Comparative qualitative analysis of Turkey and Estonia in the IT sector vacancies

Ufuk BİNGÖL[*], Hakan METE[**], Yılmaz ÖZKAN[***]

Abstract

The aim of this study is to compare the Information Technologies (IT) job requirements in Turkey and Estonia, which have made significant progress in the IT sector, and to determine the developmental pattern of IT labor workforce by utilizing qualitative data analysis methods. Estonia was chosen for this comparative analysis on the IT sector workforce qualifications primarily because its young population surplus is similar to Turkey's with regard to the demographic window. As known, the educated young population has played an important role in the development of the country in terms of digital society. After declaring its independence in 2001, Estonia shaped all of its economic and social development endeavors around the IT sector. It is believed that the exhibition of results generated by the content analysis methods through the IT vacancies of companies operating in the IT sector and the results obtained by the comparative coding and analysis studies may constitute the data source for the labor market regulations to be achieved in Turkey in the future. In this context, content analysis, which is a sub-element of qualitative data analysis study with grounded theory, has been carried out with NVIVO 12.0 Plus, a Qualitative Data Analysis (QDA) software. According to the preliminary results of the study, the qualitative analysis of the information technologies workforce in Estonia, where solutions for the employment problem and achievement of the digital society aims were identified through focusing on technology trainings, has shown results in accordance with Turkey's technology-oriented education and development strategy.

Keywords: IT, IT vacancies, qualitative data analysis, workforce qualification, comparison

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Introduction

Information has been important since the beginning of human history. Which animals were to be hunted and how to go about it, how to light fire, how to obtain fruit and vegetables from the soil, the important information of the times written in the holy books have all been passed on from generation to generation to the present day. Obtained or invented information made the development of civilizations possible, thus constituting the world's political and social history.

Knowledge, then, has had an immeasurable value for a long time. Yet, its effects on the world economy has been made possible only recently by the development of technologies that can store information and transfer it from one place to another. With the development of computers and communication technologies, the information which could only be stored in the memory of people and transmitted via verbal communication in the past has now become an economic commodity bought and sold in the markets (Kevük, 2006, p. 320).

Fritz Machlup's (1962) study on the knowledge economy and the study of Drucker (1969), which revealed that information became a strategic element for businesses, began the discussion on the concept of information society. The concept of information society is based on providing information to all people involved in the social life with the help of information technologies.

The technological advancement that Schumpeter (1943) refers to as creative destructive following the industrial society is information technologies. Thus, the start of a new period of time changed the whole process of the previous one. Mass production and market economy have been replaced by ideas, knowledge and digitized economics. Countries that are now known as developed have reached this status either through information technology, or have improved the level they reached through information technology. In the current world order, the countries that cannot reach the information society target and show adequate advancement in information technologies will not only be unable to develop economically, but also socially and politically (Aktan and Tunç, 1998, p. 118). As a developing country, Turkey has observed this obligation with many efforts to become an information society in a short time. The efforts to develop an information society strategy, the development of the education system for the training of qualified IT labor force, and the realization of the e-government and transition projects are some concrete examples. Although the lack of quality in the agricultural sector, the difficulty in accessing quality education especially in the eastern and southeastern regions of Turkey, and the structural problems that exist in all sectors are considered to be disadvantages for our country as an information society while the fact that there is a high rate of young population and the high usage rate of information technologies especially within the young population are remarkable for extending the labor force.

An important feature of the information society is the need for qualified labor force. As the labor demand in the IT sector increases yearly, new job descriptions

and new qualification requirements arise. Determining the qualifications required on the sectorial basis and ways of human resource acquisition for these qualifications have been of increasing the importance, and taken together with the dynamic structure of the sector, studies bring about the need for continuous improvement (Kelleci, 2003, p. 41).

All the studies show that in order to fulfill the aim of the information society it is necessary to provide the labor force with the qualities that the IT sector requires now as well as in the future. In order to present the current needs of the sector, studies are carried out at both governmental and academic levels. The qualification needs of the sector are discussed with the important companies of the sector and information labor shortage is examined. It will be an important step towards progress to examine the subject particularly in Turkey with the perspective of future requirements and to determine the needs of sectors, thus helping all stakeholders of the sector develop towards reaching results. One of the most important tools that reveal the qualification sectorial needs is the information related to the IT vacancies published in job search portals and business social networks, which bring together the human resources and the job seekers in a transparent manner on the same platform.

An eastern European country, Estonia achieved the information society aim long before Turkey; and thus it was found worthy of examination in answering the research question of this study as to what kind of labor force the IT sector will need in the future. The aim of this study is to determine the developmental pattern of the IT labor force of Turkey through conducting a comparative analysis of IT job ads published on the electronic platforms and business social networks.

1. Literature review

One of the most important sources of information used in a country to reveal sectorial employment information is the electronic employment platform, where job vacancies and employee profiles can be viewed. This phenomenon stems from the fact that people now use information and communication technologies to search for and find jobs, all the while evolving into the information society that forms the basis of the study.

The use of job advertisements on electronic employment platforms as a method in academic studies has been widely utilized over the last decade. In some of the studies, the general sectorial structure of the countries is put forward, some of them are analyzed in detail by focusing on specific sectors, some are selected by choosing a specific job title and some of them work in a comparative way.

Backhaus (2004), in his content analysis of job vacancies on monster.com, has shown that firms in different sectors have differentiated their recruitment tactics and try to show that they are the most attractive option for employees by emphasizing the benefits provided to employees in general. As the first study in which the job

advertisements published on electronic portals are taken as the basic data, the general job announcement strategies of the firms were put forward.

The comparative content analysis in Kennan, Cole and Willard (2006) of the US and Australian online job advertisements has revealed the differences between the characteristics of librarians. The study examined the differences in the level of development by including the change in quality differences over time.

Capiluppi and Baravelle's (2010) content analysis of ICT job postings examined the differences between the labor force requirements of the UK's IT industry and the available trainings and training facilities and the labor force qualities of the human resources. Here, the labor force characteristics of the country and sector were examined and the labor qualifications obtained by formal and non-formal trainings were compared. As a result of the analysis, it was reported that the qualifications sought could not be obtained with the available trainings.

The study conducted by Ahsan, Ho and Khan (2013) over online job advertisements within the scope of the Project Manager job description in the Australian and New Zealand labor markets, comparative analyses were conducted between two countries, sectors and qualifications. The knowledge, skills and abilities that companies seek in the candidates they will employ as Project Manager were compared in terms of countries and sectors by frequency. Communication, resource management and technical skills are highly searched in both countries. Technical skills in the Information and Communication Technologies Sector, education, in the construction and the engineering sectors, stakeholder management in the public sector and communication skills in the health sector stand out for persons to be employed as Project Managers.

In Beblavy *et al*.'s (2015) analysis of job vacancies in the Slovakian labor market, the qualifications of the sought labor force and the available qualifications of the human resources to be employed are compared. In the study, a content analysis was conducted on job vacancies and, by using simple statistical methods, it was concluded that the employees were willing to work with poorer quality than their qualifications. As a result of the study, the unemployment problem and the labor market structural problems of Slovakia were revealed. A general labor market analysis was carried out and the employees' demands for employment were examined.

In another study carried out in 2017, Chiara Nardone from Bologna University, by using data obtained from companies' career section on their web pages, made a comparison between Germany's and Italy's labor market, in order to analyze gender-fair statements in job ads. In this study, the written language used in job advertisements was examined from the perspective of gender discrimination. As a result, it was observed that German companies paid more attention to gender discrimination and generally used non-gender words for job descriptions.

There is a detailed analysis of the UK labor market by using job advertisements published online between 2008 and 2016 by Turrel, Thurgood,

Copple, Djurmalieva and Speigner (2018). In this study, conducted for the Bank of England, the evolving trends over the years, the change of job announcements, sectoral differences and common qualifications sought in all labor markets was examined. It was also discussed whether the job advertisement published online could be an accurate and reliable source in analyses through various parameters and assumptions.

Overall, in the literature review, a gap is observed in the fact that the labor force requirements of any two countries are not compared by means of job advertisements published on electronic employment platforms in the IT sector. A comparison between a country that has made significant progress in the sector and has a great progress in development and a country that is just starting out as a developing country will be carried out for the first time. Demographic and social similarities between the two countries have been important data for the quality and accuracy of the study.

2. Method

The aim of this study is to identify the needs and criteria in Estonia and Turkey IT sectorial vacancies. In this context, we aim to examine the characteristics of the two countries' IT labor markets and identify the salient differences.

2.1. Sample and data collection techniques

In this study, computer assisted qualitative data analysis was performed. The sample of the study is job advertisements related to the IT industry published in 2018 for Turkey and Estonia on the LinkedIn social network platform where business professionals come together from all over the world, and workinestonia.com, cv.ee, jobbatical.com, kariyer.net, yenibiris.com and secretcv.com job search portals. As a sub-element of qualitative data analysis, content analysis was conducted through QDA software. The IT job ads on the websites have been obtained through the NCapture internet feature of the NVIVO software. The coding process was conducted through the QDA software where 12 sub-sectors according to job titles were created, and 170 sub-categories were created under the themes „Job-related Requirements", „General Requirements", and „Sectorial Requirements" based on the job description and general qualities sought in adverts. The most important process in qualitative data analysis is the coding phase. In this study, coding and inductive grounded theory analysis was conducted in order to uncover the labor force requirements of the IT sector vacancies in Turkey and Estonia from the data collected from samples. In terms of limitations of the study, no cluster analysis was conducted because no meaningful results would have emerged between job ads published entirely in English in Estonia and in Turkish in Turkey. Instead, the cluster analyses for the countries were conducted separately and examined manually.

2.2. Model and questions of the study

In this study, the data were analyzed by using the grounded theory approach in the coding study after the dataset was imported into the software. The grounded theory aims to produce theory from the themes emerging from the dataset instead of sorting the data into predefined categories. In grounded theory, the researcher uncovers the theory embedded in the data when collecting or interpreting data, and can access new concepts and theories through research as well as data collection and analysis. This process is called „Constant Comparative Method" (Glaser and Strauss, 1967). The questions asked within the scope of the constant comparative analysis carried out in our study are as follows:

Q1: Which IT sub-sectors stand out in the IT Job Ads in Turkey and Estonia?
Q2: What are the professional and soft skills criteria in the IT Job Ads in Turkey and Estonia?
Q3: What are the differences and other criteria set forth in the IT Job Ads in and between Turkey and Estonia?

2.3. Validity and reliability of the study

Regarding the reliability of the study, the comparison of three different coding studies (QSR: 2018) was conducted by the authors of the study with the support of the QDA software by taking expert opinion into consideration. In terms of the first and second level themes and coding, in the scope of the study, an average of 91% compliance was achieved in the themes mentioned in Table 1 with the help of Miles and Huberman (1994)'s concept of coherence and convergence percentage. In the study, data visualization was performed in the context of data reduction, and clustering analysis and thematic analyses were performed with the help of the QDA software. Completion and validation studies were conducted between the analyses conducted to control for reliability. Consistency was checked through comparing the results of an analysis with the result of the other analysis.

3. Results

IT sector vacancies published in 2018 in Turkey and Estonia were examined under themes and categories shown in Table 1. The theme and categories consist of the fields coded in the dataset defined in the job description and qualifications sections. The themes that stand out as important criteria for the applicants who will be employed by the companies in the advertisements are Professional Skills, Education Level, Sectorial Requirements, Soft Skills and Job Titles.

Table 1. Themes and categories of job vacancies by country (according to reference coding value)

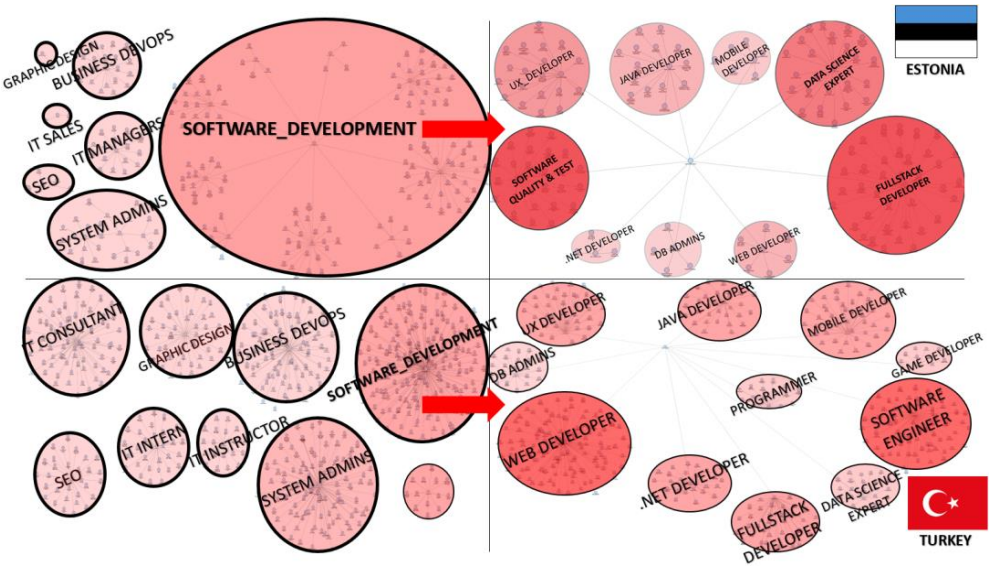
Themes	Categories	Coding References	
		ESTONIA	**TURKEY**
Professional Qualification	Certification	10	**64**
	Graphic Design Knowledge	5	34
	IT Literacy	-	54
	Maintenance & Support	7	72
	Network Management Skills	23	**105**
	Quality Management (General)	**28**	18
	Robotics	-	3
	Social Networks Management Skills	9	20
	Software Development Skills	**700**	**768**
	System Management Skills	**119**	**179**
Education Level	High School	-	3
	Vocational School	1	44
	College & Bachelor's Degree	70	277
Sectorial Requirements	Banking & Finance	9	**39**
	GIS	-	4
	Governmental	-	5
	e-Transformation	-	2
	Marketing	3	**45**
	Educational	3	16
	e-TRADE	16	32
Soft Skills	Age	-	**8**
	Language	146	214
	Sex	-	2
	Driving License	-	**44**
	Team Work	70	132
	Flexible Working Hours	17	**134**
	Customer Relations & Communication	76	111
	Experience Transfer	**39**	-
	Reporting & Problem Solving Competency	96	106
	Travel	6	**65**
	Management Competency	13	1
	Smoking	-	**4**
	Legal Knowledge	-	2
Job Titles*	Business Development	20	87
	Call Center	-	28
	Graphic Design	2	43
	IT Consultant	-	73
	IT Internships	-	19
	IT Education	-	40
	IT Manager	17	189
	IT Sales	2	106

Social Networks Operation	4	31
Software Development	**253**	**324**
System Administration	**177**	**358**

* The values included in the categories created under the theme of Job Titles were created by the automatic coding method with the QDA software within the number of advertisements on the job seeking portals.
Source: own representation

Pearson Correlation Coefficient Cluster (Clustering) Analysis is shown in Figure-1 with the support of the QDA software to be determined as the main parameter and the criteria specified in the job advertisements. Job vacancies published on the electronic employment portals are shown on the search page first by the job title and company information, and the details are displayed when one clicks on the relevant ad. The details generally consist of three or four parts, including the title, qualifications and description of the work. On some portals, data such as location and education level information can be shown in a separate section.

Figure 1. Cluster analysis of Estonia & Turkey IT industry software development and other sub-sectors job vacancies



Source: own representation

It is seen that, in terms of quantity of jobs in the IT labor market in both Turkey and Estonia, the most important is the software development sub-sector job vacancies The job advertisements in the field of system management sub-sector, which includes network management & server systems experts, cyber security and so on, holds the second position. In Turkey, Web Software Developer and Software

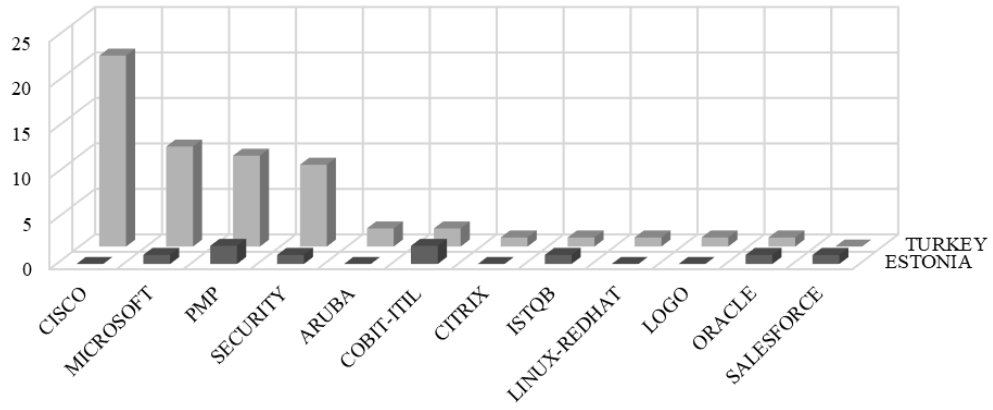
Engineer titles get the first place in terms of job postings for the software sub-sector, while the Estonian IT workforce Full Stack Developer, Software Testing and Quality Experts and Data Science Experts take the first place. Ads related to business development experts are at a similar level in both countries. In the next section, job criteria will be analyzed according to the themes and sub-categories in Table 1 and in the coding study as well.

3.1. Professional qualifications

Certification

Considering that professional skilled represent the most important criterion for employers, IT certification has been one of the important assets in job vacancies as a proof of professionalism in the IT sector that the applicants are authorized to use, manage, or provide services, software and hardware produced by big technology companies in the IT sector since the 2000s. The graph of preferred certifications according to the thematic and categorical reference coding value created in Table 1 is shown in Figure 2.

Figure 2. Comparative Certification Criteria in Job Ads



Source: own representation

While certification is not of particular importance as a criterion in Estonian IT adverts, certifications from the web technologies company Cisco and the software company Microsoft, in particular, seem to be important in recruitment in Turkey. Within the scope of Cisco products certification, CCNA (Cisco Certified Network Administrator) and CCNP (Cisco Certified Network Professional) certifications of Cisco Company, MCSE (Microsoft Certified Solution Expert) and MCTS (Microsoft Certified Technology Specialist) certifications of Microsoft are the most wanted

certifications. Also, PMP (Project Management Professional) certification, which is popular among project managers, is an important criterion in both countries. Cyber security is perhaps one of the most important IT issues nowadays. Cyber security certification criteria are constantly specified in in the ads Turkey. It is observed that ITIL certification requirement, which is related to the management of IT services, stands out in the context of the need for certification in the job vacancies in Estonia.

Graphic Design Knowledge

According to the dataset, jobs related to graphic design professionals in Turkey is higher in frequency than in Estonia. The main criterion for Graphic Design Expert positions announced in both countries is experience with graphical design softwares developed by Adobe. It is stated in all 45 job positions announced for graphic design that the candidates who can use „Adobe Photoshop" and „Illustrator" at an advanced level are preferred. Candidates experienced in the softwares Adobe Flash, Dreamweaver, Indesign, Fireworks, Effects are also preferred for related positions.

IT Literacy

IT literacy, or basic PC usage knowledge, is a criterion frequently mentioned in the job ads in Turkey. Accordingly, experience in Microsoft Office Software is demanded from all candidates in a clichéd statement such as „MS Office ve internet uygulamalarına hakim" („Good command of MS Office Applications"). It was observed that this level of experience is requested from IT Managers, IT Sales, Business Development and System Admins. While there are no criteria within the scope of job advertisements in the job seeking portals in Estonia, 8% of the job ads include this experience as an important criterion in applying for these positions in Turkey.

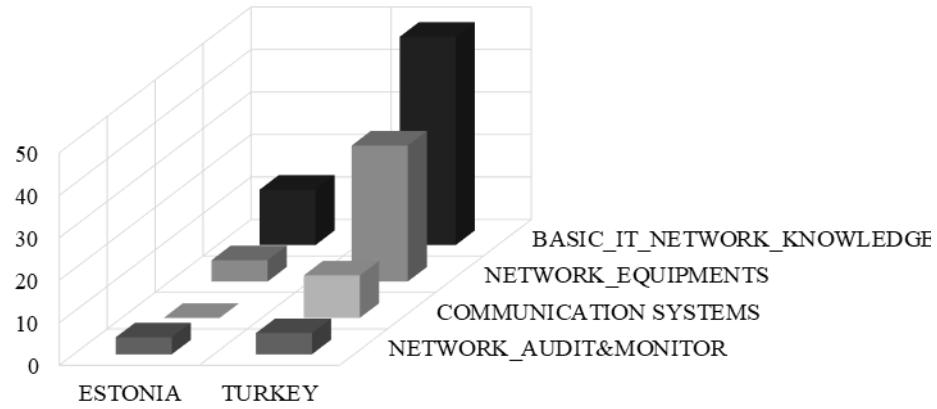
Maintenance & support

The IT sector also includes maintenance and support services. More specifically, help desk and hardware technicians are quite commonly sought in Turkey. The most commonly used words in the coding study were found to be „Notebook", „Electronic", „Support" and „Hardware". It is frequently emphasized that applicants will be assigned to provide initial support for hardware and basic network problems in job ads in both countries.

Network management

It has been determined that Network Management and criteria meet under four headings. Reference coding graph by country is shown in Figure-3.

Figure 3. Network management criteria chart in job ads



Source: own representation

As seen in Figure-3, basic network knowledge is the most important criterion in both countries. It was found that employers frequently use the words TCP / IP, DNS, DHCP, VPN, WAN, Wi-Fi, Cisco, FTP, SMTP, SSH as basic network knowledge experience. Furthermore, it is seen that the discourse of being experienced in internet communication protocols is stated in job advertisements.

Another criterion for the applicants is management and configuration experience in network devices. In this context, employers provide positions as Network Management Specialist, which require the applicants to have knowledge of management of active devices such as switch, router, firewall of various IT company's products (90% Cisco products). Communication systems, satellite communication, communication security and secure communication, wireless technologies, mobile communication emerge as keyword groups in job ads. For monitoring networks, Network Sniffing experience, the use of network monitoring tools such as Wireshark, Nagios, Zabbix and so on are mentioned in IT job ads in both countries.

Quality management (general)

Experience in ITIL and ISO 27000 is frequently requested within the general quality management criterion of the advertisements. It was determined that experience on the processes of quality systems related to IT services management and information security quality management systems are generally requested.

While Estonia especially requests experience regarding ITIL, in Turkey, ISO 27000 information security management system quality experience is requested.

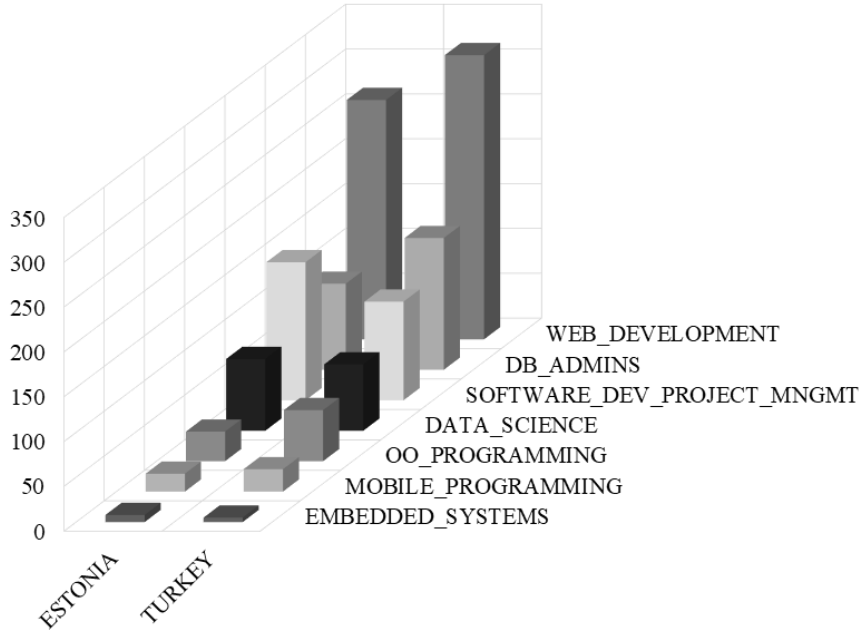
Social networks management

Social networking platforms, which are the products of the IT sector with the greatest impact on social life these days, have brought about new employment areas in many sectors all over the world directly or indirectly. Various job ads looking for social network experts were included in the IT sector in both Turkey and Estonia. The most important criterion in the ads is the experience requirement in SEO (Search Engine Optimization) and SEM (Search Engine Marketing). In this context, the aim is to increase the visibility of the relevant employer companies or the related institution on various social media platforms. Communication skills, digital campaign, advertising, Google AdWords and analytics patterns have emerged as key words within the scope of social network management criterion.

Software development skills

As shown in table-1, the software sector holds the highest proportion among the IT job adverts published in both countries. The distribution of criteria related to software development skills is shown in Figure 4 with the reference coding analysis.

Figure 4. Software sector advert criteria distribution (by reference coding value)



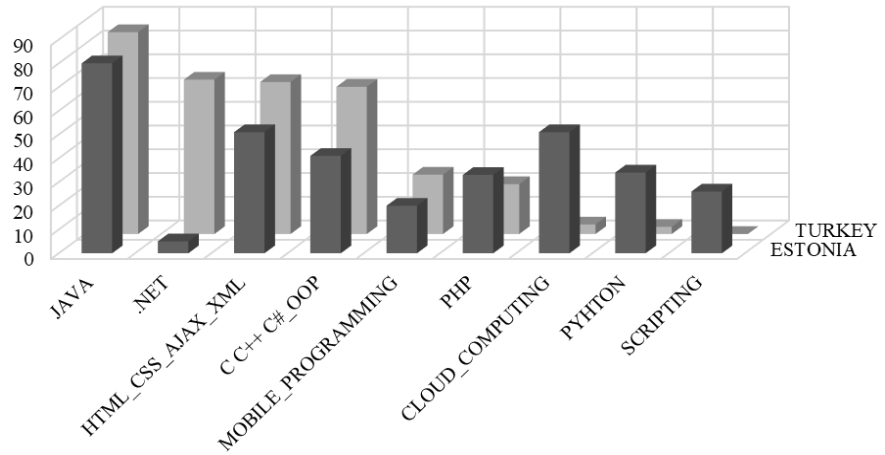
Source: own representation

In both countries, the adverts in the software sector show an urgent need for expertise in web software development. Following that, while adverts in Turkey specify criteria regarding database expertise, the appearance of project management in software development, database and data science in the advert criteria in Estonia is an indicator of where the IT sector is headed. Software development processes are perceived as a matter of project management in Estonia. Software is usually designed by specialized software companies instead of IT departments within the company. All new software is a subject of project management. Moreover, the abundance of job adverts in cluster analysis as well as data science are areas that differentiate Estonia. Data science and data management are expressed as the future of IT and countries that are advanced in this subject invest more in data management.

While ORACLE and MS SQL database experience is sought in Turkish database management positions, candidates with experience in open-source databases such as MYSQL and POSTGRESQL are sought in Estonia. The difference regarding database selection between the two countries brings with itself the question of increased skill levels for employees due to the fact that open-source databases are free yet require higher expertise. In this regard, Estonia develops a policy with IT employees in mind, while Turkey opts for companies with licensed databases that provide paid support and project management. Estonia prefers to invest in increasing its employees' qualifications rather than investing in and using its resources on licensed databases.

As it is well known, one of the most important qualifications in the software development sector is the programming language used while developing the software. The programming language experience requirements of the two countries are shown in Figure 5.

Figure 5. Programming languages criteria in adverts



Source: own representation

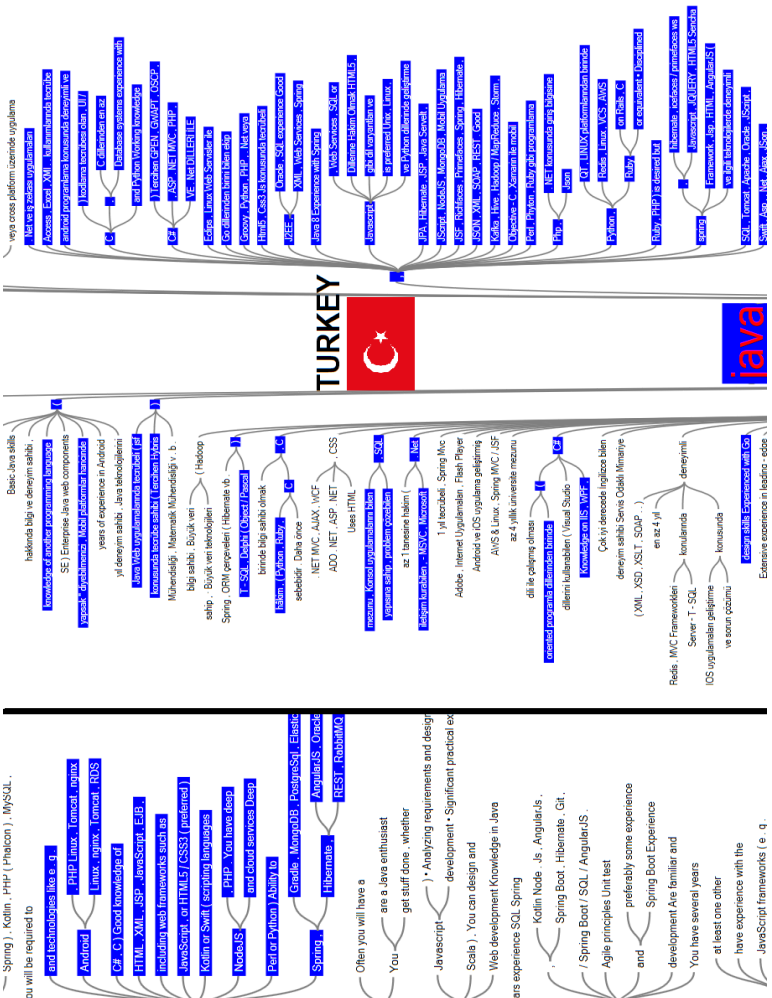
It is seen that the most popular programming language in software sector for both countries is „Java". The Java application was released to the market in 1995 and is still being used in millions of devices throughout dozens of platforms (ORACLE, 2019). Since its field of application is wide and development platforms are free, software development experience, especially on Java platforms, is sought in job adverts. The second most-sought programming language in the software sector in Turkey is NET programming language, whereas in Estonia software development experience in this language is hardly sought. On the other hand, experience in Python and other cloud computing software development, which comes to the fore regarding data science studies, is among the advert criteria in Estonia. It is observed that this is the most significant difference between the two countries. It comes into prominence that Estonia pays special attention to cloud computing and data science, which are often introduced as the future of the sector. Python programming language creates the infrastructure especially for the internet of things concept, Industry 4.0, sensors and intelligent robot technology; thus, the developing Turkey needs to start paying attention to this subject as soon as possible. Also, experience in scripting languages such as Django, REST, Powershell and Linux Shell, which are used to automatize various tasks in programming, is a frequently sought criterion in Estonia. The importance that Estonia places on script technology also shows the importance that it places on the qualitative development of employees, just as it did with the need for high expertise and database selection.

Corresponding to the increased usage of personal electronic devices, such as mobile phones and tablets, the software developed on these kinds of devices also takes up an important place in the job adverts' skill requirement section. The mobile programming concept here refers to the programming of applications specifically for Android and iOS operating system platforms and development of offline or online software and games. As stated before, web programming has a great share in the software sector and is even still on the rise. Thus, software development experience in PHP web programming language and in languages like HTML, CSS, AJAX, which are used in user interface design, is sought in both countries.

The programming languages' relation to one another within the advert criteria is studied by running a content analysis, which is performed with the support of a QDA (Qualitative Data Analysis) software. Supporting criteria in job adverts that seek experience in the most famous programming language, Java, for both countries are shown in Figure 6.

The content analysis conducted shows that, related to Java programming language, experience in HTML, PHP, Python, C, C# languages, Springboot, Angular JS., Java EE platforms, and Javascript, Ruby, Kotlin and Swift scripting languages is sought. It is also observed that both countries consider experience in object-oriented C, C++ and C# languages an essential condition in their job adverts, specifically to develop embedded systems.

Figure 6. Content analysis of java programming language and related languages in adverts

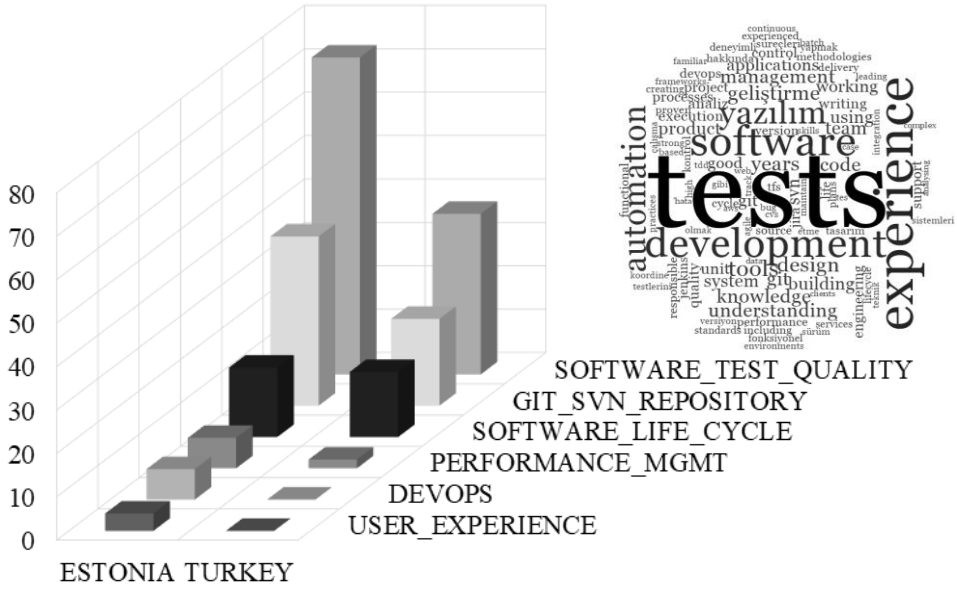


Source: own representation

The software project management field takes part together with sub-sections in job adverts in both countries. Software project management criteria based on reference coding value in the coding study conducted are provided in Figure 7.

According to Figure 7, candidates are mostly requested to have software testing and quality management process experience. Experience in creating a test scenario, developing testing automations, software code tracking, debugging, and software development in compliance with current quality management methods is sought. In Estonian job adverts, having a good command of Test Driven Development (TDD) for software that will be developed is sought, whereas in Turkish job adverts, it is only sought on a surface-level with phrases such as „having experience in software testing process". It is observed that, with regard to the software life cycle, the ideal candidate needs to be experienced in all of the software development processes that Davis (1988) stated, which are: concept, design, analysis, development, testing and maintenance stages. This criterion is similarly shared and expressed in both countries, and candidates are expected to write optimized, clean software codes with a good understanding of software life cycle principles. Providing performance management by improving the developed software is another criterion sought in candidates, as well. In this context, only Estonian job adverts posit a criterion that aims to provide quality and life cycle of software development process by taking user experience into consideration.

Figure 7. Software development project management advert criteria



Source: own representation

It is observed that the job adverts in Estonia detail their criteria related to software development process with software development methods and business continuity applications experience. Accordingly, there is a criterion that requests relevant candidates to have a good command of „agile" and „scrum" software development methodology. No such criteria related to the abovementioned methodologies were observed in Turkish adverts.

Version control management is critical for Software Projects. Version control systems provide various opportunities through a central server platform such as letting the source codes run offline, storing the changes to source codes bibliographically, and so on (Brindescu *et al.*, 2014).

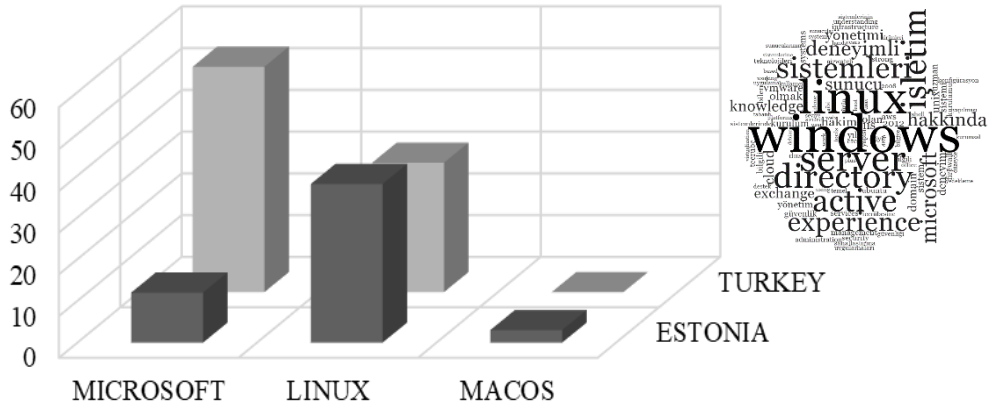
Experience in Git, which is an internet-based open source coded version control system, experience in SVN, CVS, TFS subversion systems, which support open source coded software substructure, and experience in JIRA, which is a featured software issue tracking system, are sought.

System management skills

All tasks such as management of server systems, which is the main component of IT systems, IT ecosystem security, establishment of the mechanisms of Disaster Recovery based upon worst-case scenarios caused by IT violations were studied under the system management criteria category of adverts.

The most important factor in the system management expertise category appears to be the server platform which is to be managed. The Microsoft and Linux operating systems are prominent in both countries. The criteria related to the operating system experience in job adverts by countries are shown in Figure-8.

Figure 8. Operating systems management skills with word cloud



Source: own representation

Within the scope of operating system management experience requirement in Turkey's job adverts, we may say that experience in Microsoft products is the most sought for. As shown in Figure-6, the most sought-after experience area is that in Active Directory, which provides management of institutional IT systems via the Microsoft Windows Server operating system (Desmond *et al*., 2008). Together with Active Directory, experience in DNS, DHCP, IIS, Exchange Server, Windows Domain is also sought. There are no distinct differences between the two countries in this matter. On the other hand, in both countries, little detail is given when it comes to the Linux system management experience requested from candidates, as opposed to Windows. It is stated that candidates who have experience in open source coded Linux platforms are preferred, with expressions such as „Familiar with the Linux environment", have „Experience in Linux Systems" or „Strong Linux Knowledge". In the job adverts in Turkey, there are no criteria regarding the „Mac OS" operating system developed by the Apple Company, whereas it partially exists in job adverts in Estonia.

It is found that the cloud IT infrastructure management criteria are frequently sought in systems management category, similar to job adverts in software development field. Particularly in Estonian job adverts, prior experience is sought in cloud IT management with cloud technologies like Amazon Web Services (AWS) as well as Drupal, Azure, Google Cloud etc. There are many adverts with criteria related to virtualizing physical server systems and running them on the cloud system by using the cloud IT infrastructure. In Estonian job adverts, experience in „Virtualization Experience with Elastic Search" is sought without specifying a certain software product while in Turkish job adverts, having a good command of Vmvare and Hyper-V virtualization software applications is sought.

There was a significant amount of job adverts related to contemporary IT security or cyber security both in Estonia and Turkey. In Estonia, Network Security, Web Security, Threat Management, Network Penetration test and techniques come into prominence; meanwhile in Turkey, it is observed that such concepts are detailed with extra experience in attack detection/prevention systems, firewall management, and Log management. Disaster recovery system management, which helps remove possible IT problems caused by vulnerabilities or unwanted conditions as soon as possible, is also present in both countries' IT adverts. In Estonia, experience in various instruments that provide IT infrastructure tracking is sought, while in Turkey, it is observed that the job adverts are concentrated more on data backup and migration.

3.2. Education level and sectorial qualifications

One of the criteria sought by employers in job postings is the education level. Some postings within the scope of the study have a specified education level for the opening. In 38% of the job postings in Turkey, an education level of college,

university or postgraduate level is set as a requirement, whereas in Estonia, only 10% of the job postings consider education a prerequisite. Within the postings that have the education prerequisite, about 87% require undergraduate or postgraduate level of education, and 86% of them state they require engineering or computer science graduates, whereas another 10% state that they require any undergraduate diploma. The remaining 4% use as a criterion a diploma in technical education sciences.

It is stated in the job adverts with associate or undergraduate degree criterion that graduates of electronics, network and computer technician and computer programming fields will be preferred over graduates of other fields.

It has been determined that the job advertisements included in the scope of this study have criteria directly related to some specific sectors. In this scope, sectorial criteria are more pronounced especially in the job adverts in Turkey. In the job adverts in Turkey, criteria focus primarily on expertise in IT sales and marketing, whereas in Estonia, criteria focus primarily on expertise in e-commerce. In Turkey, experience in the field of IT education for the purposes of certification training provision is required. It can be observed in Figure 8 that both countries seek similar levels of expertise in the banking and finance sector software development. While adverts looking for special experience in digital transformation and e-transformation are found in job adverts in Turkey, we did not encounter any adverts with similar criteria for expertise or experience in the field within the scope of our study in Estonia.

3.3. Soft skills

Apart from individuals' technical skills, their personal characteristics and behavior, as well as their interpersonal relations are of primary concern among the issues considered by employers, and in turn, are carefully examined in job applications (Robles, 2012). In the adverts included in the study, the most important criterion in terms of personal characteristics is found to be foreign language skills. 99% of the job adverts in Estonia sought knowledge of English from candidates, and 58% of the adverts in Turkey sought knowledge of primarily English along with other languages. In the adverts in Turkey, two adverts sought for knowledge of French, and three of them sought German along with English. In the Estonian adverts, 4% sought Russian, 4% sought Baltic languages such as Estonian, Finnish or Swedish from non-Estonian candidates, 2% sought German, and 1% sought French.

After knowledge of foreign languages, the most important characteristic with a similar reference coding value in the adverts in both countries was „Analytical Thinking Style and Problem Solving Skills". According to this, keywords such as „learning, troubleshooting skills, solution, adaptive, analysis" are found to be repeated frequently. „Customer relationships and communication skills" is another criterion that we encountered often within the scope of this study. In accordance with

this, concepts and phrases such as „negotiation, adaptation, human relations" are important criteria under this category. „Interpersonal communication and team work" is another important criterion mentioned in the adverts. Employees are required to adapt well to the organization culture and to be „team players". Reporting and documentation also come up very often in job adverts. Candidates are required to have regular written and oral reporting skills. Some criteria about analysis and examination of technical and service-oriented documents regarding processes are also sought.

The criteria above are at similar levels for job adverts in both countries. There are also criteria specific to each country. In the job adverts in Turkey, having completed one's compulsory military service, travel flexibility and having a driver's license, age, sex, smoking preferences, legal regulations are also among criteria. In eight job adverts in Turkey, only candidates below 30 were encouraged to apply. In one advert, only female candidates were encouraged to apply, and in another, only male candidates who completed their military service were eligible. Within the military service criterion, in most adverts, the male candidates are required to have completed their compulsory military service, as the military service is only compulsory for male citizens. In 10 to 15% of the adverts in Turkey, travel flexibility is another criterion. Travel flexibility (mainly abroad, but especially within the European Union) is required in six job adverts in Estonia.

Different from the job adverts in Turkey, various criteria regarding experience transfer and executive skills are found in the job adverts in Estonia. Especially in job adverts in the software development field, phrases such as „Experience transfer for the new software developers for at least one hour a day" signify that there will be company-training opportunities. With regard to experience transfer, coaching, mentoring, and leadership, keywords and executive skills criteria are found.

Conclusions

The information technologies sector is a field capable to provide new job opportunities and is constantly on the move in line with developing technologies. The comparative analysis of the two countries in this study has revealed many similarities and differences. The results of the comparative cluster analyses conducted within the scope of the study show that the software sector holds the biggest share in the IT workforce in both countries. Within the scope of the inductive coding study, it has been observed that there are other, sub-branches within the software sector. In the holistic sense, in light of the categorical findings of the study, the similarities and differences between the criteria in the job adverts have been shown below with respect to their weight.

Table 2. Prioritized Criteria in IT Job Adverts in Estonia and Turkey

Categories	Estonia	Turkey
Soft Skills	• **Foreign Language (English, Russian and Baltic Languages)** • Analytic Thinking and Reporting • **Customer Relations and Communication** • **Teamwork** • Experience Transfer and Executive Skills	• **Foreign Language (English)** • Flexible Work Hours • **Teamwork** • Compulsory Military Service • **Customer Relations and Communication** • Analytic Thinking and Reporting • Driver's License and Freedom of Travel
Education Level	Partial (Undergraduate)	Partial (Undergraduate)
Certification	Partial (ITIL & PMP)	Important Criteria (Cisco & Microsoft)
Occupational Criteria ➔ Software	• Software Quality, Test, Process Management and Software Life Cycle Experience (Agile, Scrum) • Open-Source Coded Programming Languages (JAVA, PHYTHON, PHP), Database Experience (MYSQL) • **Web Technologies** and Data Science (Big Data) expertise	• **Web Technologies** (.NET and PHP) • Experience in JAVA and .NET programming languages and Microsoft Development Environment • ORACLE and MS SQL Database Experience
Occupational Criteria ➔ Systems Management	• Experience in Linux (Open-source Coded Applications) • Scripting • Cyber Security • Cloud Computing Platforms (AWS)	• Microsoft Products Experience (Active Directory, Exchange Server, Windows Server OS) • Virtualization Technologies (Vmware and Hyper-V) • Cloud Computing (Azure Cloud) • Cyber Security • Disaster Recovery

Source: own representation

It is observed that the most important personal skills criterion that emerges from the job advertisements on Estonia's and Turkey's most important job search

portals and business social networks is knowledge of foreign languages. However, the publication of the entire job advertisements published in Estonia in English is an important sign of Estonia's relationship with the global IT sector. In accordance with this, although not part of hard data, it is deemed that job interviews themselves are also conducted in English. By contrast, all of the related portals for job search in Turkey are found to be in Turkish. However, it is observed that especially the Turkish representatives of global companies, along with some national companies, post job adverts in English. No tangible data was obtained on whether the candidates are interviewed in Turkish or in English in job interviews. In Turkey, the ability to work flexible work hours was the most sought-after criterion in candidates for IT companies. It should not be forgotten that when this criterion is regarded as a demand for working overtime, this can create negative consequences, especially with regard to humane working conditions. However, considering the fact that the sector is continuously operating on a 24-hour basis and that flexible working practices are popular in today's world, it can be seen that it is both possible and useful to develop new methods in the informatics workforce, especially with the support of technology in the current legislation regarding work life. While having completed compulsory military service, having no travel limitations or holding a driver's license are still important criteria in Turkey, there have been no encounters of such criteria in Estonia, even though male citizens of Estonia are also subject to 8 to 11 months of compulsory military service[1]. In this context, it can be seen that, especially in the Estonian IT sector, foreigners are also considered potential candidates. In the adverts in Estonia, it is stated that the candidates who are team players, with strong analytical thinking skills and who maintain good relationships with consumers and the other employees of the organization will be selected for the position. While these criteria are also mentioned in the adverts in Turkey, it was observed that they were overshadowed by other criteria mentioned above, such as military service and travelling conditions. The education level is portrayed as a partially important criterion in both countries' job adverts. Due to the self-education routes available to the general public as a result of the developing technology, it is seen that the diploma requirements as a criterion in the IT sector partially hold less importance. Therefore, in addition to the fact that the education level is an important criterion in all labor markets, it is seen that the occupational criteria and work experience in the field of informatics are also important in recruitment. Moreover, although only partially, especially in Estonia, having a certification in IT projects is a reason for recruitment, whereas in Turkey, holding a certificate from global IT companies in systems management in support of the diploma is stated as a reason for recruitment.

In the software sector, it is observed that in both countries web technologies are at the forefront. However, especially in Estonia, we may notice a higher volume

[1] Estonia Defence Forces Official Web Site (2018), Compulsory military service (retrieved from http://www.mil.ee/en/defence-forces/compulsory-military-service).

of job adverts regarding machine learning, artificial intelligence and big data. However, what is worth noticing is that the Estonian software sector has a strong commitment for quality and process management. In addition to many positions in the software sector, such as software test and control expert, in almost all of the job postings, it can be observed that one of the criteria is the experience in software quality and process management. We believe that this would, in turn, affect the success of the product or service created. It is seen that in Turkey, there are less criteria regarding software testing and processes. Considering their demands on the labor market, the IT companies operating on a global scale should especially request this. Experience in Java programming language is still the criterion required from most candidates. While 95% of the software job adverts in Estonia seek experience in open-source coded programming languages such as JAVA, PHP etc., in Turkey, experience in .NET, which has a license fee, is very often sought, after JAVA. The same is observed in the systems management area. While the primary criterion is mostly experience in open-source coded Linux systems management in Estonia, job adverts in Turkey still ask for experience in Microsoft products. The benefits of using local, open-sourced software over high-priced software with high added value in the software sector for the national economy should not be forgotten. It is clear that the national economy can benefit greatly from being a part of the global IT sector with locally-sourced software products, especially considering the fact that it reduces the external dependence on software development, has low investment costs and is idea-based. In this context, in accordance with the basic criteria Estonia has established as a country having completed its digital transformation regarding information technologies workforce, we believe that creating a flexible curriculum structure that will be updated based on the needs of the institutions that provide information technologies training should be beneficial in steering the young Turkish workforce towards working on data science and open source coded local software production.

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