

## I.T. SKILLS ACCOUNTANTS: A STUDY ON JOB ADS

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### ABSTRACT

**Purpose** — *This study aims to identify the I.T. skills required in the labor market for accounting staff, manager, and supervisor positions and to assist prospective accounting graduates in building the skills required to obtain the desired career.*

**Design/methodology/approach** — *This study has utilized the content analysis method to analyze 543 job advertisements from the job street website. The data was then tested using the Kruskal-Wallis test to determine the differences in the skill requirements between positions.*

**Findings** — *The most in-demand skills across all positions are those associated with Microsoft Office and accounting software. In addition, the difference in staff, supervisor, and manager needs was confirmed.*

**Practical implications** — *This study informs prospective accounting graduates about the labor market's skill requirements and is expected to raise graduates' awareness and understanding, allowing them to prepare the skills required for regular jobs.*

**Originality/value** — *This study contributes to the previous literature by identifying the intensity of the need for information technology skills in the current digital era through the percentage of needs. Framed in the signaling theory, the content analysis of the paper presents the comparison of skills required among different positions (staff, supervisor, manager).*

**Keywords** — *accountant; content analysis; I.T. skills; job advertisement; data analytic; accounting software*

**Paper type** — *empirical paper*

### INTRODUCTION

Rapid technological developments have resulted in the accounting profession being predicted to experience significant changes in the future (Qasim & Kharbat, 2020). Accountants may feel threatened by technological developments, but technology can also create new opportunities and even simplify the performance of accountants (Moll & Yigitbasioglu, 2019). Furthermore, the result of information technology makes prospective accounting graduates expected to adapt to the needs of the current world of work (Al-Htaybat et al., 2018). Therefore, skills in information technology are expected to be applied to the accounting

curriculum (Ballou et al., 2018; Behn et al., 2012; Griffin & Wright, 2015; Lawson et al., 2014; Sledgianowski et al., 2017).

Accountants need information technology skills to facilitate business activities (ACCA, 2020b). In addition, information technology skills are required to establish harmony between work and technology that continues to develop (Wellener et al., 2020). The development of information technology has led to an increasing need for information technology skills for prospective accounting graduates (Pan & Seow, 2016). The increase in demand was followed by several new skills in the accounting world, such as blockchain, artificial intelligence (A.I.), automation, and data analysis (Aldredge et al., 2020; Zhang et al., 2018). Previous research found three technologies most often used by accountants: spreadsheets, data analytics, and accounting and tax research software (Andiola et al., 2020; Stoner, 2009). Skills in the use of Microsoft (Excel, Word, PowerPoint, Outlook) and Enterprise Resource Planning (ERP) also help accountants in managing transactions, primarily accounts receivable transactions, and Excel is known to be the most important analytical tool (Sprakman et al., 2015). A recent survey by Refinitiv (2021) also stated that technology adoption could minimize the risk of fraud in financial transactions. In addition, the technological innovations that are currently developing have helped improve company security a lot (Refinitiv, 2021). Therefore, the role of accountants will be more useful if they can collaborate with information technology and human resources and continue to increase the potential of the skills they already have (IFAC, 2016, 2019).

Currently, prospective accounting graduates still lack information technology skills, so they are not ready to face the world of work in the future (Wells, 2018; Zhang et al., 2018). Several previous studies also explain that the skills possessed by prospective graduates are still low, so they cannot meet the needs of the world of work (Abayadeera & Watty, 2014; Howieson et al., 2014; Jackling & De Lange, 2009; Kavanagh & Drennan, 2008). In addition, previous research has explained that universities are still lacking in equipping students with the skills and knowledge needed in the world of work (Dolce et al., 2020; Humphrey, 2005; Keevy, 2020; Kotb et al., 2013; Kotb & Roberts, 2011). Information technology skills are one the essential skills that can help accountants solve various business needs (Tan & Laswad, 2018). This causes some public accounting firms to require more non-accounting graduates to integrate new technologies into their business (Lin & Hazelbaker, 2019). This is because accounting graduates' technology and data analysis skills are still minimal (Abayadeera & Watty, 2014; Dunbar et al., 2016).

Various associations of the accounting profession respond to technological developments by creating a framework. For example, the Institute of Management Accountants (IMA) issued a framework that defines the abilities, skills, and knowledge accountants need to remain relevant in the digital era (IMA, 2020). Likewise, Chartered Global

Management Accountants (CGMA) publishes a competency framework to identify knowledge needs and evaluate current desired skills, which contains five knowledge domains, one of which is Digital Skills (CGMA, 2020). ICAEW (2018) also forms a framework that forms several new skills, including data strategy, ethics, data intuition, data analysis and interpretation, data communication and visualization, programming, statistics, and data wrangling. Finally, ACCA (2020a) has also released a framework that helps professional accountants develop a career in the digital age. The difference between these various frameworks lies in each component of skills for career development to support accountants' careers in the future. Thus, the many responses from the accounting profession association can be used as a reference for prospective accountants to pay more attention to the current needs for information technology skills.

In accounting education, the International Accounting Education Standards Board (IAESB) is an independent standard-setting body that has developed and implemented international education standards (IES, 2019). This research refers to the global education standard, IES 2, which provides a basic framework to help prospective accountants have quality skills, especially in information technology. IES 2 is a guideline to ensure that future accountants are equipped to carry out their functions as professional accountants (IES, 2019). In addition, IES is expected to be a reference in perspective accountants' learning process and development (IES, 2019). There are three main areas of knowledge in IES 2: accounting, finance and related knowledge, organizational and business knowledge, and information technology knowledge and competencies (IES, 2019). In the component of information technology knowledge and competence, it has been described those accountants should have five information technology capabilities, namely: 1) general knowledge of information technology; 2) knowledge of information technology control; 3) control competence; 4) competency of information technology users; and 5) one or a combination of the competencies and responsibilities of managers, evaluators or information systems designers (IES, 2019). Including I.T. skills in IES reflects the widespread need for information technology skills for accountants in the current digital era.

Referring to the theory of job market signals popularized by Spence (1973), this study identifies signals companies convey to job applicants through job advertisements. These signals are considered a means for job applicants to obtain information about the company (Spence, 1973). Companies use job advertisements to signal applicants to adjust to the skills desired by the company (Highhouse et al., 2007; Spence, 1973). Suppose it is associated with the world of accounting. In that case, this theory is in line with several previous studies, where signal theory is related to the recruitment stage in job advertisements (Connelly et al., 2011; Highhouse et al., 2007; Uwizeyemungu et al., 2020). The labor market signal theory involves two parties where the company opens

a job vacancy, and prospective employees apply for the job vacancy (Connelly et al., 2011; Spence, 1973). This signaling theory also concludes that job advertisements contribute to job applicants' perceptions of the quality or image of a company (Rynes, 1991). Prospective applicants can obtain information about skill needs in the job market through job advertisements (Poba-Nzaou et al., 2020; Uwizeyemungu et al., 2020). Therefore, job applicants are expected to adapt by seeing the extent of their skills to apply to the desired company (Spence, 1973). Thus, the signal theory is considered the right source to determine the various competencies needed by employers for prospective applicants.

This study aims to provide an overview of the information technology skills most needed by prospective accounting graduates. Previous literature has identified the need for professional skills based on professional fields, such as financial accounting, auditing, and taxes (Tan & Laswad, 2018; Uwizeyemungu et al., 2020). However, previous research did not identify the extent to which information technology skills are needed based on the position of staff, managers, and supervisors. This study contributes to the previous literature by identifying the intensity of the need for information technology skills in the current digital era through the percentage of needs. This research is essential because prospective accounting graduates need to know the extent to which information technology skills are currently needed in the job market (Poba-Nzaou et al., 2020; Uwizeyemungu et al., 2020). Therefore, this research is expected to increase understanding of skill needs in the job market through job advertisements. Thus, this research can help to account for graduates to prepare the skills needed to get the expected jobs.

This research is related to job market signaling theory, where there is information asymmetry between two parties (Spence, 1973), namely the organization as the employer and the individual as the job applicant (Connelly et al., 2011). Signals companies give through job advertisements can help job applicants understand the skills needed in work (Spence, 1973). Therefore, job vacancies are an excellent source to see the needs of the current labor market (Brooks et al., 2018; Debusse & Lawley, 2009). Spence (1973) formulated a signaling theory by utilizing the labor market in the job recruitment process. Therefore, applicants can use this signal to adjust and compete with other applicants who may be more educated (Spence, 1973).

The theory of job market signals in this study relates to the skills needs of companies that are conveyed to job seekers through job advertisements (Spence, 1973). Signal theory contributes to the early stages of recruitment of job applicants, where applicants tend to seek company information through job advertisements (Rynes et al., 1991). In addition, job advertisements contain essential information that job applicants can use in making decisions to apply or not to a company

(Barber & Roehling, 1993). Therefore, the skill requirements contained in job advertisements can be used by job applicants as a source of information about a company (Acarlar & Bilgiç, 2012; Moore & Khan, 2019). Therefore, job applicants must develop the right strategy to understand the overall content of job advertisements (Ganesan et al., 2018).

The theory of job market signaling explains how the signals occur during recruiting employees in an organization through the image formed by a company (Suazo et al., 2009). A company's positive image can be seen if job advertisements clearly describe information about a company to benefit job applicants and the company (Ganesan et al., 2018). Job applicants have different points of view in identifying a company, depending on the signals conveyed by the company through job advertisements (Rynes, 1991). Only applicants who feel they have adequate skills can work in quality companies (Highhouse et al., 2007) to meet the skill standards desired by the company (Hopkins, 2012). In addition, a signal theory also explains organizational characteristics which have not been researched, such as organizational culture (Highhouse et al., 2007; Ryan et al., 2000).

The development of the signal theory was necessary because of the information gap between employers and job applicants (Spence, 1973). For example, previous research has analyzed how employers (companies) signal prospective CPAs about the necessary and expected skill requirements through job advertisements (Uwizeyemungu et al., 2020). However, many studies have used this signal theory in various fields, including human resource management, business, and financial markets (Connelly et al., 2011). So, this research is expected to support alignment between the competency-based framework, which serves as a reference or guide for training professional accountants with the actual requirements in the job market. In addition, this study reveals a pattern of technical competence based empirically, which still does not describe the criteria expected by companies recruiting the accounting profession.

Information technology development is predicted to significantly influence the accounting profession over the next ten years (Chua, 2016). Initially, the development of information technology was still the responsibility of the specialized I.T. field, but accountants also played an essential role in developing information technology (Bassellier et al., 2003). One of the accountant's roles is achieving a business goal with knowledge of information technology skills (Lawson et al., 2014). Information technology skills enable professional accountants to interact directly with clients to complete their work well (Pan & Seow, 2016; Spraakman et al., 2015; Todorova & Bogdanova, 2021; Wessels, 2005; Wocintechchat et al., 2020).

Responses from various associations of the accounting profession have accommodated the development of information technology by creating a framework. This framework helps accounting professionals

integrate information technology competencies into accountant's careers. CGMA (CGMA, 2020) emphasizes the importance of digital literacy so that accountants remain relevant even though technology develops rapidly. Then, ICAEW (ICAEW, 2018) asked accountants to adapt continuously to technological innovations by forming a team open to technological changes. In contrast to the IMA framework (IMA, 2020), accountants will remain relevant in the digital era if they continue to improve their skills through six domains: technology and analysis. The framework issued by ACCA (ACCA, 2020a) also supports technology development through data, digital, and technology elements. The entire framework of the various accounting professional associations can essentially be used as a reference for accounting education to form relevant professional accountants in the digital era.

Previous research explained that accountants still have little knowledge of information technology, so awareness of its importance is still relatively low (Boritz & Stoner, 2014; Gundumalla, 2021; Vien, 2021). The cause of the delay in the application of information technology skills is due to the age factor, limited digital literacy, infrastructure, and the difficulty of internet access (IAESB, 2018). Other factors hinder the application of information technology skills, one of which is the inadequacy of existing resources and the limited time accountants have (Bui & Porter, 2010; T. Ismail, 2018). Therefore, it is crucial to develop the skills of prospective accounting graduates to prepare for the world of work (Chaplin, 2017). In addition, it is necessary to link the skills taught by universities with what alums and employers need in the job market (Altrawneh, 2015).

Information technology skills are considered necessary because information technology is increasingly used in the business world, especially in accounting (Boritz & Stoner, 2014; Boulianne, 2016; Pan & Seow, 2016; Sithole, 2015; Tan & Laswad, 2018). Based on this, IES 2 has determined the information technology skills that the accounting profession should have (IES, 2019). IES 2 was established because accountants must utilize information technology to make decisions (IES, 2019). In addition, the role of accountants today has been greatly facilitated by new technologies (Bühler, 2020). The development of information technology can certainly be a challenge and a burden for accountants in the digital era (Bühler, 2020). However, information technology can open up many opportunities because it improves the quality of accounting information (Forbes, 2018). Therefore, current accountants have changed traditional accounting methods into computerized methods (Thottoli, 2020b).

The accounting profession in various business activities can act as (a) accountants as users of information technology (financial managers, financial controllers, tax practitioners, bankruptcy management practitioners, and information analysis); (b) accountants as assurance providers and evaluators (internal financial or operational

auditors, information systems assessors, and professional audits); (c) accountants as information system managers (knowledge managers and data center managers); (d) accountants as independent or team business system designers (financial information system designers, knowledge engineers, external advisors/consultants) (IES, 2019). Moreover, over the next few decades, accountants will continue developing skills, especially in information technology (DeMarco, 2021). All that factor is supported by senior accountants from various countries, which state that the need for accountants will not disappear quickly just because of rapid technological developments (Nagarajah, 2016). Therefore, accountants must play a role in all situations, including applying information technology in the world of work (IES, 2019).

Skill needs in the job market are constantly changing as technology develops, so the trend of skills needs in the job market is currently widely discussed (Osmani et al., 2020). Thus, changes are needed in accounting education that can bridge so that the skills needed in the job market can be met by prospective graduates (Senik et al., 2013). This change can be achieved through collaboration between industry, academia, and universities (Gibbs et al., 2011; Hernandez-March et al., 2009; Ogundana et al., 2015). In addition, providing a competent workforce is one of the contributions of accounting education to developing prospective graduates' capabilities to meet labor market skills needs (Altrawneh, 2015). Thus, efforts to improve the skills possessed by prospective accounting graduates cannot be separated from the critical role of accounting education and the involvement of academics (Dolce et al., 2020; Howieson et al., 2014). Therefore, providing skills for prospective graduates is still a challenge for accounting education to align with the skills needed by the job market (Elsaadani, 2015).

To compete in the world of work, accountants are expected to have data analytic and interpersonal skills, computer skills, and communication skills (Barac, 2009). Previous studies have identified that basic accounting and spreadsheet skills are most often needed (Burnett, 2003; Klibi & Oussii, 2013; Sithole, 2015). Therefore, job applicants, or in this case, accounting graduates, are expected to improve further their basic accounting and spreadsheet (Sithole, 2015). Previous research has also identified the ten most crucial information technology skills for accounting graduates, namely: spreadsheet software, Windows, word processing software, the World Wide Web, information systems planning and strategy, database software, communications software (Outlook), project management, presentation software, and technology security and control (Burnett, 2003). Therefore, to be able to compete in the world of work, accountants are expected to have the following skills: technical skills, expertise in the field of information technology, management skills, physical qualities, intellectual skills, interpersonal skills, and personal skills (Klibi & Oussii, 2013). In addition, accountants are expected to

understand the role and importance of e-commerce in today's business world to help improve the efficiency of company performance (Kasswna, 2019). Therefore, all the activities of prospective accountants are always related to the skills needed when entering the world of work (Barac et al., 2021). Thus, information technology skills are very relevant to the accounting profession in the world of work (Kotb et al., 2019; Pan & Seow, 2016).

Previous research explains that students' awareness of the importance of information technology knowledge and skills is still low (Boulianne, 2016; Brewer et al., 2014). This may be due to the lack of equipping students to apply the skills needed for their career success (Abayadeera & Watty, 2014). The achievement of success in using information technology knowledge certainly cannot be separated from the role of academics and practitioners (Pan & Seow, 2016; Prasetyo et al., 2017). Success in applying information technology can be achieved if educators contribute as mediators, facilitators, and evaluators for prospective graduates (Prasetyo et al., 2017). The skill needs of the accounting profession will be adequately met if all elements of accounting education also apply educational standards that continue to develop (IAESB, 2018).

The increasing need for information technology can also improve client services (Hood et al., 2016). For example, the application of information technology in accounting significantly positively affects the quality of financial reports (A. Rahmawati et al., 2018). The quality of information produced by the company will increase if information technology is implemented correctly. This indirectly benefits the company (Evania et al., 2016). Three types of technology help in accounting and auditing: structured digital financial reporting based on XBRL (Extensible Business Reporting Language), knowledge-based systems, and applications of artificial intelligence-based blockchain (C. Hoffman, 2017). Recently, blockchain has been developed to address privacy and security issues in the business world (Semenova, 2020). Accounting students must also have automated identification systems, XBRL, programming, and data mining (Pan & Seow, 2016). These information technology skills will undoubtedly change how data and information are used, making company performance more efficient (Cotteleer & Sniderman, 2017).

Several companies, such as PwC, Deloitte, and EY Global, have implemented information technology in their operations (Kruskopf et al., 2020). For example, PwC launched Digital Accelerator in 2018, aiming to train employees in three areas: data analysis, automation, and artificial intelligence (Liffreing, 2018). Deloitte has also created a special division of blockchain in New York, which significantly influences accountants and auditors to help detect fraud in real-time (Deloitte, 2019). Meanwhile, EY Global has implemented The EY Blockchain Analyzer to assist auditors in auditing companies that use cryptocurrency transactions.



Thus, prospective applicants have a new task to prepare the appropriate skills due to the development of information technology in the current digital era (Marr, 2018).

Public accounting firms and professional associations highly recommend Big Data, technology, and information systems to apply to accounting practice to help students adapt to data. In addition, a survey conducted by various professional accountants explains that knowledge of information technology helps accountants make decisions (Ballou et al., 2018). For example, accountants are also encouraged to understand Big Data and business analytics which can open up great opportunities for accounting education to integrate into the curriculum (Sledgianowski et al., 2017). Thus, technology will not eliminate the accounting profession but simplify their tasks and make their work more creative and engaging (Colquhoun, 2018).

The accounting field's need for information technology skills is increasing (Todorova & Bogdanova, 2021). Therefore, the accounting profession currently needs skills according to the needs of the labor market so that their resources can benefit the company (Todorova & Bogdanova, 2021). Various information technology skills expected to be mastered by the accounting profession must also be in line with the readiness of the technology itself to be applied in the world of work (Wulandari & Ali, 2019). The progress caused by the development of information technology has affected every aspect of business (Dimitrios et al., 2014). The use of information technology can assist the accounting profession in providing services, planning, and making business and individual decisions (Damasiotis et al., 2015). Using information technology for problem-solving can help managers obtain specific analyses without relying on the I.T. department so that the decision-making process can take place more efficiently (D. Rahmawati, 2015). Therefore, all positions in the accounting profession must be aware of the importance of information technology skills so that in this study, the hypothesis is proposed:

- H0: There is no difference in skills required for the accounting profession for staff, managers, and supervisors
- H1: There are differences in skills required for the accounting profession for staff, managers, and supervisors
- H1.1: There are different skills required for the accounting profession for staff and managers
- H1.2: There are different skills required for the accounting profession for staff and supervisors
- H1.3: There are different skills required for the accounting profession for supervisors and managers

## **METHOD**

Data was obtained online from job advertisements on jobstreet.com for accountants' positions from November 2020 to March 2021. The jobstreet.com page was chosen because it is the largest job advertisement website with the most interest in Indonesia (Agustyani & Santoso, 2021). The research period is five months because it can represent the need for information technology skills in job advertisements (Harper, 2012), so the percentage can be calculated. This research uses a primary data type, where the sampling technique for this research is purposive sampling. The sample is taken based on the classification determined by the researcher, namely job advertisements with requests for information technology skills for accounting positions for staff, supervisors, and managers. This is so accountants can learn more about the skill needs in each position.

This study uses the content analysis method of job advertisements to represent the company's workforce demand (Carnevale et al., 2014; Kennan et al., 2008), which is expected to answer the objectives of this study. Content analysis was chosen because it is a recommended/recommended research technique for analyzing textual data to provide new insights into certain phenomena (Krippendorff, 2004). In addition, content analysis is considered an appropriate method to systematically examine text data collected during the research process (White & Marsh, 2006). In this study, content analysis was carried out by recording every indicator that appears in job advertisements for the accounting profession based on information technology indicators that have been compiled. Some of the information technology indicators in question are spreadsheets, data mining, cloud accounting, audit software, Microsoft packages, database management systems, blockchain, XBRL, business strategy/social media, Artificial Intelligence (A.I.), Big Data, ERP, programming, data analytics, accounting software, and word processing (Kotb et al., 2019; Segura & Zamar, 2020; Tan & Laswad, 2018; Uwizeyemungu et al., 2020). This indicator determines what information technology skills are often mentioned in job advertisements. The formation of information technology skills indicators in this study is also based on the Indonesian National Qualifications Framework (KKNI) level 6 for undergraduates. KKNI has described qualifications where graduates must be able to utilize science and technology in their field of expertise, make strategic decisions based on information and data analysis, and provide guidance in choosing various alternative solutions (KKNI, 2015). This shows that it is vital for accounting graduates to have information technology skills as a tool for efficient decision-making.

The data used in this study was obtained by opening the online job vacancy site jobstreet.com first. Then, the researcher wrote down the keywords in the search column with the words "accounting," "accountant," "accounting," and "accountant." Next, the researchers looked for categories of job vacancies that matched the research

classification for accountant positions by matching the information technology skill indicators that had been made. The data obtained is then coded according to the position in the job advertisement to find out the most needed information technology skills in each group of staff, supervisor, or manager positions. The researcher gives a number one if it is found that there are information technology skills. Then, the code for each position is zero (0) for staff, one (1) for supervisors, and two (2) for managers. To ensure the consistency of coding, in this study, a measurement of agreement between coders known as Cohen's Kappa coefficient was carried out. The data coded by the independent coder was 10% of the population (n = 55) because this number was considered to be able to represent the population (Neuendorf, 2017). The resulting intercoder reliability value is 0.833, indicating a good level of consistency, so that objective and reliable results have been achieved (Stemler, 2001). Thus, the process of coding information technology skills can be continued.

Furthermore, the data that has been obtained is entered on one sheet and gives information on each accounting profession for staff, supervisors, and managers according to the purpose of the study. The data that has been classified is then calculated to determine the percentage. The highest percentage indicates the most needed information technology skills.

This study also wants to know the differences in skill needs among the three independent populations, namely staff, supervisors, and managers. After the classical assumption test was carried out, it was found that there were data abnormalities, so the Kruskal-Wallis test was used. At the same time, Kruskal Wallis could show the overall difference between the sampling groups while simultaneously answering the research objectives (Weaver et al., 2017). However, the Kruskal-Wallis test could not determine which group differed significantly from the other groups. Therefore, a post hoc Mann-Whitney U test is necessary. The Mann-Whitney U test was chosen because it can test different null hypotheses with the same idea for the two groups (Denis, 2018). The Mann-Whitney U test is a non-parametric test conducted to identify significant differences between staff and supervisors, staff and managers, and supervisors and managers.

## **FINDINGS AND DISCUSSION**

Skills needed in the job market are constantly changing as technology develops, so the trend of skills needs is essential to pay attention to (Osmani et al., 2020). This study aims to find the most needed information technology skills for the accounting profession based on content analysis in job advertisements. Table 1 shows that information technology skills for Microsoft have the highest percentage of all skill indicators. These results are in line with the research of Thottoli

(2020a) and Lee et al. (2018), which states that using Microsoft is necessary in all accounting fields, even in small and medium enterprises.

**Table 1. I.T. skills needs**

Skills Indicators	Job Position						Total
	Staff	Supervis or	Manage r				
Packages <i>Microsoft</i>	23	50	11	39	72	31	43,7
	8	%	4	%		%	%
<i>Accounting software</i>	12	27	84	29	63	27	28,1
	6	%		%		%	%
Analytical data	39	8%	55	19	47	20	14,5
				%		%	%
ERP	43	9%	20	7%	25	11	9,1%
						%	
Management systems database	11	2%	6	2%	15	6%	3,3%
Business Strategy/Social Media	3	1%	0	0%	8	3%	1,1%
<i>Cloud accounting</i>	0	0%	1	0%	0	0%	0,1%
Programming	1	0%	0	0%	0	0%	0,1%
		47%		29%		24%	100%
Mean Rank Kruskal-Wallis	252,34**		293,45**		290,89*		
						*	
Staff – Supervisor	201,61**		234,09**				
Staff – Manager	189,23**				216,84*		
						*	
Supervisor - Manager			134,35		133,56		

Note: Microsoft includes Microsoft Word, Excel, PowerPoint, spreadsheet, and word processing. Data analytics includes significant data and data mining; Accounting software includes accounting and audit software.

Several things can cause the importance of mastering Microsoft. First, using Microsoft Excel and spreadsheets still dominates data entry and transaction storage (Leon et al., 2017). Mastery of Microsoft Excel and spreadsheets is vital for data extraction from databases, analysis, and problem solving, and presentation of work results to company managers (Spraaakman et al., 2015). The high need for Microsoft Excel and spreadsheets is also related to analytical skills, where accountants are expected to be able to make decisions from data to solve a problem (Dzuranin et al., 2018; Leon et al., 2017; Ragland & Ramachandran, 2014). This study's results align with Osmani (2020) and Sithole (2015), in which companies expect accounting graduates to have good skills in Microsoft Excel and spreadsheets. This finding shows the importance of prospective accounting graduates increasing their training in Microsoft Excel and spreadsheets to prepare themselves to enter the workforce.

In addition to using Excel, mastery of Microsoft Word is also essential as a means to communicate reports on company performance results (Bawaneh, 2011). It is greatly needed because it relates to prospective accounting graduates' ability in written communication (Dale-Jones et al., 2013; Holmes et al., 2019; Irafahmi et al., 2021; Riley & Simons, 2016). These skills affect how accountants can write documents clearly to be communicated to internal and external parties (Merkl-Davies & Brennan, 2017). Besides Microsoft Word, PowerPoint skills are closely related to prospective accounting graduates' oral communication skills (Ahadiat & Martin, 2016; Dzurainin et al., 2018; Gray, 2010; Gray & Murray, 2011; Ireland, 2020). One of the most common approaches to developing prospective graduates' verbal communication ability is to present in a group (Rebele & St. Pierre, 2019; Shauki & Benzie, 2017). PowerPoint is also related to the ability of accountants to visualize data, which is needed to convey the results of a framework so that it is easy for the audience (Janvrin & Weidenmier Watson, 2017; Kokina et al., 2017). Visualizing data using PowerPoint can also help managers make decisions, so accountants must master the use of PowerPoint well (Janvrin & Weidenmier Watson, 2017). Thus, based on the results of this study, it can be concluded that prospective accountants need to attend training on Microsoft to facilitate the company's operational activities.

The study results in Table 1 also show that the need for mastery of accounting software ranks second (28.1%) among all skills. This indicates that mastery of accounting software is also needed in accounting job vacancies. Software such as MYOB, Omega Accounting, Accurate Accounting, and Microsoft Office Accounting Express (MOAE) is widely used in companies, especially in Indonesia (Merlina & Nuraini, 2020). In line with the research results of Damerji (2021) and Chao (2012), accounting software is needed because it can make it easier for companies to control their business activities. The importance of mastery over accounting software is that ignorance or mistakes in software selection can affect the state of a company (Thottoli, 2020a). Therefore, prospective accounting graduates must be able to meet the various skills requirements set by the job market so that their chances of being accepted into the desired company are even more significant. Therefore, this accounting software can be mastered by prospective graduates to the maximum if the accounting study program also integrates its application properly (Andiola et al., 2020).

In addition to mastering accounting software, prospective accountants are also expected to master auditing software. Understanding audit software can help identify risks and anomalies in client financial data (Cunningham & Stein, 2018). Software audits are also related to analytical and problem-solving skills to provide clients with information and evidence regarding their problems (Zhang et al., 2018). Therefore, audit software will significantly help accountants

increase productivity, time, and cost efficiency (Kruskopf et al., 2020). Furthermore, combining the importance of accountants' software audits with information technology knowledge can increase auditor productivity in the computerized audit process (BINUS, 2020). However, most of the business developments in Indonesia are currently dominated by MSMEs (Kristian & Imelda, 2015), so the use of audit software is rarely found. However, this should not prevent aspiring accountants from continuing to develop software auditing skills by attending various training courses (Cunningham & Stein, 2018; Plant et al., 2019; Zhang et al., 2018). Based on the results in Table 1, the third rank (14.5%) is indicated by data analytic skills. This shows that these skills are currently quite widely needed in the skill requirements in job advertisements for the accounting profession. Skills in data analytics are much needed because they can help accountants further analyze complex financial data issues so that the information can be helpful for stakeholders (Andiola et al., 2020; Convery & Swaney, 2012; Ragland & Ramachandran, 2014). This study's results also indicate new challenges for prospective graduates to master data analytic skills better. This study's results align with Ballou et al. (2018) and Behn et al. (2012), which show that data analytic skills are essential for accountants to master. This is because accountants are a profession that combines various skills, where data, analysis, information processing, and reporting are essential components that make big data and data analytics important to master (Liu & Vasarhelyi, 2014). Thus, accountants need to develop data analytic skills to perform analytical functions in a data extract system (Dzurandin et al., 2018; Kavanagh & Drennan, 2008; Leon et al., 2017; Qasim & Kharbat, 2020). Table 1 shows that the most needed position in job advertisements is a staff position (47%), while the most minor needed is a manager position. This is by the organizational pyramid, where more staff are needed because the company's operational goals can be achieved immediately if lower-level management can assist managers in achieving company goals (R. C. Hoffman & Shipper, 2012). Staff tends to perform basic company tasks and are still in the skill development stage (Malik & Kanwal, 2018). Therefore, to create a company that continues to grow, more staff is needed than in other positions because supervisors and managers cannot carry out their duties if the company's operations cannot be carried out correctly. The burden of corporate responsibility given to staff is relatively lower than in other positions (Suraja, 2018). However, supervisors and managers also have an essential role in nurturing and encouraging their employees to continue to develop skills, so that staff are not only tasked with helping meet company aspirations but can also form skilled staff (Nair et al., 2019).

The difference in needs at each level of position was confirmed by the results of the Kruskal-Wallis test, which found a significant difference in the need for information technology skills among the three positions ( $c2 = 10.253$ ,  $p 0.05$ ). This was followed up by the Mann-Whitney U test,

which found a significant skill difference between staff and managers (Mdn = 2.00,  $z = -2.378$ ,  $p < 0.05$ ) and staff and supervisors (Mdn = 2.00,  $z = -2.817$ ,  $p < 0.05$ ). However, this study found no significant difference between supervisor and manager positions. This may be because various operational skills are more needed in staff positions than in supervisors and managers. The results of this study indicate that the lower the position level, the more technical the skills required, so the ability to complete tasks efficiently is needed. However, the higher the status of the position indicates that the required skills are conceptual, so it helps make strategic policies in running the company (Ahmed et al., 2020; Dwindu, 2020; I. Ismail, 2020; Koziol-Nadolna, 2020; Naseer et al., 2021). Therefore, the company's primary operations, such as data input and transactions, are mainly carried out by staff (Eldridge & Nisar, 2006). The overall skills required for these staff positions indicate that skills of coordination or supervisory nature are not emphasized. This is in line with research by Eldridge & Nisar (2006), which explains that staff tends not to be allowed to carry out supervisory duties over the company. Compared, the need for data analytic skills is greater for supervisory positions. This study's results align with Gardiner (2017), that managers need more data analytical skills. This may be because managers are more involved in decision-making and statistical analysis of the company (Gardiner et al., 2017). In addition, currently, in Indonesia, there are not many human resources who master data analytic skills in terms of knowledge and experience obtained by applicants (Pradistya, 2020).

This study's results align with Devece's (2013) research that managers play a direct role in integrating information technology skills. Managers must be able to understand the potential of information technology to implement a unique strategic business vision and forecast the opportunities and needs of the company (Devece, 2013). Likewise, database management system skills and business strategy are most needed in managerial positions. The results of this study indicate that the higher the level of the position, the more strategic the management process and dimensions for the long term, thus requiring managerial skills that are more conceptual. On the other hand, the lower the level of the position, the more tactical and short-term the management process will be so that it focuses more on the operational functions of management. Therefore, all roles and tasks in each position must be mastered to achieve organizational or company goals (Gardiner et al., 2017; Hermkens, 2021; Muizu & Sule, 2017; Risley, 2020; Singh et al., 2021). This finding is also in line with Basselier (2003) research, which explains that managers' intentions to seek information technology integration are high.

This study found that prospective skills graduates rarely need programming skills. This may be because future graduates must understand only basic programming knowledge, so there is no need to emphasize this further in job advertisements (Kennan et al., 2008). Based

on the research results, several skills are not found in job advertisements, namely XBRL (Extensible Business Reporting Language), A.I. (Artificial Intelligence), and blockchain. This is because XBRL skills are currently being developed, but previous research has shown that XBRL is used as a reference for exchanging digital business information needed in company business reports (Pei & Vasarhelyi, 2020; Perdana et al., 2019). The application of XBRL skills is still not optimal due to differences in the structure of the presentation of financial statements between issuers. Likewise, A.I. (Artificial Intelligence) and blockchain may still be needed more in IT-specific fields (Moll & Yigitbasioglu, 2019; Qasim & Kharbat, 2020). In line with the research of Weisenfeld et al. (2020), A.I. and blockchain are hyper-automation where the technology is currently still in development.

This study is in line with the theory of job market signals by Spence (1973), whereby job advertisements are crucial for both parties, namely companies and job seekers. The results of this study confirm the labor market signal theory, where applicants can use the signals conveyed by the company through job advertisements to adjust to what skills the company currently needs. Based on the results of this study, job advertisements are expected to help job seekers investigate what skills are required by companies today. This is because the company's signal through job advertisements can represent the company's needs for prospective applicants, namely accounting graduates (Acarlar & Bilgiç, 2012; Moore & Khan, 2019). This study's results align with Verwaeren et al. (2017), where job advertisements provide helpful information for job applicants to increase their attractiveness to the company they are applying for. In addition, company information through job advertisements can help prospective accounting graduates prepare for various job market demands (Brooks et al., 2018; Debusse & Lawley, 2009; Moore & Khan, 2019). Therefore, job applicants can prepare well by learning what skills are expected of current job seekers.

## **CONCLUSION**

Information technology has been widely used in all business activities of accountants and non-accountants. This study aims to determine what information technology skills are needed today by analyzing job advertisements' skill requirements for each staff, supervisor, and manager position. The first finding in this study shows that skills such as Microsoft Office, accounting software, and data analytic skills are the most needed by companies today. Therefore, accountants must have these skills to support technological advances in today's digital era. This study also found a significant difference in skill needs between staff and managers and between staff and supervisors. Staff duties tend to be technical and operational. This difference in skill needs is due to the need for more staff positions than supervisors and managers. Meanwhile, the tasks of supervisors and



managers are more important than the tasks of supervising the company. Therefore, accountants need to learn more about the skills required for their desired position. In addition, various training programs to improve information technology skills are also recommended to adapt the accounting profession to technological developments (Andiola et al., 2020; Junger da Silva et al., 2020; Kotb et al., 2019).

The results of this study indicate that prospective accounting graduates still have to develop their skills to become individuals who can compete in the world of work. This research contributes to the applicability of the labor market signal theory, where the signals conveyed by companies through job advertisements can help applicants adjust their qualifications needed by the company being applied for. This research is expected to be useful for accounting students in preparing for information technology skills that employers most need. Furthermore, this research is also expected to add insight into the information technology skills required by the job market so that academic and accounting professional associations can emphasize which information technology skills are preferred. For universities, the results of this study are expected to contribute to improving the accounting curriculum by forming abilities.

The data in this study may not represent the entire population of job vacancies because this study did not further analyze offline. Therefore, further research can examine job vacancies online and offline through mass media and newspapers. In addition, rapidly changing technological developments require accountants to adapt to demands in the job market to provide competent and professional services. This results in a change in the need for information technology skills in the future, thus making the results of this research less relevant. Therefore, further research is still needed to analyze the need for information technology skills for accountant positions. Nevertheless, this research is expected to increase knowledge regarding developing information technology skills for accountants, especially in Indonesia.

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