

## COMPETENCIES FOR ACCOUNTING POSITIONS IN POLAND ANALYSED FROM THE PERSPECTIVE OF INDUSTRY 4.0

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**Purpose:** The purpose of this paper is to reveal the most important transversal competences for accountants on various levels in the context of Industry 4.0 in Poland.

**Design/methodology/approach:** The purpose is fulfilled by analyzing the competency requirements from job advertising using the methods of descriptive and mathematical statistics.

**Findings:** The empirical part shows the dominance of hard finance and accounting competences, followed by data analysis and management ones. It was also revealed, that personal competences are not the crucial ones, similar to the ability to use foreign languages.

**Research limitations/implications:** The data were collected from only one online job portal. In the future analysis of bigger data set are planned, together with identifying the barriers for competence groups and international comparative study.

**Practical implications:** Candidates will know what to focus on while applying for the job, and employers gathered a good source of benchmark for their job advertising.

**Originality/value:** The paper focuses on a specific set of competences for accounting jobs.

**Keywords:** competences, accounting position, industry 4.0, Poland.

**Category of the paper:** Research paper.

### 1. Introduction

Industry 4.0 with its vast development of new technologies and artificial intelligence (AI) proves a great challenge to perspective and current employees. While automatization processes and AI are taking over more and more human based tasks, the great question of which job will be next to extinct arise. Extinction of a human base jobs is still a long term orientation, but truth to be told that Industry 4.0 and AI will influence the most algorithmized jobs, such as

accounting (Kanaparthi, 2024; Kureljusic, Karger, 2024; Ndaka, Lassou, Kan, Fosso-Wamba, 2024). As some of the authors focuses on impact of Industry 4.0 and AI on accounting jobs, others are trying to prepare the new approach to competences and its development in accounting (Palacios, Sousa, 2023; Bastos, Oliviera, Barros, de Sa, 2024). Association of Polish accountants presented the report about competences as far as in 2020, and from that time in the WoS database there were 77 articles combining competences and accounting and only 7 were affiliated in polish institutions. That proves that there is still a scientific gap to be filled with the most up to date research.

The purpose of this paper is to reveal the most important transversal competences for accountants on various levels. The purpose is fulfilled by analyzing the competency requirements for employees working in the field of accounting considered from the point of view of the spread of the idea of Industry 4.0 in Poland.

The first part of the article covers the topics of industry 4.0 followed by the discussion on the competencies considered to be transversal/ universal competencies in accounting jobs. The empirical part shows the results of the analysis of the types of positions dedicated to employees hired for positions in the field of accounting and the competence requirements set by employers in Poland. The article is finalized with the reflections on limitations and future research.

### **1.1. Industry 4.0**

The milestones of human development in the 21st century are the trends occurring in the global economy, most often understood as forces that affect economic life, through changes regarding production and investment processes, and social life, by affecting consumption and social interactions. These trends include Industry 4.0, the closed-loop economy, sustainable finance, the talent market, and the development of electromobility. Of particular importance from the point of view of the requirements for the labor market is the first of the ideas indicated - Industry 4.0. Nowadays Industry 4.0. characterized by rapid technological advances (Götz, 2018) impacts the labor market. Smart factories (Bendkowski, 2017), digitally controlled machines, stable internet connection (Schwab, 2017), real-time data sharing throughout the value chain, optimizing production for individualized products (Bujak, 2017) drives the labor world to the reality, where machines may be implemented in almost every. It has potential positive and negative impacts on the labor market (Paprocki, 2016) as routine and algorithm based jobs may face serious problems (Jaimovich, Siu, 2012). It all ensures creation and growth of new business sectors, requiring both technical knowledge and market insight and demands competencies for collaboration with AI (Krzyżanowski, 2017). Digital skills, the ability to work with machines, continuous competency improvement, and creative problem-solving become crucial (The Future of Jobs Report 2023).

This process, according to management theorists and practitioners, will accelerate in the future. Of particular interest seems to be the impact of the implementation of Industry 4.0 on the evolution of competence requirements related to the performance of professions conventionally included in the category of occupations occurring in the field of accounting, that are classified in ESCO under the codes 1211.1.1, 2411.1.1, 3313.1 and 2411.1. The analysis of competency requirements should result in changes in the appropriate adjustment of the majors and specialties offered to students, as well as the forms and tools of study used for the development of competencies necessary in the labor market.

## 1.2. Competences

In general terms, competencies are mainly identified with the employee's abilities that enable them to achieve good work results (Boyatzis, 2008; Armstrong, 2009). In turn, competencies considered "in detail" refer to the attributes of a person, their personality traits, knowledge, skills, education, professional experience, and abilities, as well as practical aspects of their use in the performance of tasks in the workplace (Becker, 2001; Whiddett, Hollyforde, 2003). Moreover, it is worth emphasizing that numerous elements of competencies are specified in the subject literature. Nevertheless, the crucial components of competencies include knowledge, skills, and attitudes, which – when used in the work process – are used to reach the organization's goal (Tyrańska, 2015; Oczkowska et al., 2017). Importantly, in the subject literature, there are numerous classifications of competencies, among which competencies are divided into hard (Dixon et al., 2010; Lasauskienė et al., 2015) and soft (Marques, 2013; Anthony, Garner, 2016).

Individual competencies differ in terms of the degree of transferability. The competencies that are most susceptible to transfer from one activity to another are universal competencies, also called transferable competencies. The opposite of universal competencies is those that are specialized for a specific occupational group or industry (Jurek, 2012).

The transferability of a particular competence is also determined by its independence from the situational context (e.g., working conditions, tools used) and its usefulness in the future (Turek, Wojtczuk-Turek, 2011).

The group of universal (transversal) competencies includes (Czapla, 2018):

1. effective communication;
2. cooperation in a team;
3. innovativeness;
4. business attitude;
5. planning and organizing own work;
6. decision-making;
7. analyzing data and information;
8. application of technique and technology.

The results of previously conducted research indicate that, in the opinion of the surveyed accountants, their most important competencies include: competency in taxation, competency in accounting, organization of own work, problem-solving, competency in human resources and payroll, communication in a team, understanding the principles of business, time management, IT competency, communication with other departments of the company, negotiation, cooperation in a team (Oddział Wielkopolski Stowarzyszenia Księgowych, 2017). It is worth noting that among the indicated competencies are those specialized for a specific professional group such as accountants, as well as universal ones.

## **2. Methodology**

### **2.1. Competences**

Two main research questions were driving the research:

1. What is the structure of demanded competences in management accounting?
2. Is there a difference between the demand of different groups of competences?

### **2.2. Data gathering and analyzing**

The data were gathered in June 2024 from the website pracuj.pl. The website has one of the biggest databases of accounting related job offers in Poland. The data gathering was conducted within the web scraping method.

The collected data was first analyzed by the expert panel to divide the words indicating demanded competences into groups of competences. There was no previously prepared structure, and data were divided using the coding from the grounded theory. After that, when the depended variables were ready (competences groups), the data were analyzed with the use of both descriptive and mathematical statistic methods such as:

1. Descriptive statistics (mean, median, min, max, percentiles).
2. Shapiro-Wilk normality test.
3. Friedmans ANOVA.
4. EFA.

All the statistical analysis were conducted with the use of SPSS-29 software.

### **2.3. Research sample description**

There were 612 job offers analyzed. They were announced by more than 500 companies in 18 cities in Poland. There were 96 junior positions, 360 mid positions and 156 senior positions announced. Stationary work was possible in 198 positions, remote work in 34 positions and hybrid in 380 positions.

### 3. Research results

The first step of data analyses was to prepare the descriptive analyses of the given variables. It is presented in table 1.

**Table 1.**  
*Results of descriptive statistics for the variables*

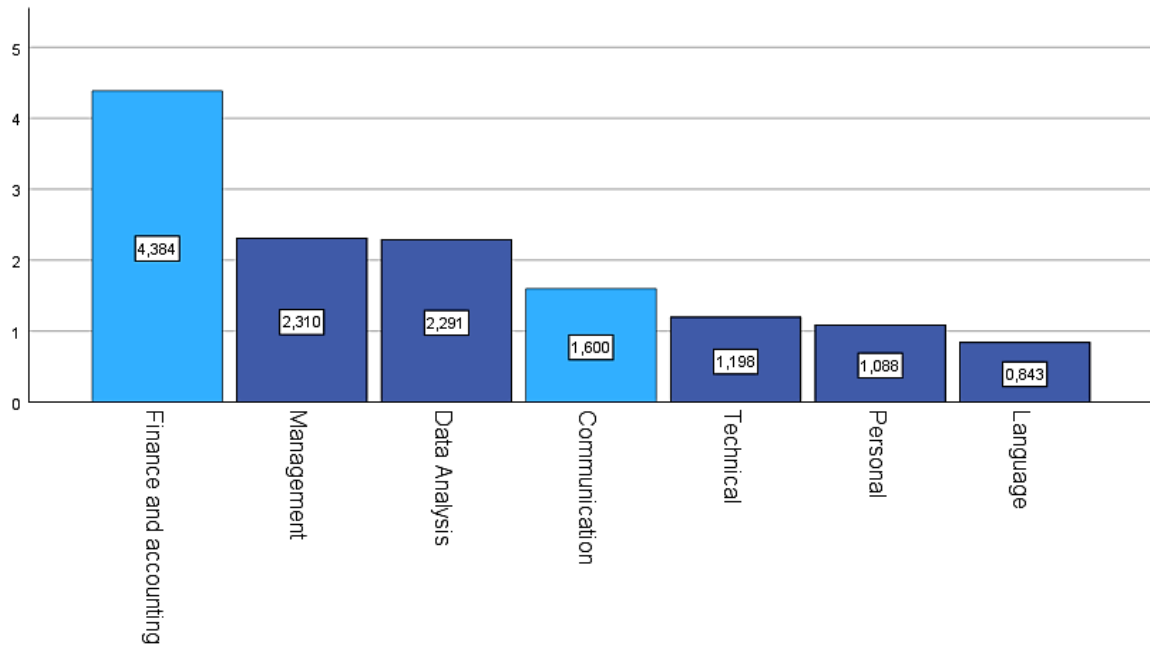
Competence	Mean	Median	Mode	Std. Deviation	Min	Max	Percentiles		
							25	50	75
Finance and accounting	4,38	4,00	4	2,302	0	11	3,00	4,00	6,00
Management	2,31	2,00	1	2,033	0	12	1,00	2,00	3,00
Data Analysis	2,29	2,00	1	1,856	0	13	1,00	2,00	3,00
Communication	1,60	1,00	0	1,464	0	8	,00	1,00	2,00
Technical	1,20	1,00	1	1,139	0	8	,00	1,00	2,00
Personal	1,09	1,00	0	1,169	0	7	,00	1,00	2,00
Language	,84	1,00	0	,867	0	4	,00	1,00	1,00

Source: Own study.

Out of the conducted research it was revealed that finance and accounting competences were the mostly needed, with  $M = 4.38$  and  $SD = 2.302$  competence per job offer. Two more groups of competences were demanded more than two times for a job offer, those were management competences ( $M = 2.31$ ,  $SD = 2.033$ ) and data analysis competence ( $M = 2.29$ ,  $SD = 1.856$ ). One competence was demanded less than once for a job offer, and that was the language competence with  $M = 0.84$ ,  $SD = 0.867$ .

The second step of data analyses was to check the distribution of the given variables. None of the variables has the normal distribution ( $p < 0.05$ ), so non-parametric tools were used in further analysis.

The Friedman's ANOVA was conducted to check the statistical significance of differences between the competences. The results  $\chi^2(6) = 1216.073$ ,  $p < 0.001$  indicates that there are differences between the given competences. The Wilcoxon test revealed that there were no differences between language and personal ( $T = -.354$   $z = .123$ ,  $p = .088$ ), technical and personal competence ( $T = .154$   $z = .123$ ,  $p = 1$ ) as well as between management and data analysis ( $T = .051$   $z = .123$ ,  $p = 1$ ). For all the other pairs the  $p$  value was  $< .05$ . The differences between the competences were presented in Figure 1.



**Figure 1.** Differences between competences.

Source: Own study.

The seven above-mentioned competences are not homogenous. The EFA revealed that there are two separate factors. The results are presented in table 2.

**Table 2.**  
*Rotated EFA matrix*

	Component	
	1	2
Data Analysis	,725	,036
Management	,712	,182
Finance and accounting	,672	-,086
Personal	,428	,193
Language	-,207	,755
Communication	,293	,706
Technical	,190	,697

Extraction: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Source: Own study

The first factor comprised of data analysis, management, finance and accounting and personal competences with loading respectively .725, .712, .672 and .428. It may be considered as a core competence for accounting positions. The second factor may be called a communication factor, as it is loaded by language (.755) communication (.706) and technical (.697). The technical competence is connected with ability to use different software which is as such a communication but not with other employees but with computers.

#### 4. Discussion and conclusions

Accountants are crucial to the operation of a modern and rapidly changing service-based economy. The skills possessed by accounting graduates are valuable not only for accounting positions but can be applied to a diversity of professions (Kroon, Alves, Martins, 2021; Jackson, Michelson, Munir, 2022). As digital transformation continues, accountants will need a more technological profile and greater mastery of transversal competencies (Carvalho, Almeida, 2022). It can be concluded that nowadays accountants should develop more universal competencies, such as critical and strategic thinking, leadership, communication, teamwork, and problem-solving (International Federation of Accountants, 2019).

The results of earlier analyses carried out by other researchers unequivocally prove that in the era of changes taking place in the perspective of Industry 4.0, an employee is increasingly expected to have - in addition to specialized competencies - appropriate transferable competencies, the possession of which often determines his employment. Moreover, such competencies are now required regardless of the nature of the job. Also, accountants are expected not only to have accounting knowledge but also transversal competencies, which are now becoming indispensable attributes of this profession. Conclusions from previous studies indicate that having a solid and broad knowledge of accounting will continue to be a basic, but no longer sufficient, requirement for the accounting profession. It will become a necessity to develop such qualities as communication, analytical thinking, and the ability to cooperate, as well as others that are part of a broad portfolio of transversal competencies (Paszkiwicz, Silska-Gembka, 2013).

According to Greek researchers, Asonitou & Hassall (2019), despite automation and technology disrupting social interactions, and globalization requiring working across cultures and languages, accountants equipped with universal competencies such as problem-solving skills, a comprehensive and global vision for the organization, and an awareness of accountants' social and ethical responsibilities can build trusting relationships with clients and colleagues. Equipped with these skills, accountants can successfully compete in a global highly competitive business environment (Asonitou, Hassall, 2019).

Similar competencies are identified as important for accounting positions in the UK (Osmani, Weerakkody, Hindi, Eldabi, 2019). These competencies include excellent customer service, organizational skills, the ability to learn quickly to acquire new skills, excellent communication skills, the ability to solve problems and resolve difficult customer inquiries quickly, hardworking, career-oriented, the ability to see areas for improvement, and the ability to work under time pressure while maintaining a high level of accuracy and confidence. In terms of more practical competencies, employers require accountants to have a working knowledge of basic Microsoft Office packages, Google applications, and data analysis skills.

Polish employers expect similar competencies. Among the hard competencies that Polish employers expect from business graduates are IT skills (including operation of office packages such as MS Office) and analytical skills (information and data processing, reasoning). The most desirable soft competencies they expect from economics graduates are responsibility, ethical conduct, ability to organize own work and ability to communicate effectively (Walczak, Ziębicki, Tyrańska, Kafel, 2023).

Regarding the professional competence development, study have clearly confirmed the importance of knowledge of financial accounting, management accounting, reporting, corporate finance and business administration and considered communication and presentation skills and an ability to deal with other people and assert one's opinions as very important in management accountants' work in the Czech Republic and Poland. These features should be taken into consideration in the phase of candidate selections as well as in the long-life building of professional competence of management accountants. The study also shows that management should not enable management accountants to build their professional development only but also should verify whether they enhance their professional competencies continuously (Král, Mikołajewicz, Nowicki, Šoljaková, 2021).

However, the results of earlier studies identified the existence of a gap between the competencies of accounting graduates and the needs of the accounting profession regarding technology-related competencies, such as the ability to collate, analyze and communicate large amounts of information to management and clients, proficiency in relevant software and cloud tools, and creativity and critical thinking to support solutions to complex problems, as well as proficiency in sophisticated data analysis and visualization techniques (Jackson, Michelson, Munir, 2022). In addition, the “informational” nature of today’s organizations raises the need for a new classification of AI-based roles in the accounting context, namely: identifier (where AI should be introduced), explainer (explaining how automation works), trainer (teaches the operation of the AI system) and sustainer (ensuring that automation works effectively in the long term). Researchers emphasize the important role of the accountant as an “identifier” and “explainer” who recognizes opportunities to embed technology to improve current accounting processes. In addition, the accountant's “sustaining” role requires him or her to anticipate and adapt processes to relevant changes, such as financial regulations. However, underpinning the adoption of these different technology skill requirements is the ability for self-development and enthusiasm for continuous learning (Jackson, Michelson, Munir, 2022).

It should be noted that the increasing automation of work processes is leading to the fact that in the future robots will replace accountants in a significant part of the tasks they perform (Jędrzejka, 2019). This could lead to the disappearance of entry-level accounting positions and the simultaneous creation of new accounting roles. The responsibilities of future accountants will go beyond bookkeeping and financial reporting to business consulting and leading the transformation of accounting process automation. The inevitability of this change implies the need to simultaneously improve soft skills and technology and data competencies.



#### 4.1. Limitation and future research

This study has some limitations that the reader should consider when interpreting the results. The data was collected from specific job portals in Poland. The second potential limitation is the lack of homogeneity in the sample of accounting jobs. However, the discussion of universal accounting competence is still ongoing, and we therefore believe that the study provided a general view of the issue.

In the future, it is planned to analyze the opinions of stakeholders: accounting students, academics teaching accounting in the fields of study, as well as employers, to deepen the conclusions. In addition, future research may identify barriers to the development of universal accounting competencies from the point of view of these stakeholders and higher education institutions. Another direction of future research may also be to examine the potential financial and non-financial effects of the progressive automation of work processes in accounting. It is also beneficial for the study to conduct similar research in other countries and to compare the results obtain there.

#### Acknowledgements

The article presents the result of the Project no 068/ZZS/2024/POT financed from the subsidy granted to the Krakow University of Economics.

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