications specialist
• IT trainer/educator
• Online publisher
• Publications manager
• Technical writer
IT Sales/marketing (does NOT include contact center personnel handling offshore sales and marketing)
• Marketing/product manager
• Pre-sales support
• Account managers/relationship managers

APPENDIX B: Technical Skills

Programming
- Java/Javascript/JSP
- C/C++/C#
- Visual Basic/VB.net
- XML
- HTML
- Unix
- Windows OS
- Linux
- SQL
- Perl
- Active Server Pages
- CGI
- Solaris
- Cold Fusion
- Linggo

Database Development and administration
- Oracle
- SQL Server
- DB2
- Sybase
- Informix
- Access

Network Design and Administration
- Cisco products
- Novell Netware
- Windows OS
- Unix
- Linux
- SNA
- IPX
- Routing
- LAN/WAN
- TCP/IP
- Ethernet
- Virus protection/firewalls
- 10 base-T switching
- Client/server technology
- Data network protocols
- Wireless

Enterprise systems analysis and integration
- Oracle
- SAP
- Baan
- JDE
- Great Plains

Technical Support
- Windows OS
- Unix
- Business applications
- LAN/WAN
- Novell Netware
- TCP/IP
- PC Hardware

Other IT-enabled service technical skill requirement (primarily for BPO related services). Examples include:
- Accounting knowledge
- Understands medical terms
- Understands legal terms

APPENDIX C:
List of firms in the sample

APPENDIX C: List of firms in the sample

IT companies	*non IT companies*
OJA dooel	Pivara Skopje AD
EKONET	Fod novaci, ad elem skopje
Artisoft	Tutunski Kombinat AD Prilep
Pexim	Prokredit Banka
Makpetrol A.D.	Toplifikacija AD Skopje
GORD Systems	MAKPETROL-TEAS AD
SIGMA-SB	Bucim Radovis
Rema Kompjuteri	Komercijalna Banka a.d.Skopje
Alkatel dooel	MOKEL EEII
Semos Edukacija	Alkaloid AD
Mobimak AD	StudioMarketing JWT
SIMT	Trajkovski & Partnerki Konsalting
Proinfo.	Makedonska Banka Skopje
Edusoft	Izvozna i Kreditna banka AD Skopje
Megasoft - Info Centar dooel - Bitola	ProCredit Bank
S&T Hermes Plus d.o.o.e.l	FAKOM AD
Ultra Skopje	Konti Hidroplast
RSC Doo	Bato&Divajn
Inkoma D.O.O.	Vitaminka
Synergy	Prilepska pivarnica
Infinite Solutions	Progres Komerc
INet Inc.	Unibanka AD
Seavus	Jaka80 AD Radovis Group of Companies
DDS	Enterprise Records
Duna kompjuteri	Ohridska banka a.d. Ohrid
UNET	AD ZEOLIT BSB - Probistip
Intervej	Fakom Montaza
EuroNetCom	FAKOM INZENERING DOOEL Skopje
Videolab	Centar za plazma tehnologii Plazma Skopje
Semos Kompjuteri	Jasen
GRNAROV d.o.o.	EUROSTANDARD BANKA AD SKOPJE
Kac Maksprint	SEAF/Macedonia
On.net Doo	GTZ REDEM
Netcetera Doo Skopjee	
Zona	*Others*
LANCOM Kompjuteri	Fondacija Metamorfozis
BLANK	Makedonski Zeleznici
Nextsense	AD MEPSO
EuroCompute Systems AD	ESM
Makedonski biznis sistemi	Водовод
SRC SI dooel	REK-Bitola
	Sektor za informaciski tehnologii i modernizacija
	MON

Conclusions

Nr. 58-4158/4
Skopje, 13 March 2006

MACEDONIAN IT WORKFORCE DEMAND SURVEY 2005

MASIT (Macedonian Association of Information Technology), supported by the German Project for technical support and development GTZ- PSP, Macedonian Competitiveness Activity (MCA), as well as:
- Electro-technical Faculty- Skopje,
- Faculty of Mechanical Engineering- Skopje,
- University of Southeast Europe- Tetovo,
- Technical Faculty- Bitola,
- Faculty of Natural Sciences- Skopje
- Faculty of Economics- Skopje,

Conducted a survey in order to collect statistical data regarding the demand of ICT staff in Macedonia in the forthcoming years.

The conclusions of the survey are given below, which are prepared on the basis of the survey results, which were also confirmed from the above mentioned faculties and members of the Committees of education and development of the MASIT workforce.

Conclusions of the survey "Macedonian IT Workforce Demand Survey 2005"
1. The demand of IT staff in Macedonia is larger than the supply of IT staff.
2. The need of educating IT programmers and IT professionals for technical support is increased.
3. The companies have an increased need of IT professionals, who need to possess other types of skills apart from the IT skills, e.g. business and soft skills.
4. The need of acquiring world recognized IT certificates is also increased.

Conclusions

MASIT Recommendations

1. *The demand of IT staff in Macedonia is larger than the supply of IT staff.* Therefore, MASIT strongly supports the increase of the entry quotas of the existing IT faculties. Apart from the support of the existing, MASIT also supports the formation of new IT educational institutions (IT faculties, etc.)

2. *The need of educating IT programmers and IT professionals for technical support is increased.* MASIT will continue its activities regarding the raise of public awareness for the IT industry needs, especially among high school students. Also, MASIT strongly supports all the programs for IT qualification of unemployed people.

3. *The companies have an increased need of IT professionals, who need to possess other types of skills apart from the IT skills, e.g. business and soft skills.* The IT companies have identified that the professional lack practical training during studies and therefore need to invest in their further education. Therefore, MASIT is ready to participate in the activities for changing the curricula of the existing educational institutions. MASIT will participate in the adjustment of the practical training programs of the faculties for the needs of the business IT community.

4. *The need of acquiring universallyrecognized IT certificates is also increased*, and therefore MASIT will strongly support the introduction of as many new certification programs at all levels of education as possible. MASIT will continue with activities for introduction of a European Computer Driving License (ECDL) as a necessary certificate for employment in public administration.