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Skills Analysis of Employes by Using LinkedIn Profiles of Global and Türkiye Audit Firms

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ABSTRACT

Purpose – The study aims to reveal the current status of the skills of those working in audit firms in today's changing business world. In addition, the aim of the study is to reveal the differences between Global audit firms and local audit firms in Türkiye.

Design/methodology/approach – In this study, descriptive analysis method were used to reveal the existing situation. It is aimed to reach the top 20 audit firms with the highest turnover in the world and 364 audit firms registered with the Public Oversight Agency in Türkiye as of January 2022. LinkedIn corporate pages of 19 of the top 20 audit firms with the highest turnover in the world and 58 of 364 audit firms in Turkey have been reached.

Findings – It has been revealed that the soft skills of employees in Big4 firms are an important complement to their technical skills. This situation is more limited in local audit firms. While Data Analytics (DA) skills are also observed in employees of Big4 firms, no one stated skills with the word "data analytics" in local audit firms. It has been determined that Python, R, SQL, Power BI and Tableau tools are used as DA skills. Engineering education stands out for those who indicate Python, R, and SQL skills.

Discussion – The study's empirical evidence shows that Big4 firms need DA skills more and more as they move from the accounting and auditing fields to consulting, technology, and digital services. It shows the lack of both soft and DA skills in local audit firms. This study develops empirical knowledge of what employee skills are and should be for global and local audit firms.

1. INTRODUCTION

Body of paper Today as a result of globalization and technological developments, the business environment is more challenging, complex, intense, and extremely competitive (Mathew, 2015; Scheepers & Whelton, 2018). Now almost every industry continually is changing. Organizations see human resources as their core assets, which play a critical role in their performance and sustainable competitive advantages (Kang & Sidhu, 2011). However, technical, and professional skills alone are not enough to achieve organizational goals and gain a competitive advantage (James & James, 2004;Chattoraj & Shabnam, 2015). Organizations often prefer to see a good combination of skills in their employees and desire sufficient soft skills to advance in addition to discipline-based knowledge and skills (Chattoraj & Shabnam, 2015).

Hard skills are expressed as the technical expertise and knowledge required for a job, while soft skills are interpersonal qualities and personal qualities that a person has (Robles, 2012). There is no generally accepted classification of soft skills. In the literature; leadership, communication, teamwork, creative, adaptability, self-motivation, problem solving, work ethic, time management, critical thinking, planning, and management (Kumar et al., 2022;Gorustowicz, 2019;Whitmore, 2012) skills are common soft skills. Soft skills are recognized as an important complement to hard skills, facilitating the creative and productive application of hard skills in the workplace (Dixon et. al., 2010; Jackson & Chapman, 2012).

In addition to these, with the emergence of modern technologies (Artificial Intelligence, Internet of Things, Big Data Analytics, Cloud Computing, etc.) with Industry 4.0, strong analytical skills (data analytics) have become the skills demanded by employers in order to adapt business environments to alteration. Simon (2013) defines

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data analytics as the combination of "statistics, mathematics, programming, problem solving skillful capturing of data, the ability to look at things differently, and the ability to clean, prepare and organize data". The report of PwC (2018) also shows that the demand for analytics-enabled jobs, such as data-driven decision-makers and functional analysts across all industries, is growing rapidly in the United States. Analytical skills are data collection, data interpretation, data analysis, and using analytical tools (Fechter, 2022). Analytics tools are closed-source software (e.g., Excel, Tableau, RapidMiner) and open-source software (e.g., Python, SQL, R) (Mashayekhy et al., 2020: Jafar et al., 2017). Specifically, one of the shortcomings that can be easily included in data analytics skills is teaching soft skills such as communication, collaboration, and interdisciplinary team management (Mikalef et al., 2018). Indeed, data analysts need to transform data with insights to help organizations make better decisions. They also need to be able to effectively communicate these insights to people without a technical background. They need to be able to find and solve problems by collaborating with others in the organization in resolving problems (Brooks, 2021). Therefore, data analytics skills also require strong soft skills.

In particular the fact that the service sector has much more human-oriented processes than the manufacturing sector, which has mechanical routines, and many processes revolve around humans have made employees more important than ever (Wilderom, 1991). Although audit firms, which are among the service companies, provide services in the field of audit where technical knowledge is used intensively, their business models have changed considerably due to both technological developments and the competitive environment. It is seen that large international audit firms have a structure that evolves towards consultancy services in order to compete (Shore & Wright, 2018).

Today, especially when the structure of global audit firms is examined, it is seen that consultancy services are provided in different areas such as information technologies, people and change management, CFO consultancy, customer and marketing, and purchasing. For this reason, employees working in different departments in audit firms, whether they are providing traditional audit services (auditor) or those working in other departments providing services such as consultancy, must have the skills appropriate to today's conditions. Therefore, global audit firms may need more consisting skill combination (technical skills and soft skills) than small and local audit firms to increase the efficiency of their work. However, the professional skills of employees in local audit firms have limitations compared to international audit firms (Nguyen et al., 2020). There are very few studies in the literature on what kind of skills the employees in audit firms have. Most of the studies are related to curriculum regulation and education. The motivation for the study is the lack of an exploratory analysis of skills in audit firms. Accordingly, research on assessing the skills of employees in audit firms is necessary and meaningful both in theory and in practice. In this study, using LinkedIn (professional social media application) application, the skills of employees of Big4 global and other international global firms and Big4 and other international and local audit firms in Türkiye were revealed. Thus, the situation in practice of the skills specified in the literature was tried to be explored. The use of LinkedIn a business-oriented social network, as a database constitutes the originality of the study.

The study aims to explore the skills of those working in both global and Türkiye audit firms in today's changing business world. To achieve this aim, the following research questions were created:

RQ1: What are the departments, education field and skills of the employees in audit firms?
RQ2: What are the DA skills of those working in audit firms?
RQ3: What are the departments, education field, and other skills of those with DA skills?

2. LITERATURE REVIEW

Meeting the expectations of the business world in the rapidly changing dynamic business environment has become a necessity in the field of auditing, as in every other field. In order to adapt to this environment, audit firms have changed the training and skills they seek in the people they employ. However, studies on the skills of human resources in audit firms have not been found in the literature. Since the main service (main activity) of auditing and accounting firms is accounting and auditing, the studies focused on the skills required for accountants and auditors. Therefore, studies on accountant and auditor skills are included in the study.

Today, already both soft skills and hard skills are equally important and necessary for employee to be competitive and to have a successful career in the current labor market (Silva, 2009). That's why study aim and scope of will not affect.

Today, audit firms to seek soft skills such as communication skills, critical thinking, problem solving, emotional intelligence, independence, flexibility, and team building, in addition to the existing skills they expect from their employees (Jones & Abraham, 2009; Penafort & Ahmad, 1997). Lawson et al. (2014) proposed a broad framework of skills for audit firm employees that includes quantitative, analytical thinking, problem solving, interpersonal skills, and technological skills, in addition to the basic skills like accounting and management (leadership, ethics, and social responsibility) and communication. Kavanagh and Drennan (2008) state that, audit firms, which also provide consultancy services to enable a competitive advantage, seek a wide range of skills and qualifications under the title of soft skills from their employees working in auditing and consultancy services. However, Nguyen et al. (2020), in their empirical study on audit firms in Vietnam, revealed that technical skills, especially international professional certifications, are important for audit firms, while critical and creative thinking skills are limited.

ACCA (The Association of Chartered Certified Accountants), a global organization with the authority to professionally qualify and certify finance and accounting professionals, stated that accountants and auditors should be competent on technical skills, ethics, intelligence (thinking, reasoning, and problem-solving skills), creativity (generating new ideas), digital (including emerging digital technologies), emotional intelligence, vision and experience (ability to understand customer expectations, meet desired results, and create value) (ACCA, 2016). ACCA also emphasized that Big4 audit firms prefer people with soft skills such as social responsibility and sportive achievements, communication, teamwork, leadership, along with academic success (ACCA, n.d.). Soft skills become increasingly important as career advancement in audit firms increases (Chabus, 2021).

On the other hand, with the development of technology and the increase in access to big data, DA skill has become a skill that employers desire (Mitchell et al., 2010). DA is a qualification and requirement for auditors to analyze and visualize data to draw conclusions (Sastry et al., 2021). In other words, what is expected from the auditor is not to have coding knowledge and experience as much as a data scientist, but to have the skills to analyze data (Karan, 2022). Powerful and essential tools that auditors should use in data visualization and analysis are Excel, Tableau, Power BI (Franklin University, n.d.; Karan, 2022). In addition, there is an expectation that auditors will be able to understand some basic coding of basic programming languages such as Python and R (ACCA, 2020;Goh et al., 2019, Franklin University, n.d.) and have knowledge of SQL (Tsiligiris, 2019, Karan, 2022). Programming languages such as Python and R, the most popular programming language in data science, are skills that can be developed through continuous learning for people who do not have an engineering degree (Balaganur, 2020). On the other hand, although there are programming tools like SQL or Python for data analytics, Excel is still seen as a simpler and more basic tool (Islam, 2021).

It is people, not technology, that make sense of data. This means that business intelligence resides in people's minds, not in the data store. Critical thinking and communication skills are the most important parts of DA skill (Kostis, 2017;CGMA, 2016). When DA knowledge is combined with soft skills, it creates the necessary skill combination for the success of accountants and auditors (Tsiligiris, 2019;Franklin University, n.d.;Mokas, 2022).

On skills, KPMG and Deloitte, audit firms identified as Big4, conducted research on the expectations of CEOs and CFOs from auditors. In these studies, it has been determined that communication skills and critical thinking skills, which are soft skills, and DA skills come to the fore due to technological developments (Forbes & KPMG, 2017; Deloitte, 2021). PWC listed the five basic skills expected from auditors in recruitment as a human resources policy as whole leadership, technical capabilities, business acumen, global acumen and relationships (PWC, n.d.). E&Y, on the other hand, considers DA skills, which are increasingly important today, as a human resources policy, as well as traditional skills such as accounting, professional skepticism and teamwork (Delarue & Kostem, n.d.).

It is seen that the academic literature and the studies of global audit firms on skills are compatible. Although the technical and professional role of employees in audit firms has not changed, the way in which services are performed (consulting, tax, audit, risk management, etc.) will continue to change in order to produce the highest quality work in a rapidly changing and increasingly demanding business environment. However, while the diversity of services of large audit firms compared to small and local audit firms increases the need for human resources with DA skills; having more financial resources also facilitates access to technology.

Globalization has caused the investments of enterprises and the need for independent auditing to spread all over the world. Some of the audit firms have accordingly created a large economy by expanding their brand presence around the world. The contribution of each country to the total economy created by Big4 (KPMG, Deloitte, E&Y, PWC) and other international audit firms operating in many countries and shaping the audit market; is closely related to the economic development of the country, line of vision of the audited enterprises and their expectations from the audit. The reason for choosing Türkiye in the study is that it is an interesting country, where the number of audit firms and the number of audited companies has increased continuously, especially in the last ten years (KGK, 2022). In order to compare the skills of the employees of the audit firms in Türkiye, 20 audit firms operating on a global scale with the highest revenues were considered. Thus, it is aimed to reveal whether there is a difference by comparing the existing skills of the audit firms in developed countries and those of the audit firms in Türkiye, and to reveal the skills that audit firms need.

3. METHOD

Today, it is frequently encountered that the information in the LinkedIn social network is used in studies conducted in different disciplines. LinkedIn is the world's largest professional network, with over 774 million members in more than 200 countries and regions around the world. LinkedIn was established in 2002 with the website opened in May 2003 (LinkedIn Cooperation, 2022). LinkedIn is perhaps the most successful and widely used social networking site for job seekers and recruiters and is the world's largest professional network on the Internet (Adams, 2013). In total, 92 percent of US companies use social networking sites to pre-screen applications for recruitment (Jobvite, 2012). In addition, profiles are created more consciously on social networks, especially on LinkedIn, and it has been proven that the information about individuals and organizations is reliable (Van de Ven et al., 2017). Chang et al. (2019) made suggestions on curriculum development and academic program design using skills information on LinkedIn. Dai et al. (2017) conducted workforce analysis by examining LinkedIn profiles.

In this study, descriptive analysis and document analysis method were used to reveal the existing situation. LinkedIn website database was used as data collection tool in the study. In accordance with the purpose of the study, data in 3 sections (skills, field of education and department they work in) were collected from 6 categories in the section of "people" on the corporate pages of audit firms. The information in these sections is listed from the most reported information to the least. However, LinkedIn allows the first 15 lines of information to be visible. The data obtained from the research were analyzed with the descriptive analysis technique. The percentage (%) and frequencies (f) of the data were determined and tabulated.

In the study, audit firms in Türkiye and Big4 Global and other international global audit firms were examined. The data covers the period January-March 2022. In the study, it is aimed to reach the top 20 audit firms with the highest turnover in the world (Smith, 2018) and 364 audit firms registered with the Public Oversight Agency (Public Oversight Authority, 2022) in Türkiye as of January 2022. However, 58 audit firms out of 364 audit firms in Türkiye have LinkedIn corporate pages. While 25 of them are local audit firms, 29 of them are audit firms with international audit networks, and 4 of them belong to 4 big audit firms. Among the top 20 audit firms with the highest turnover in the world, 4 of which (KPMG, E&Y, PWC, and Deloitte) are considered as big4 and the remaining 16 are international audit firms. On the other hand, 15 of the 16 audit firms have corporate LinkedIn pages in the LinkedIn application.

4. FINDINGS

The findings of the study are given in the tables below.

Table 1. People by Audit Firms

LinkedIn	People	%
Big4 Global	1,167,895	0.9466
Other Int. Global	70,052	0.0562
Big4 Türkiye	7,221	0.0058
Other Int. Türkiye	1,469	0.0012
Local Türkiye	292	0.0002
Total	**1,246,929**	**100**

Source: Prepared by the authors.

The results presented in Table 1 show that, in the LinkedIn social networking platform, 1,167,895 (94%) people were registered employees in the Big4 global companies in 2022. This is followed by other international global companies with 70,052 (6%). When the data for Türkiye are analyzed, it is seen that the Big4 global companies with 7,221 (6%) registered the most and local companies with at least 292 (002%) people.

Table 2. Department of People (%)

Department	Big4 Global (N=1,108,618)	Other Int. Global (N=71,955)	Big4 Türkiye (N=6,954)	OtherInt. Türkiye (N=1,559)	Local Türkiye (N=328)
Accounting	29.04	42.47	44.39	57.34	51.52
Administrative	3.06	7.45	5.61	3.01	2.44
Business Development	10.87	7.90	5.62	5.90	7.32
Consulting	13.04	4.28	5.48	1.99	0.91
Education	2.67	2.28	2.75	2.69	1.22
Engineering	3.72	1.70	1.37	0.00	0.61
Entrepreneurship	2.96	4.09	2.37	3.98	5.49
Finance	10.25	8.39	9.03	8.72	20.73
Human Resources	3.51	3.55	2.80	1.54	0.61
Information Technology	9.55	5.57	8.86	3.27	0.30
Operations	3.63	4.02	3.28	2.95	0.61
Others	7.71	8.29	8.44	8.59	8.23

Source: Prepared by the authors.

Table 2 presents the distribution of employees in the departments of the firms by each group audit firms. Accordingly, it is seen that the activities of Big4 Türkiye and Other International Türkiye audit firms are narrower than those of the Global Big4 audit firms and Other International audit firms.

The density of the numbers of employees working in different departments of Big 4 global and other international global firms is higher than in Türkiye. Especially business development and consulting departments draw attention. The density of employees in the main areas (Accounting and Finance) in audit firms in Türkiye is at the highest level with 72.25%. A significant difference is observed in Big 4 global and Türkiye firms.

Table 3. Education Field of People (%)

Field	Big4 Global (N=930,130)	Other Int. Global (N=63,876)	Big4 Türkiye (N=3,870)	Other Int. Türkiye (N=599)	Local Türkiye (N=328)
Accounting/Finance/Auditing	50.74	62.52	6.59	16.36	17.54
Business Administration/Economics	30.15	19.30	48.86	32.05	36.84
Computer Engineering/IT	2.71	4.68	0.00	1.34	3.51
Engineering/Mathematics/ Statistics	9.80	6.82	25.35	25.21	12.28
Others	6.59	6.68	19.20	25.04	29.82

Source: Prepared by the authors.

The educational information in the table was not classified according to the level of education (bachelor, master, doctorate). Therefore, employees may have reported more than one education area.

In Table 3, the education areas that audit firm employees highlight in their profiles are presented. The proportion of employees whose education fields are computer engineering/IT and engineering/mathematics/statistics is remarkable in Türkiye accordingly Big4 global and other international global audit firms.

Table 4. Skills of People (%)

Skills	Big4 Global (N=2,577,117)	Other Int. Global (N=189,080)	Big4 Türkiye (N=19,253)	Other Int. Türkiye (N=4,258)	Local Türkiye (N=811)
Accounting	7.44	17.20	10.32	15.19	17.63
Analytical Skills	0.00	0.00	3.03	1.13	0.99
Auditing	4.01	12.28	5.08	10.62	11.34
Business Analysis and Planning	3.48	0.01	0.00	0.52	0.25
Communication	3.76	0.51	0.00	0.49	1.73
Data Analysis	0.00	0.00	0.00	0.16	0.00
English	0.00	0.02	9.45	5.43	1.36
Finance	0.00	3.11	0.00	1.78	2.47
Human Resources and Management	0.00	0.00	0.00	0.28	0.74
IFRS	0.00	0.51	1.89	4.58	4.32
Information Technologies	42.27	31.26	38.79	30.32	26.14
Management and Organization	17.45	10.89	4.32	3.24	4.44
Others	0.48	0.83	0.00	0.54	6.41
Project Planning and Management	6.40	0.05	4.09	0.70	0.62
Reporting and Analysis	5.02	13.49	9.71	12.87	12.33
Research	0.00	0.00	4.96	3.59	2.22
Tax	0.00	4.51	0.00	5.19	5.30
Teamwork and Management	9.70	5.32	8.36	3.36	1.73

Source: Prepared by the authors.

The skills of the people in the Table 4 do not represent the number of people. "N" describes the number of skills.

In Table 4, the skills that the employees of the audit firm highlight in their profiles are presented. LinkedIn allows the first 15 lines of information to be visible. Because of this limitation, this table shows the skills that employees want to highlight. Except for communication skills in local audit firms in Türkiye, other soft skills are more prominent in Big 4 Türkiye firms. When Big 4 global and Big 4 Türkiye audit firms are compared, soft skills stand out in Big 4 global. When other international global and other international Türkiye are compared, only the "management and organization" skill differs. It is seen that Management and Organization, Teamwork and Management, Project Planning and Management and Communication skills, which are classified as soft skills, are higher in global audit firms and this rate is the highest in Big 4 global audit firms. It is seen that IT skills come to the fore in all audit firms. Excel skill constitutes the majority of IT skills in all audit firms. In addition, language skills attract attention especially in Big 4 audit firms in Türkiye. Project

management is classified as a soft skill as it requires the ability to work in a team, problem-solving skills, the ability to collaborate on a task, and the ability to resolve human conflicts (Jelonek et al., 2020).

The DA query was made with the word "data analytics" on the corporate pages of the audit firms.

Table 5. DA Skills

LinkedIn (DA)	LinkedIn	Data Analytics	%
Big4 Global	1,167,895	95,337	8.16
Other Int. Global	70,052	1,244	1.78
Big4 Türkiye	7,221	140	1.94
Total	**1,245,168**	**96,721**	**7.8**

Source: Prepared by the authors.

Table 5 presents employees who report having DA skills. While 8.16% of the Big4 global firms have DA skills, it is seen that this rate is quite low in the Big4 audit firms in Türkiye.

In Türkiye, it has been determined that there are no people with DA skills in audit firms other than Big4. The tools specified with the DA skill are Power BI, Tableau Python, R (Programming Language), and SQL. A new query was made for each specified tool, and the departments, education field and other skills of those who had this skill were revealed.

Table 6. Skills of DA

Skills of DA	Big4 Global	Other Int. Global	Big4 Türkiye	Total
Power BI	21,628	83	593	22,304
Tableau	23,637	36	478	24,151
Python	48,109	917	292	49,318
R (Programming Language)	26,290	0	179	26,469
SQL	77,457	2,651	476	80,584

Source: Prepared by the authors.

The most frequently reported DA skills are SQL[1], program language (Python[2] and R[3]), and data visualization (Tableau[4] and Power BI[5]) tools, in that order. Since people with DA skills are mostly in Big4 audit firms, no classification has been made according to audit firms as of Table 7.

[1] SQL is a data sublanguage for accessing relational databases managed by relational database management systems (Melton & Simon, 1993, p.4). Since data for companies are primarily stored in relational databases, writing SQL queries for data extraction and retrieval is seen as an integral part of any business analytics application (Chen et al., 2012).

[2] Python is a programming language. It also consists of a large standard library. This library is structured to focus on general programming and includes operating system specific modules for threading, networking, and databases (Ozgur et al., 2017, p.355).

[3] The R environment is a programming language with a large number of existing libraries and an active developer community, which provides a natural platform for developing new statistical methods because of the language's mathematical expression (Wallace et al., 2012).

[4] Tableau is the visualization platform for large datasets and it can connect to relational databases, cloud databases, and spreadsheets (Wang et al., 2015).

[5] Power BI is a powerful business intelligence and analytics playground for analysts and developers developed by Microsoft. In addition, data exploration, data modeling, data visualization, and sharing processes are simplified in a single product (Knight et al., 2020, p.1).

Table 7. Field/Departments/Other Skills for Power BI Skill

Department		Field		Other Skills	
Consulting	5,384	Accounting/Finance/Auditing	9,773	IT	46,099
Information Technology	5,057	Business Administration/Economics	6,800	Data Analytics	39,892
Accounting	4,334	Computer Engineering/IT	6,159	Soft Skills	31,069
Business Development	2,837	Engineering/Mathematics/Statistics	3,312	Accounting	319
Finance	2,665	Data Science/Analytics	112	Other	136
Research	2,021	Others	19	Finance	7
Engineering	1,543				
Operations	809				
Support	505				
Administrative	459				
Human Resources	414				
Arts and Design	349				
Program and Project Management	310				
Education	277				
Sales	246				
Marketing	69				
Other	35				

Source: Prepared by the authors.

Those with Power BI skills mostly work in consulting and IT departments rather than accounting or finance departments. Although those with Power BI skills state that they have an education on the fields of accounting/finance/auditing and business administration/economics, the number of those who take computer engineering/IT and engineering/mathematics/statistics education is also high. Those who have Power BI skills have intensive IT and DA skills as well as soft skills. It can be stated that most of them do not have accounting or finance skills.

Table 8. Field/Departments/Other Skills for Tableau

Department		Field		Other Skills	
Consulting	6,150	Accounting/Finance/Auditing	11,208	IT	50,690
Accounting	4,590	Computer Engineering/IT	8,001	Data Analytics	49,552
Information Technology	5,292	Business Administration/Economics	7,102	Soft Skills	35,567
Finance	3,024	Engineering/Mathematics/Statistics	2,675	Accounting	178
Business Development	3,196	Data Science/Analytics	2,131	Other	144
Research	2,475	Others	10		
Engineering	1,967				
Operations	856				
Sales	513				
Education	462				
Arts and Design	452				
Human Resources	433				
Support	401				
Program and Project Management	364				
Administrative	184				
Legal	103				
Other	34				

Source: Prepared by the authors.

Those with Tableau skills mostly work in consulting and IT departments rather than accounting and finance departments. Although those with Tableau skills state that they have education on the fields of accounting/finance/auditing computer engineering/IT, the number of those who have business administration/economics, engineering/ /mathematics/statistics and data science/analytics education is also high. Those who have Tableau skills have intensive IT and DA skills as well as soft skills. It can be stated that most of them do not have accounting skills.

Table 9. Field/Departments/Other Skills for Pyhton Skill

Department		Field		Other Skills	
Information Technology	12,471	Computer Engineering/IT	26,363	Data Analytics	99,064
Consulting	11,001	Engineering/Mathematics/Statistics	11,806	IT	71,078
Engineering	8,338	Business Administration/Economics	8,390	Soft Skills	34,698
Business Development	7,282	Accounting/Finance/Auditing	7,307	Other	247
Finance	5,920	Data Science/Analytics	2,901	Accounting	50
Accounting	5,017	Other	27	Finance	5
Research	3,924				
Operations	1,727				
Education	1,583				
Support	819				
Sales	730				
Arts and Design	650				
Administrative	497				
Program and Project Management	398				
Military and Protective Services	223				
Community and Social Services	209				
Marketing	199				
Legal	102				
Other	47				

Source: Prepared by the authors.

It is seen that those who have Python skills mostly work in IT, consulting, engineering, and business development departments, and less in accounting and finance departments. Those who have this skill mostly have education on computer engineering/IT and Engineering/Mathematics/Statistics. Those who have Python skills mostly have DA and IT skills as well as soft skills.

Table 10. Field/Departments/Other Skills for R Skill

Department		Field		Other Skills	
Consulting	5,631	Business Administration/Economics	7,565	Data Analytics	58,695
Information Technology	5,120	Engineering/Mathematics/Statistics	6,590	IT	53,014
Finance	4,880	Computer Engineering/IT	6,043	Soft Skills	25,243
Accounting	2,900	Accounting/Finance/Auditing	5,494	Other	5,595
Business Development	2,826	Data Science/Analytics	3,142	Accounting	20
Engineering	2,608	Other	11	Finance	15
Research	2,383				

Education	754
Operations	677
Customer Success and Support	606
Administrative	434
Sales	310
Arts and Design	285
Human Resources	251
Community and Social Services	196
Program and Project Management	180
Marketing	107
Other	57

Source: Prepared by the authors.

It is seen that those who have R skills mostly work in Consulting, IT, Finance, Accounting, Business Development, and Engineering, and Research Departments. The majority of those with R skills have education on business administration/economics, and more than half of those who have education on engineering/mathematics/statistics, computer engineering/IT and data science/analytics. They also have Data Science/Analytics, IT and soft skills.

Table 11. Field/Departments/Other Skills for SQL Skill

Department		Field		Other Skills	
Consulting	19,608	Computer Engineering/IT	48,721	IT	141,371
Information Technology	16,563	Engineering/Mathematics/Statistics	15,050	Data Analytics	137,034
Engineering	11,458	Business Administration/Economics	8,733	Soft Skills	60,273
Business Development	8,378	Accounting/Finance/Auditing	7,409	Accounting	67
Finance	5,902	Other	30	Other	44
Accounting	4,605	Data Science/Analytics	1		
Research	4,007				
Operations	2,426				
Program and Project Management	1,864				
Sales	1,499				
Arts and Design	1,339				
Support	970				
Human Resources	616				
Education	461				
Quality Assurance	396				
Marketing	217				
Administrative	194				
Other	81				

Source: Prepared by the authors.

It is seen that those who have SQL skills mostly work in departments such as consulting, IT, engineering,

business development, and research, and they work less in accounting and finance departments. Those with SQL skills have education on computer engineering/IT and engineering/mathematics/statistics and less in business administration/economics and accounting/finance/auditing. Those who have SQL skills mostly have DA and IT skills as well as soft skills.

5. DISCUSSION AND CONCLUSION

The aim in the present study was to reveal the human resources structure in audit firms and the skills of those working in these firms in today's changing business world. For this purpose, comparisons were made between audit firms by evaluating the skills, education fields, and departments of employees in the Big4 global, other international global, Big4 Türkiye, other international, and local Türkiye audit firms via LinkedIn. In addition, attempts were made to reveal the education fields and other skills of those who have DA skills in audit firms.

When the departments of the employees are examined, it is seen that the accounting and finance departments stand out in local audit firms, while the departments in Big4 audit firms are diverse. Decreased revenue from auditing service and demands from clients have caused international audit firms to have a structure that has evolved from traditional audit activities to consulting services (Shore &Wright, 2018). This is because Big4 firms also provide services in different areas apart from auditing. Local audit firms did not go beyond services such as audit and tax. This will affect the need for a workforce with a variety of skills.

Soft skills appear to be prominent in Big4 audit firms. This result is in line with the studies of ACCA (2016), Forbes & KPMG (2017) and Deloitte (2019) that emphasize the importance of soft skills. It can be said that soft skills are not an important complement to technical skills in local audit firms in Türkiye. The skills they need remain at the level of technical skills due to the fact that local audit firms have a more technical approach to the audit and other non-audit services they perform and may not be aware of the advantages of social skills, or because local audit firms are non-institutional firms compared to Big4 audit firms. In addition, local audit firms may not need employees with social skills due to their client portfolio. On the other hand, the striking finding of the study is that the Information technology skill is far ahead of the skill set in all audit firms.

In the inquiry made with the word "DA", no one in other international Türkiye or local audit firms specified a skill with the name DA. In the comparison of Big4 Global and Big4 Türkiye, it is seen that Türkiye audit firms remain at a very low level compared to the global Big4 audit firms. This is because the new partner groups of Big4 global firms are rapidly drifting towards consultancy, technology, and digital services (Tadros, 2016).

Those who have DA skill stated that they use Power BI, Tableau, Python, R, and SQL tools. Franklin University (n.d.) and Karan (2022) highlighted Excel, Tableau, and Power BI as powerful and essential tools that auditors should use in data visualization and analysis. In this study, Tableau and Power BI emerged as prominent data visualization tools, respectively.

Accordingly, the least reported other skills by those who reported having DA skills were accounting and finance skills. DA and social skills emerged as the most reported skills. It is noteworthy that those with Python, R, and SQL skills have education on computer engineering/IT and engineering/mathematics/statistics. Accounting and business administration education field come next. The education field of those using Tableau and Power BI data visualization programs revealed as accounting/finance/auditing and business administration/economics. The results can be interpreted as programming languages require basic statistical and engineering knowledge. However, the ability to use these programming languages today can be gained through continuous learning (Balaganur, 2020). It can be said that those who have DA skills complete their skill combination with soft skills. This finding is in line with the views of Tsiligiris (2019), Franklin University, (n.d.) and Mokas (2022), when data analytics knowledge combined with soft skills creates the necessary skill combination for the success of accountants and auditors.

The phenomena of digitalization, DA, and big data, which have been the subject of studies recently, have created new business models; audit firms have also been significantly affected by these facts. By investing in unprecedented amounts in technology, Big4 firms are transforming not only the way they operate, but also their identities. The technology expedition goes far beyond automating standard auditing and accounting tasks. The biggest players in accounting, focusing on artificial intelligence, data analytics and comprehensive technology education across their organizations, are making technology part of their DNA (Kapoor, 2020). The takeover of the audit and finance functions by big technology companies puts the big four firms in direct

competition. Big4 has pushed firms to buy businesses with skills they don't have internally in order to compete. Only 22% of the new partners of Big4 firms were in the audit and assurance field, while the rest were technology-focused consulting fields that covered rapidly growing digital and cyber skills (Tadros, 2016). This has affected the organizational structure of audit firms and necessitated the existence of departments such as information processing, consultancy, research, and project management apart from the audit and accounting departments. The firms also focus on artificial intelligence and data analytics to serve both audit processes and consulting clients. These changes are observed in the firms called the Big4, which steer the audit market. Therefore, Big4 audit firms are the determinants of the knowledge and skills that those they will work with should have. However, the fact that local audit firms are generally limited to tax, accounting and auditing and assurance services can be interpreted as they do not need DA skills as much as Big4. However, technology has changed the way these areas do business. All transactions can be controlled in real time and allow the use of data analytics capabilities. This shows that employees in local audit firms need to be trained to use DA tools. The expectations and needs of the market also lead educational institutions to review and renew their curricula.

The use of the LinkedIn database in the study enables the skills to be questioned more objectively than the survey method. Therefore, this study develops empirical knowledge of what employees' current skills are and should be for global and local audit firms. In this sense, the study is expected to fill the gap in the literature.

The present study will especially contribute to the renewal of local audit firms (restructuring) and updates to the curricula of educational institutions. However, this responsibility should not be limited to educational institutions only. Especially in local audit firms, this responsibility can be fulfilled by regulatory bodies of the audit market. For example, the Public Oversight Accounting and Auditing Standards Authority in Türkiye has required auditors to periodically take hard skills training in order to continue their audit activities. By adding soft skills and basic DA skills to the scope of this compulsory education, audit firms can complete their deficiencies in this area. The study is also expected to be a study that will guide audit firms in determining the human resource's structure.

The limitation of the study is that most of the employees are not included on the LinkedIn corporate pages of other international firms. In future studies, research can be conducted to reveal the skills needed by developed and developing economies. Analysis of the country's corporate pages of the audit firms may be conducted in future studies. In future studies, the subject can be approached from different perspectives by using different analysis methods.

The originality of the study is that it is the first in which information in the LinkedIn social network was used as a database in the field of accounting and auditing.

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