SOFIA

STATE AND DEVELOPMENT OF THE IT INDUSTRY

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State and Development of the IT Sector in Sofia municipality

Institute for Market Economics - www.ime.bg

Introduction

Information technology has been attracting attention as one of the fastest developing sectors in Bulgaria, characterized by very high salaries and good working conditions. The IT sector has acquired a growing importance for the country’s entire economy, while its development in the future may prove decisive in the process of gaining on and the increase of prosperity. Sofia being the unquestionable center of information technology in the country, the present analysis will focus on the development, the state and the tendencies in this sector in the capital.

The analysis of a number of indicators for the IT sector in Sofia has shown that its achievements surpass most expectations: its share in the municipal economy and export is on the rise, forming 5.7% of the total production in Sofia in 2015, while all prospects point to that share’s continuing growth.

The sector’s competitive environment is shaped to a considerable extent by several large companies, including both Bulgarian companies founded in the 90-s, like Fadata and Sirma Group, and branches of international giants like SAP and VMWare. Numerous small firms have also played an important role.

In recent years, employment in the IT sector has also registered a considerable increase: one in every 20 employees in Sofia is in a profession connected with IT. Most of the sector’s employees are young and highly educated.

Both pay and labor productivity have outpaced those in most sectors, with an average salary of 2,688 BGN for the IT sector as a whole in 2015. In its main activity, programming, salaries have been considerably higher, reaching over 3,300 BGN in 2015. High salaries are the result of the sector’s high productivity: over 57 thousand BGN in value added per employee in programming.

The key challenge before the sector is finding suitable qualified workers to ensure its future growth. Still, both formal and informal education offer more and more possibilities for developing the skills required in the sector.
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Literature review

The sphere of information technology in Bulgaria has often been subject to systematic analysis, though not at the sub-national level. A considerable portion of the information about the sector is accessible thanks to the Eurostat focus on EU development in the digital economy. Here we shall briefly summarize the more recent studies of this sector.

One of the most extensive studies of the sector was carried out by the Bulgarian Industrial Association in 2013, within the framework of the Human Resources Development program of the European Social Fund (BIA, 2013). The analysis pointed out that the IT share of 2.3% in the country’s economy in 2010 was slightly below the EU average of 3.0%. Most of the sector’s companies were in the category of microenterprises while most of the employees worked for a small number of large companies. Considerable problems in recruiting suitably skilled specialists for the sector were noted; they were forecasted to exacerbate due to the inability of educational systems (both in Bulgaria and in the EU as a whole) to equip a sufficient number of workers with the necessary skills. According to BIA, the Bulgarian IT sector is almost exclusively export-oriented, which makes it more closely integrated with the dynamics of the international economy than with that of Bulgaria. It is territorially very highly concentrated in Sofia (72% of employees) and the workforce has a clearly distinguishable profile: young highly educated specialists. The organization’s analysis foresees a considerable sector growth in the coming years, which on its part will increase its demand for specialists.

In a much more recent (but also much less detailed) evaluation of the state of Bulgaria’s digital economy, the European Commission (EC, 2017) the EC ranked the country 27th on the so-called DESI or Digital Economy and Society Index. Bulgaria’s best results were in the sub-indices for digital infrastructure and its worst ones were in those for human capital. The main reason, however, is the population’s low IT skills. On the indices for ICT specialists and graduates in the IT branch, Bulgaria ranks 22nd in Europe.

In an annual report on the state of the IT sector, published by the association of leading Bulgarian software development companies, BASSCOM (БАСКОМ, 2017), the latest edition of which offers data from 2016, the point is made that the sector is among the fastest growing ones in Bulgaria and is already over the mark of 2% of GDP. According to the report, people working in this sector have a living standard much higher than the average for Bulgaria, with the average salary reaching 2,752 BGN. That report, too, mentions the problem with recruiting highly skilled workers, and, among other threats facing the sector, it points out the rise in maximum insurable incomes and the risk of a possible introduction of progressive income tax. According to the analysis, there is practically no shadow economy in the sector and budget revenue from labor tax per job exceeds that in most other sectors.

A report by the Embassy of Denmark in 2014 pointed out that the IT sector in Bulgaria was growing by about 30% annually. It set out Bulgaria’s numerous advantages, such as the highly qualified workforce and competitive prices, long traditions in information technology and telecommunications, a good infrastructure and the combined active presence of both international market leaders and vigorously developing innovative local companies (Royal Danish Embassy in Sofia, 2014). Among the sector’s problems, it mentions low research and development expenditure and its inefficient spending, problems with the protection of intellectual property and the shortage of workers with a high level of soft skills.
**Methodology**

One of the challenges sector analysis faces is clearly delimiting the sector under study. The living economy is not easy to be divided into separate activities in a strict way; companies often belong to more than one. This is all the more true of present-day technological sectors where new trends often spring up faster than statistics manages to describe. This is why a clear definition of the subject of the present analysis and its boundaries seems necessary to begin with. For this purpose, Zuppo’s (Zuppo (2012)) classification of the wider sector of ICT can prove helpful. In the classification, information technology includes activities connected with the use of computers for the storage, study, manipulation and propagation of data and information. This is why the present analysis focuses only on programming, management and service of computer networks, data processing and consultancy in connection with that technology, and not on hardware trade and telecommunications.

Despite the difficulties in delimiting the IT industry, two sectors in the classification of economic activities encompass it in a more or less exhaustive way:

1/ “Computer programming, consultancy and related activities” (code 62 under NACE, Rev.2), which include:
   - Computer programming activities
   - Computer consultancy activities
   - Computer facilities management activities
   - Other information technology and computer service activities (including installation of computers and programs and hardware and software recovery)

2/ “Information service activities” (code 63 under NACE, Rev. 2), including for the purposes of the present analysis
   - data processing, hosting and related activities
   - web portals
   - other information service activities including automatic services and browsing

Throughout the analysis, “the IT sector in Sofia” means the sum of indicators for these two economic activities in Sofia Municipality.
History and development of the sector in Bulgaria

Bulgaria’s traditions in this sphere go back to the period of communist rule, especially in hardware manufacture. This is why the IT sector developed vigorously in the very first years of market economy. The first organization of companies in the sphere of information technology, BAIT, was founded in 1995 to include leaders in both the software and hardware industries – Fadata, Stemo, Vali Computers, and Cisco. BASSCOM, an organization focused more narrowly on the software industry, whose members - Sirma, VMWare, SAP, and CSC are now the leaders on the IT market, was founded in 2001. The two organizations represent the common interests of the companies in the branch, the influence on policies concerning the sector, and organizing joint initiatives and campaigns. ICT Cluster, with similar functions, and the Bulgarian Web Association, focusing on companies specializing in web applications and web design are also among the important branch organizations.

Computerworld magazine’s rating of the biggest IT companies makes it possible to compare incomes, profit, and employee numbers in the sector leaders. Though the rating is for Bulgaria as a whole, not for Sofia exclusively, all market leaders are located in the capital. As the present analysis has as its particular target information technology and services, the most pertinent category from the magazine’s rating is the one including companies that specialize in software development. The following table includes the first 10 companies in this category, ranked according to profits made in 2015 – the most recent year in which companies were rated.

Table 1: Largest firms in the software industry in Sofia, BGN thousand

<table>
<thead>
<tr>
<th>company</th>
<th>income in 2015</th>
<th>growth from previous year</th>
<th>employees number</th>
<th>export as % of total output</th>
<th>profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware Bulgaria</td>
<td>59 500</td>
<td>23,5%</td>
<td>513</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>SAP Labs Bulgaria</td>
<td>58 620</td>
<td>10,2%</td>
<td>614</td>
<td>100%</td>
<td>1 708,0</td>
</tr>
<tr>
<td>Kontrax</td>
<td>52 961</td>
<td>48,5%</td>
<td>103</td>
<td>1%</td>
<td>3 443,0</td>
</tr>
<tr>
<td>CSC Bulgaria</td>
<td>36 114</td>
<td>1,1%</td>
<td>560</td>
<td>-</td>
<td>5 253,0</td>
</tr>
<tr>
<td>Sirma Group Holding</td>
<td>33 977</td>
<td>21,1%</td>
<td>364</td>
<td>43%</td>
<td>2 574,0</td>
</tr>
<tr>
<td>Fadata</td>
<td>32 341</td>
<td>34,9%</td>
<td>190</td>
<td>90%</td>
<td>13 251,0</td>
</tr>
<tr>
<td>BULPROS Group</td>
<td>29 903</td>
<td>137,2%</td>
<td>572</td>
<td>-</td>
<td>2 197,0</td>
</tr>
<tr>
<td>CAD R&amp;D Progress</td>
<td>29 324</td>
<td>65,6%</td>
<td>32</td>
<td>-</td>
<td>151,0</td>
</tr>
<tr>
<td>MM Solutions</td>
<td>24 941</td>
<td>13,5%</td>
<td>189</td>
<td>100%</td>
<td>11 101,1</td>
</tr>
<tr>
<td>Musala Soft</td>
<td>17 109</td>
<td>30,0%</td>
<td>285</td>
<td>76%</td>
<td>1 872,0</td>
</tr>
</tbody>
</table>

Source: Computerworld

What attracts attention is the fact that most of the large enterprises for which information is available are almost exclusively export-oriented: three export 100% of what they produce, while one, Fadata, exports 90%. There is no obvious market leader: the first three companies have very similar amounts of revenue while even the difference between the first and the tenth one in the rating is only 3 times, an indicator of healthy competition in the sector. Part of the reason for the distribution of the largest firms is the fact that they are branches of large multinational conglomerates, so their market shares should rather be considered in the context of the global IT sector than in the local one.

An overview of ratings for the last five years shows the sector to be quite dynamic: the company heading the 2010 rating was Progress (then called Telerik – before merging with the American conglomerate), followed by Fadata and Sirma Group. Gradually foreign-owned firms took the place of Bulgarian ones in the first places but that did not mean less competition.
Most of the leading companies in the IT sector today date back to the 1990s. Fadata was founded as early as 1990; its key product was insurance software called INSIS. Over the years, the company took orders to build infrastructure for a number of other companies and institutions. Sirma group, created in 1992 from about ten smaller companies, each focused on a specific IT field, has a much wider portfolio. The group’s most popular products and services are in finance and banking but its portfolio includes a wide spectrum of other branches for which they develop IT solutions: from industry through culture to state government.

The remaining Bulgarian companies among the top ten were founded in the new millennium. Musala Soft was born in 2000, focusing on software solutions for multinational companies and governments and Telerik came into being in 2002, specializing in web design tools. In 2015 it was acquired by the American-owned Progress Software. Bulpros, a more recently created Bulgarian company (2010) deals mostly in cloud services, big data and Internet of things.

The remaining companies on the top ten list are foreign-owned. The with greatest significance for the local IT sector among them are the world leader in virtualization software VMWare and the accounting and corporate software developer SAP, the two with a total of over 1,000 employees. The top ten is completed by the East-European consortium Kontrax, specializing in software development for a wide spectrum of branches (including education, industry and healthcare), CSC, which builds banking software and MM Solutions, which is focused on software for creation and processing of images and video, specifically mobile platforms.

The IT sector in Sofia’s economy

Unlike most other sectors, which are scattered around the country, the wider ICT sector is strongly concentrated in Sofia. One reason is that all three mobile operators have Sofia as their place of registration; another is that the majority of companies working in software and network maintenance are located in this city. Let us consider exactly how important Sofia is for the wider ICT sector based on output, value added, turnover and employment in the sector.
Between 2011 and 2015 the share of IT in the wider ICT sector in the capital grew considerably, quickly getting close to the 50% mark on most indicators. Its shares in all three indicators of economic result are quite similar: 42% of production, 48% of value added at factor cost and 44% of turnover in 2015. As for employment, 47% of all employees in the entire ICT sector are in the IT sector in Sofia. However, these shares have registered a considerable growth: only 4 years earlier, in 2011, the sector comprised 27% of produce, 31% of value added, 27% of turnover and 38% of employees in the larger ITC sector.

In view of this dynamics, and especially taking into account the accompanying growth of outsourcing in the capital, there are all the prerequisites for an ever increasing significance of the IT sector in Sofia in the larger ITC sector in the future. It is highly probable that in 2017 it already accounts for more than half of all economic activity in it.

The fact that the IT sector is mainly export-oriented is among its most important characteristics. Between 2012 and 2015, export revenue of IT sector enterprises in Sofia (defined as income from services offered to foreign clients) grew by 78% to reach 1.2 billion BGN. During the same period, the share of the capital’s IT sector in the overall national export grew almost twice: from 1.4% to 2.1% of the total exported goods and services. More specifically, the capital’s IT sector has a share of 8.8% in the national export of services.

As for the IT sector’s share in the capital’s economy, between 2011 and 2015 it grew by almost 50%: from 3.8% to 5.7% of the total production in Sofia, as well as from 29% to 47% of its volume in the larger ICT branch. The significantly expanding IT share in recent years can be explained by taking into account the fact that most companies in the sector work for the international market which is incomparable in size with the local market. Unlike the IT sector, telecommunications services are local market-oriented and the local market is incomparably smaller in volume despite the constant growth of incomes and consumption.

**Sector segmentation and company demography**

News in the IT sector most often refers to software giants with thousands of employees and universally recognizable goods and services used by millions of consumers. In the Bulgarian context, those are the virtualization products and cloud technologies of VMWare, the SAP corporate software and the popular Haemimont games.

However, the distribution of companies and employees in the sector shows that there are a great number of microenterprises with up to 9 employees in Sofia. Micro-companies are 89% of all IT companies in the capital. Micro-company dynamics is also more vigorous by far: the number of those with up to 9 employees grew by 55% in 2015 compared with 2011, to reach a total of 4,810 firms. According to business statistics, 7,703 people were working for them, or an average of 1.6 people per company. In other words, most of them are sole traders or freelancers. One of the reasons for the fast rise in the number of sole traders in the sector is the steep rise of the maximum insurance income. Policies tending in this direction created a strong stimulus for IT specialists to change their formal status from ‘employed’ to ‘self-employed’, while continuing to sell their services to their former employers as contractors. The reason is the relatively low insurable income for self-employed people, which lowers the general tax burden on labor as well.
The number of large companies with over 250 employees on its part grew from 15 to 20 between 2011 and 2015. A total of 12,468 people worked for the 20 companies with over 250 employees, or an average of 623 per company. Almost as many people were working in the 107 average (from 50 to 249 employees) companies and the 441 small firms (from 10 to 49 employees): 11,333 and 8,920 people respectively.

However, that distribution does not hold for all activities in the sector: in programming, for example, workers are concentrated in small and average firms, while in consultancy they are in the largest ones. In information services, the greatest number of employees is in average-sized firms (between 50 and 249 employees).

In all activities, the number of companies has been on the increase, the most significant growth between 2011 and 2015 period falling on consultancy services: by 77% to a total of 776 companies. Average company size is also different for the different types of activities: while in web portals the “average” company has 44 employees, in programming it has 10.

As for the distribution between the two sub-sectors of Sofia’s IT sector, activities connected with IT strongly prevail over information services. While in 2015 there were 4,305 companies in the first category, in the second category there were 1,073. In IT activities, there was more growth in the considered period, the number of companies increasing by 53% compared with 45% in IT services.

Business demographics account to a considerable extent for the distribution of companies in the sector. Though the number of employees in the sector has been growing throughout the period, the dynamics has characterized almost exclusively companies with between 0 and 9 employees. Besides, their growth rate has increased with every year. While in the two segments of the IT sector (information technologies and information services) 1,064 micro-enterprises were born in 2011, in 2015 their number was already 1,754. By way of comparison, the number of newly created enterprises in the next group (between 10 and 19 employees) was only 22. Similarly, the greatest death rate was again in the group of microenterprises, but the growth rate was positive nevertheless: in 2014 the difference between born and dead enterprises was 7.9% of their total number. The dynamics in the IT sector generally follows that of the economy as a whole.
where the share of both born and dead micro- and small enterprises is much higher than among average and large ones.

The sector’s characteristics determine the specific distribution, the high percentage of micro-enterprises in IT and their considerable mortality. Companies in IT are most often created as small teams of several people working on a specific project and it is the project’s success that could entail enlarging the team in the future and taking on other projects. Also, new firms are often created with a single project in view and are then closed down. The nature of work itself also allows working single-handedly or in small teams, something very difficult in other sectors. Besides, the larger firms in the sector are mostly either branches of international IT giants or established local players from the first wave of IT development with a considerable market of their own and set relations with clients.

**Investment**

Foreign direct investment in the IT sector in Sofia grew considerably between 2011 and 2015. The total FDI in cumulative terms as of the end of 2015 was 70% higher than the corresponding number as of end-2011. In absolute terms, it reached 261 million euro as of the end of 2015. Almost all investment was concentrated in activities in information technologies – 92% of the total investment in the sector. Over half of it – 137 million euro – was in the “other” category (among them, computer repairs and installation of computers and software). The fastest FDI growth for the period was in data processing and hosting: by 109%.

*Source: NSI, author’s calculations*

There was a similar dynamics in the expenditure on the acquisition of fixed tangible assets (FTA), another important indicator of investment activity. They grew by 53% to reach 124 million BGN annually in 2015, with 98 million in information technologies and 26 million in information services. The fastest growth (by
544%, though the initial base of 295 thousand BGN was very low) was in web portals, followed by management and maintenance of computer systems (356%). A drop in FTA acquisition expenses was noticed in the category “other activities in the area of information technologies” (-18%), but it should be borne in mind that it had the highest nominal expenses, 38 million BGN, in 2015.

The importance of the IT sector in Sofia investment has increased significantly in recent years. The share of the sector in FDA (cumulative by the end of the year) in the municipality as a whole grew from 1.3% to 2.1% and in ICT it grew from 5.9% to 15.2% between 2011 and 2015. There was an analogous growth in FTA expenses: from 0.9% to 1.5% for Sofia as a whole and from 14.4% to 17.6% in the ICT sector.

**Employment in IT**

The total number of employees in the two subsectors which make up the capital’s IT sector grew by 51% between 2011 and 2015, from 26.8 thousand to 40.4 thousand people. This growth rate is typical of most activities in the sector with the exception of consultancy services, where the growth was 112%, to 4.6 thousand people. The slowest growth, 32%, was in hosting and data processing.

The largest number of people employed, 15.5 thousand, was in the category “other activities in the area of information technology”, which seems natural, having in mind the fact that it includes a number of labor-intensive activities, including computer repairs and computer and software installation. The second largest group includes programmers – 12 thousand, followed by IT consultants. The fewest number of people, 500, work for web portals.

**Distribution of employees in the IT sector in Sofia, 2015**

The number of people employed in the IT sector makes up 6% of all employed people in the municipality and 62% of the people employed in the entire ICT sector in Sofia.
Employee profile in the sector

Because of the sector’s characteristics – its fast development, its relatively recent boom on the Bulgarian market and the high requirements for knowledge and skills, the profile of people working in it is quite different from that of the remaining workforce in the country. This is certainly nothing typical of Bulgaria only: Eurostat data on the employee profile in the wider ICT sector for the entire European Union show that the sector is dominated by men with university degrees in the age group up to 35. At the national level (as already seen, the greater part of the ICT sector is concentrated in the capital) in Bulgaria, the percentage of men in the sector is the lowest, 70%, compared with 90% in Slovakia and an average of 83% in the EU. Part of the reason for this fact may be the workforce distribution in the economy as a whole, there being no considerable differences in employment between men and women in Bulgaria. Eurostat data shows the difference in employment rates between men and women to be 7 percentage points (pps); the EU average is 11 pps, while 26 pps in Malta and 18 pps in Italy are the worst results for this indicator.

NSI data on the employee profile in information technology and information services in Sofia point to similar conclusions. From a total of 33.8 thousand people working in these two subsectors of the capital’s economy, 22.1 thousand (65%) were male and 11.7 thousand (35%) were female. This ratio has remained roughly unchanged over the entire period between 2011 and 2015 despite the almost twofold increase in the number of employees in the sector.

Over half the people working in the sector are in the 25-34 age group; another 28% are between 35 and 44. NSI data on other age groups for almost the entire period is rather imprecise because of the relatively small number of observations. The concentration in the 35-44 age group slightly increased in the 2011-2015 period having in mind the fact that 48% of employees were in it in 2011. A visible reason for this is the growing popularity of IT positions among recent university graduates, as well as the appearance of different schools and education centers focusing on IT skills, aimed mainly at youngsters. The sector’s shortage of workers against the background of its fast growth is probably another reason for the gradually dropping average age: companies keep lowering their requirements for experience and offer more and more jobs to students, making commitments for on-the-job training.

High qualification is another characteristic of IT workers in the capital: in 2016, 80% of them had university degrees. The remaining 20% were students, self-educated or educated in educational centers not certified as higher education establishments and/or online platforms offering courses in programming and IT skills. The share of employees with college degrees was lower, compared with 2011, when they were 84% of all, which is another piece of evidence for both lowered employer requirements and the growing popularity of alternative forms of IT education.

Salaries in the IT sector

There are some key factors determining the higher salaries in the IT sector (compared with the country average figures). High competition in the sector, its export orientation, the presence of a number of world leaders on the local market and the relatively small number of highly qualified workers are among them. BASSCOM calculations in the latest edition of its IT Barometer show the living standard of programmers in

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1 Figures on the number of people employed are from the NSI sample survey of the labour force, a study that systematically underestimated the number of people working in IT - hence the differences with previously quoted business statistics.
Sofia in particular to be similar to that of programmers in London thanks to significant differences in prices in the two cities.

The average gross monthly salary varies considerably between the different segments of the IT branch in Sofia, the sector average being 2,688 BGN a month (latest NSI data for 2015). The highest average salaries are those of programmers, 3,372 BGN a month in 2015. The lowest salaries are those of web portals’ employees – 1,306 BGN. However, we should bear in mind the fact that that subsector has the smallest share of workers in the IT sector. In consultancy, the average salary is 2,695 BGN and in data processing and hosting it is 1,816 BGN.

Almost all segments offer considerably higher salaries, both compared with the national average figures and compared with the wider ICT sector. In 2015, the average salary in information technologies in Sofia was four times the national average and over twice (132%) that of the ITC sector in the country. Compared with salaries in Sofia, the average salary in the capital’s IT sector was over three times (221%) higher and over two times (120%) higher than that in the capital’s ICT sector. The reason is that the wider ICT sector includes a number of activities in telecommunications with relatively lower pay. If we take only the salaries of programmers in the capital, they are almost 4 times higher than the national average salary.

IT salary dynamics in Sofia was quite close to the average tendencies for the country: salaries grew by 24% on average for the sector in 2015 against 2011, compared with 28% for the country. The range between the two values remained relatively stable during the entire period. Programmers’ salaries kept growing at a slightly faster rate (39%) than the sector average and so did those in computer system management (27%).

Source: NSI, author’s calculations

THE AVERAGE MONTHLY PAY OF PROGRAMMERS AND IT CONSULTANTS IN SOFIA IS 3372 BGN AND 2695 BGN, RESPECTIVELY.
Labor productivity

There are many ways to approach measuring labor productivity. The one chosen here is the one preferred by Eurostat; it is based on a ratio between value added and number of employees. In our case, the indicator is the annual value added at factor cost in the economic activities under consideration divided by the number of employees in those activities in the particular year.

Gross value added per employee in the IT sector in Sofia, BGN thousand

<table>
<thead>
<tr>
<th>Activity</th>
<th>Value Added (BGN thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other information service activities n.e.c.</td>
<td>33.7</td>
</tr>
<tr>
<td>Web portals</td>
<td>19.5</td>
</tr>
<tr>
<td>Data processing, hosting and related activities</td>
<td>38.6</td>
</tr>
<tr>
<td>Other information technology and computer service...</td>
<td>45.6</td>
</tr>
<tr>
<td>Computer facilities management activities</td>
<td>34.4</td>
</tr>
<tr>
<td>Computer consultancy activities</td>
<td>49.0</td>
</tr>
<tr>
<td>Computer programming activities</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Source: NSI, author’s calculations

The IT sector in Sofia has one of the highest labor productivities in the country: in 2015, the average value added in the sector per employee was 47 thousand BGN – a 22% increase in comparison with 2011. However, there were large differences among segments in productivity: while in programming one worker produced an average value added worth 57 thousand BGN, in web portals value added was only 19 thousand BGN. This threefold difference in productivity in the two activities comes to explain a similar difference in pay between them. Web portals was the only IT sector segment with a drop in average value added, by 21% in the period under consideration. The segment with the highest growth during that period was computer facilities management, by 66% to 34 thousand BGN value added per employee. In programming, growth was slower, by 34%, which was largely expected, in view of the exceptionally high base.

Labor market and IT education in Sofia

Like almost all branches of the economy, in recent years the IT sector in the capital has suffered from a serious shortage of qualified workers. Regardless of the numerous new jobs and the attractive salaries and working conditions, IT companies have faced considerable difficulties in finding suitable workers, especially for higher positions requiring mastery of several programming languages and familiarity with all elements and phases in the process of developing and testing software, alongside with management skills. Eurostat
data point to similar problems in filling job positions: in 2016, 44% of companies in the ICT sector in Bulgaria had difficulties filling positions requiring ICT specialist skills. By way of comparison, in 2012 that percentage was 28%. Bulgaria ranks fifth in the EU on this indicator; shortage of ICT workers is greater in Luxemburg, Malta, Estonia, and Slovenia.

Data from the latest edition of the European Skills and Jobs Survey (CEDEFOP, 2015) of the European Centre for the Development of Vocational Training offers a perspective on necessary skills and competences in the IT sector, as well as their real levels as of 2014. The IT sector in Bulgaria has the highest requirements in technical skills (8.9/10) and developed ITC skills (8.6/10) from workers in the sector compared with all other sectors in the country’s economy.

At the same time, there is a relatively high level of discrepancy between skills (in the form of workers’ skills being too high or too low), mostly in basic ITC skills (80% of workers interviewed), basic literacy (66%) and communications skills (61%) in the sector.

Because of these problems, many companies in the sector prefer to train their own workers on the job and offer frequent and lasting internships. Besides, basic IT skills training has been on the increase in secondary school curricula in recent years. Ten schools in Sofia offer specialized training more broadly or more narrowly connected with information technologies. According to the admission figures of vocational schools planned for the 2016-17 school year, 988 students were expected to be admitted, with specialization in some of the most demanded specialties in that area, such as ‘computer equipment and technology’ (234), ‘system programming’ (208) and ‘computer networks’ (182). The remaining areas range between electronic trade and microprocessor technology. Still, BASSCOM’s annual studies conclude that professional education in Sofia has failed to provide a sufficient number of graduates to satisfy the IT sector’s needs.

Still, because of the highly sophisticated material and the wide range of necessary knowledge, the greater portion of IT specialists get their training in higher education. Data from the Ministry of Education’s registry of active university students and dropouts show that as of March in the 2016/17 academic year the number of students in majors connected with informatics, computer science, software, hardware, networks and other digital technologies on all levels and forms of education in Sofia’s universities was slightly over 11 thousand. Most of them, over 7,500 were enrolled in bachelor’s programmes, 2,500 in master’s programmes and 1,000 - in professional bachelor’s programmes.

By themselves, student numbers seem considerable, but intensive emigration of specialists and the vigorous development in the sector explain the continuing shortage of workers. Having in mind IT companies’ high requirements, we should also consider the quality of education offered at universities. The Ministry of Education’s Higher School Rating System (HSRS) offers some perspective on this. HSRS divides IT education in two parts: ‘informatics and computer science’ and ‘communication and computer technology’.

The highest rating in the ‘informatics’ section belongs to Sofia University: it offers the best training conditions while its graduates find the best realization on the labor market. Unemployment among them is 1.1% according to 2016 data; 93% of them find jobs suited to their speciality (91% do in the same region) and their average insurable income is 2,180 BGN. It should be noted though, that the average social insurance income underestimates actual income in the sector due to the existence of a maximum insurance threshold (which amounts to 2,600 BGN at this point).
In the same section, the lowest rated university is the University of Library Studies and Information Technologies but even among the graduates of this university, unemployment is only 2.1%. Their average insurable income is 1,396 BGN but only 62% find jobs in their area of study (we should bear in mind that figures do not include self-employed and part-time workers).

The leader in communication and computer technology is the Technical University whose almost perfect record in the different categories for learning and training environment is combined with 1.22% unemployment among graduates, an average insurable income of 1,807 BGN in 2016 and 85% of graduates in positions in their area of study (79% of them in the region). The poorest rating belongs to the University of Telecommunications and Post with an average insurable income of graduates amounting to 1,055 BGN, 2% unemployment and 30% employment in the area of study.

Regardless of the wide opportunities in Sofia for higher education in IT and its visible good results, alternative education opportunities are also very well developed. What the various centers for IT training mostly offer are shorter educational programs and separate courses which are more practice-oriented than focused on IT theory. People who enlist in such courses mostly study a specific technology (a family of programming languages, design, system administration etc.) and get trained for a specific job. The most popular schools for IT specialists are the Software University and the Telerik Academy.

Research and development

Research and development activity is one of the main focal points in the IT industry. Though data on employment in research and development is not available at the regional level (but, as already pointed out, the greater part of the sector is concentrated in the capital) 17% of all people employed in the wider ICT sector in 2015 were working in research and development. More people were employed in R&D only in manufacturing (43% of all) and professional activities and research (29%). The increase in the number of workers in research and development activities is highest in ICT – 905% between 2011 and 2015, to 1,980 people in the entire country.

Data confidentiality does not allow expenditure on research and development to be considered separately for the IT sector in Sofia. The total research and development expenses in the capital grew from 350 to 620 million BGN (77%) between 2011 and 2015. Having in mind the rapidly increasing number of employees in research and development and the expansion of the IT sector, one can surmise that IT has been responsible for a considerable part of spending on research and development in recent years.

Perspectives before the IT sector in Sofia

The overview of the state of Sofia’s IT sector gives grounds for optimism: almost all indicators considered show that the sector’s development has been stable in recent years and there are no signs that the positive tendency may change in the near future. The most visible obstacle in front of it is the increasing difficulty in finding workers, especially for positions requiring high levels of skill and experience. This problem has been increasingly important in most sectors of the economy. Unlike most sectors, however, IT has already demonstrated its ability to create alternative opportunities for training its workers, while traditional
education has been veering towards the preparation of more and more specialists in this sphere. Another problem is the emigration of highly qualified specialists as demand for them is even higher in many countries while labor conditions and pay are better. Prestige and development opportunities are also important, as the largest companies in the sector - Alphabet, Amazon, Facebook, Microsoft have no branches in Bulgaria yet.

Part of the sector’s vigorous development can be attributed to the relative absence of regulatory and administrative obstacles before it. Attempts at state interference in the sector have been made only recently, but they rather been of a supportive character and aimed at improvements in the business environment through projects like “Sofia Tech Park”. The relatively low (compared with the EU) R&D expenses and patents registered in this sphere also point to a risk of the sector’s orientation to more routine activities within the framework of large international companies rather than the creation of innovative products and services from local startups. However, if it manages to cope with those threats, there are no signs that the IT sector in Sofia will stop its rapid development and growth in the near future.
Conclusions

The analysis of the IT sector’s main indicators and their dynamics in recent years leads to some general conclusions:

- There is considerable competition between international and local companies in the sector with the market leaders changing from year to year. The tendency is towards a growing importance of international companies;

- The Sofia IT sector’s importance both in the wider ICT sector and in the national economy as a whole is on the increase: in 2015 the capital’s IT sector yielded 5.7% of all production in Sofia and 47% of the production in the wider ICT sector in the capital;

- The IT sector in Sofia is mainly international market oriented: export revenue from the IT branch in the capital amounts to about 9% of all revenue from export of services from the country;

- By the end of 2015 the IT sector had attracted foreign direct investment for over 260 million euro, almost exclusively concentrated in programming and similar activities;

- 40.4 thousand people or 6% of all employed people in the capital work in the IT sector, about 12 thousand of them in programming. They make up 62% of all people in the ICT sector in Sofia;

- Employees in the sector have a distinct profile: the majority of them are highly educated young men. Compared with other European nations, however, a relatively higher share of women and people more advanced in age work in Sofia;

- The capital’s IT sector offers some of the highest salaries in the country: in 2015 the average salary in the sector was over four times higher than the national average and over three times higher than the Sofia average;

- This is one of the most productive sectors: the average value added per worker is 47 thousand BGN – it is highest (57 thousand BGN) in programming;

- The chief challenge facing the sector is finding qualified workers. High emigration among such specialists and the sector’s vigorous development have exacerbated the problem in recent years.

- There are about 11 thousand students enrolled at Sofia’s universities in areas connected with the IT sector. Graduates have very low unemployment; almost all of them find work in their area of study and have social insurance incomes much higher than the average.
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