

# Technology and Information System Expertise Demand for Accounting Professionals: A Requirements Analysis of Job Advertisements

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**Abstract**—Digital transformation has driven change in business and industry ecosystems, and has also created a disruptive impact in the workplace. The purpose of this research is to describe the technology and information system skills needed by professional accountants as required in job advertisements. This study uses a naturalistic non-participant observation method. The research subject is an online job advertisement, with minimum education requirements of a bachelor's degree and a minimum of 3 (three) years of work experience. The object of study includes: job position, main jobs and responsibilities, education, knowledge and skills of technology and information systems. The data were analyzed by thematic and semantic content analysis methods. The final analysis involves the application of quantitative descriptive techniques. This study identified the technology and information systems skills required by professional accountants with the highest ranking: MS-Office, Accounting Software, IT Literacy, Database, ERP Software, Financial technology & software, Tax software, Data presentation, and other application programs. There is no significant difference in desired technology skills between middle management and higher management. This study recommends that a further study be conducted to identify the skill requirements needed by professional accountants in the future.

**Keywords**—technology and information system skills; accounting professionals; job advertisements analysis.

## I. INTRODUCTION

Advances in information technology followed by digital transformation are driving the changing ecosystem of the business and industrial world. In general, digital transformation is defined as the adoption of digital technology to change services or business processes, through replacing non-digital or manual processes with digital processes or replacing old digital technology with

newer digital technologies [1]. Changes that occur not only in the production process, but also change most work systems and procedures [2]. In accounting field and finance, these changes are identified as 5V, namely velocity, volume, value, variety, and veracity [3]. The combination of these five changes has implications for the changing roles played by accounting and finance professionals in business organizations.

In addition to improving and supporting traditional methods and providing various conveniences in business processes, digital transformation also creates disruptive effects on the world of work. McKinsey & Company identified three simultaneous effects of digital transformation in the world of work, namely: jobs lost, jobs gained, and jobs changed [4]. Accounting work activities such as data collection and processing will be affected by the adoption of Artificial Intelligence (AI) and automation, some workers will lose their jobs due to being replaced by smart machines. A study shows an increasing demand for workers with digital technology skills in recent years [5]. In order to keep a career, employees need to adapt to the development of digital technology.

As a business process support function, accounting is also affected by digital transformation. In general, accounting is needed in business as a company's financial reporting. The development of cloud technology and big data analytics in recent years has changed the way companies make business decisions and report their financial performance. As a result, there is an increasing demand for advanced technology skills among accounting professionals [6], so it is deemed necessary to adjust the accounting curriculum [7]. In addition, digitization also increases the demand for higher-order cognitive skills, digital, interpersonal, and self-leadership

[8]. Professional accountants must get used to and make technology the main platform in their work and activities. Digitalization is a challenge and opportunity for the accounting profession in the future. The accounting profession needs to continually learn new skills and adapt to emerging jobs.

The disruptive impact of digital transformation on accounting and finance can be seen from the increasing automation of accounting tasks and jobs. Transactional tasks will shift to integrated business services solutions and automation using intelligent robots and smart machines, predicted to eliminate up to 40% of accounting transaction jobs [9], as well as removing accounting positions responsible for tasks such as managing daily cash flow and processing claims from producer [10]. Various discussions about digital transformation and its impact on accounting indicate that the role of accounting professionals will change from bookkeeping tasks to strategic business partners [11]. The presence of automation in the industry is rapidly increasing the skills gap for accounting and finance jobs [12]. Thus, professional accountants are expected to have technological expertise and can adapt to a digital-based work environment.

Higher education institutions need to identify the technological knowledge and skills required by the world of work in the future. Skills and qualifications desired by the job market are important for accounting higher education institutions [13]. The Association of Chartered Certified Accountants (ACCA) report states that 89% of respondents consider digital skills to be relevant and highly relevant to the accounting and finance professions [3]. Other researchers also mention technology and data analytics skills are important for success in a professional accountant career [14]. To anticipate the development of digital technology, it is necessary to review the accounting education curriculum so that graduates are able to meet the qualifications required by employers.

This research focuses on identifying technology and information systems skills needed by the world of work in the accounting field. Accounting technical skills and strong ethics remain at the core of what professional accountants do, but these need to be supported by technological skills. The ACCA report mentions digital skills that need to be developed to support the implementation of the duties and responsibilities of the accounting profession in the next three to five years, including data analytics, spreadsheeting, project management, digital transformation and strategy, artificial intelligence and machine learning, and data structures [3]. The online job seeker site identifies advanced excel skills, knowledge of business intelligence software, data analytics expertise, understanding of enterprise resource planning systems, experience with cloud computing as technology and information system skills needed by professional accountants to be more

competitive in the job market [15]. These various skills indicate the wide scope of technology and information systems required by professional accountants.

Specific research that identifies technology and information systems skills for professional accountants as required by job advertisements has not been widely carried out. Contributions of this research is to reveal the technology and information systems skills demanded by employers, particularly in accounting and finance, as required in job advertisements. The skills signals that appear in job advertisements play an important role in identifying the most relevant skills for accounting graduates. The results of the analysis of job advertisements provide an overview of the current real needs for skills, and can be used as a basis for developing an accounting education curriculum.

#### *Objectives of Study*

To identify employers' demands for current technology and information systems skills, we developed the following research questions:

1. What are the technology and information systems skill requirements for professional accountants as indicated in the job advertisement?
2. Are there any differences technology and information systems skills demanded between middle and higher management?

## II. LITERATURE REVIEW

Digital transformation has changed the accounting profession in obtaining and processing data to produce information for organizational decision making. Accounting is the activity of collecting business data, posting transactions to producing financial reports. According to the ACCA, it is very important for accounting and finance professionals to have digital technology skills [3]. Currently, clerical accounting tasks have begun to be replaced by the application of digital technology [16]. Digital technology trends are predicted to cause transaction processing tasks to be reduced by up to 40% [17]. In the future, accounting processes are likely to be cloud-based and controlled automatically, communicating with and through Artificial Intelligence machines to meet user information needs [18]. In this work environment, professional accountants are expected to have the technological expertise and skills to complete tasks and make decisions accurately and timely.

Technology and information systems skills are important elements in various fields of accounting. Today's accountants need to exploit emerging technologies to help them complete their tasks more effectively, efficiently, accurately and timely. Employers expect accounting graduates to have skills in word-processing, spreadsheets, accounting packages, and

communication software skills [19]. Knowledge and skills in accounting software, tax software, time management and billing systems, ERP, database analysis and concepts are very important for accounting graduates in Malaysia [20]. The job market in Jordan also requires accounting graduates with skills in financial spreadsheet application, general ledger packages software, word processing, flow charting and database, financial instrument software, accounting software, audit software, ERP system software, presentation, tax preparation software, statistical analysis packages and applications [21]. Cloud accounting, enterprise resource planning (ERP), cybercrime and computer-assisted audit techniques are some of the technologies and information systems that need to be developed in the accounting curriculum at UK and Irish universities [22].

The development of the industrial revolution 4.0 is expected to have a significant effect on the accounting profession. In the era of digital technology, accountants can access data in real time and increase information assurance for decision making [23]. Accelerated adoption of digital technology is expected to automate most accounting tasks [24]. To be useful, accountants need to have a new set of technological skills. Having advanced Microsoft Excel, Word, PowerPoint, Outlook and familiar with ERP System skills are important for management accountants to analyze business problems [25]. Digital skills are one of the main skills for future accountants, including advanced spreadsheets, cloud-based accounting, enterprise resource planning, standard business intelligence (BI) applications, digitization of tax returns, artificial intelligence (AI), Blockchain, Data management skills, and data analysis [26]. Advances in digital technology require a fundamental change in the accounting profession, namely by mastering technological expertise so as to be able to provide added value to the profession. The rapidly changing business environment requires professional accountants to update their IT knowledge and skills, and transform themselves into knowledge-based professionals.

### III. RESEARCH METHOD

#### 3.1 Data Collection

The purpose of the study is to describe the technological skills needed by professional accountants as required in job advertisements. The research was conducted using a naturalistic non-participant observation approach. Through this method, research activities are focused on observing the facts of technological expertise requirements that appear in job advertisements. The research subject is an online job advertisement found on the site: <http://kompaskarier.com/>, <https://www.simplyhired.com/>, <https://www.glassdoor.com/>, <https://www.linkedin.com/jobs>, <https://sg.indeed.com/>, <https://malaysia.indeed.com/>, <https://www.jobstreet.co.id>,

<https://ph.indeed.com/>. Requirements for job vacancies are education at least S1/D4 with a minimum of three years of work experience. The object of study includes: position or title, duties and responsibilities, education, knowledge and technology skills.

#### A. Focus Group Discussion

Focus group discussions (FGDs) were conducted to determine areas of knowledge and technology skills needed by professional accountants. FGD materials were formulated from various references. The results of FGD concluded that technology and information system expertise were grouped into: accounting software, MS-Office, ERP software, IT literacy, databases, financial technology & software, tax software, data presentations, and another application software.

#### 3.2 Data Analysis

Data were analyzed using content analysis method. This analysis is used to determine the presence of certain words, themes, or concepts in qualitative data [27], such as in job advertisements. Data analysis was carried out with two approaches, namely conceptual and relational content analysis [28]. Conceptual content analysis also known as thematic analysis is a method of analysis by looking at the occurrence of selected terms in the text, even though these terms may be implied or explicit. Relational content analysis, also known as semantic analysis, is an analytical method by exploring the relationship between identified concepts, focusing on finding the meaning or relationship of word meanings [29].

The analysis was carried out by examining each word or phrase and comparing it with the group of technology and information systems expertise from the FGD results. The comparison process begins by identifying several key terms that are expected, both thematically and semantically. If new concepts are found and difficult to identify, these concepts are placed in other groups. The final analysis involves applying quantitative techniques, such as calculating the frequency of each skill group and presenting it in a graph depicting the technology and information systems skills required in job advertisements.

### IV. RESULTS AND DISCUSSION

#### 4.1 Results

There are 123 job advertisements that have met the analysis criteria. The job advertisements analyzed were from four ASEAN countries, 77.2% of job vacancies were in Indonesia, 9.8% in Malaysia, 8.9% in Singapore, and 4.1% in the Philippines. Most of the job vacancies were for lower-level management (49.6%) such as senior staff and supervisors, and middle-level management (45.6%) such as assistant managers and managers (Table 1).

**Table 1. Description of job advertisements**

Description		Frequency	Percentage
Job advertisement website	<a href="http://kompaskarier.com/">http://kompaskarier.com/</a>	9	7,3%
	<a href="https://malaysia.indeed.com/">https://malaysia.indeed.com/</a>	12	9,8%
	<a href="https://ph.indeed.com/">https://ph.indeed.com/</a>	5	4,1%
	<a href="https://sg.indeed.com/">https://sg.indeed.com/</a>	9	7,3%
	<a href="https://www.glassdoor.com">https://www.glassdoor.com</a>	19	15,4%
	<a href="https://www.jobstreet.co.id">https://www.jobstreet.co.id</a>	23	18,7%
	<a href="https://www.linkedin.com/jobs">https://www.linkedin.com/jobs</a>	44	35,8%
	<a href="https://www.simplyhired.com/">https://www.simplyhired.com/</a>	2	1,6%
Total		123	100%
Country of job vacancies	Indonesia	95	77,2%
	Singapore	11	8,9%
	Malaysia	12	9,8%
	Philippine	5	4,1%
	Total	123	100%
Position level	Senior Staf	52	42,3%
	Supervisor	9	7,3%
	Ass Manager	5	4,1%
	Manager	51	41,5%
	Director	6	4,9%
Total		123	100%

This study analyzes 168 words or phrases related to technology and information systems skills required in job advertisements (Fig 1). Skills in Microsoft Office such as word, advanced excel, and powerpoint were found as prerequisites with the highest frequency (36.3%), and followed by accounting software skills (35.7%). Some of the accounting software skills needed include QuickBooks Software, SAP Software, Xero Accounting Software, and cloud-based accounting software.

Professional accountants also need expertise in IT Literacy, relational databases, ERP Software, Financial technology, Tax software, and data presentation. Skills in Workday Software, Microsoft Dynamics, and NetSuite are some examples of ERP Software skills needed in job advertisements. Understanding of the development of information technology is important for professional accountants.

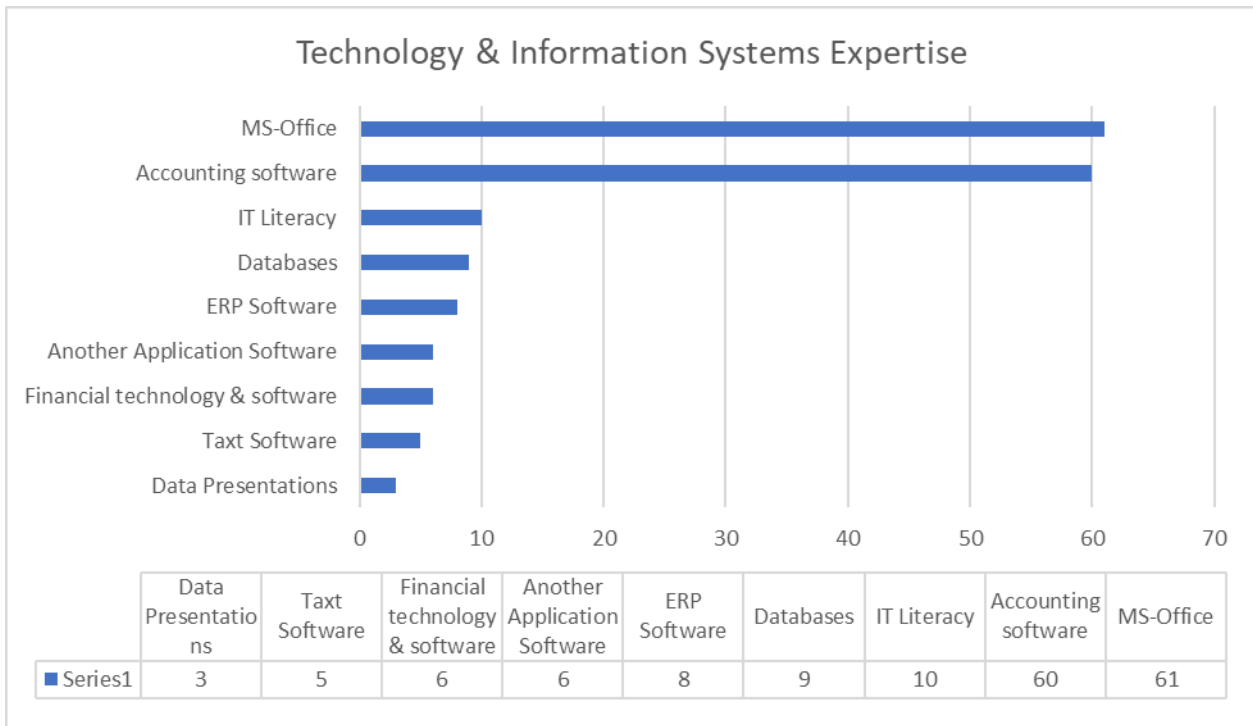


Figure 1. Graph of frequency distribution of technology and information system expertise requested in job advertisements (n=168).

This study also identifies the distribution of information technology and system skills requirements at each level of position (Table 2). The three skills with the highest frequency required for middle level management are: accounting software, MS-Office, and IT Literacy. Meanwhile, upper-level management is required to have

MS-Office skills, accounting software, and databases. The results of the independent sample t-test showed that there were no significant differences ( $p = 0.078 > 0.05$ ) in the requirements for technology and information systems expertise between middle management and higher management.

Table 2. Distribution of technology and information systems expertise groups at each level of position.

Technology & Information System Expertise	Level Jabatan					Number
	Senior Staf	Supervisor	Ass. Manager	Manager	Director	
Accounting software	29	4	2	25		60
Another Application Software	2			3	1	6
Data Presentations	1			2		3
Databases		1	1	7		9
ERP Software	4		1	3		8
Financial technology & software	2			3	1	6
IT Literacy	5	1	1	3		10
MS-Office	27	2	2	27	3	61
Taxt Software	1			4		5
Total	71	8	7	77	5	168

#### 4.2 Discussion

The impact of current technological advances encourages business organizations to expand the use of digital technology and automation to support accounting and finance tasks. In addition to accounting technical skills, a professional accountant must also have technology and information systems skills [16]. Technology and information systems skills are the types of skills that contribute to the effective execution of tasks and responsibilities. Technology and information system skills that companies are interested include: MS-Office, Accounting Software, Enterprise Resources Planning (ERP) Software, Relational Databases, and IT Literacy. Skills in operating MS-Office, especially advanced Microsoft Excel, are the dominant technology skills that appear in job advertisements [30]. The findings of this study are also in line with the ACCA report which states that advanced spreadsheet skills, accounting software, ERP software, data analytics, and databases are digital skills that need to be developed to support the implementation of the duties and responsibilities of the accounting profession [3]. The online job seeker site also shows the technology skills needed by professional accountants to be more competitive in the job market, including advanced excel skills, knowledge of business intelligence software, data analytics expertise, understanding of enterprise resource planning systems, experience with cloud computing [15].

Technology and information systems skills are very important for the accounting profession. Key technology trends impacting the accounting profession include intelligent automation, blockchain, and cloud-based software [16]. In line with this statement, this research also identifies the need for expertise in the field of cloud accounting. Job advertisements require employees with cloud-based accounting and ERP software skills, such as: Intacct Accounting Software, Sun Systems Accounting Software, Workday Accounting Solutions, SAP Software, Xero Accounting Software, Zahir Accounting Software, Oracle Accounting Systems, QuickBooks Software, Workday Software, Microsoft Dynamics, NetSuite, PeopleSoft System, and Hyperion Tools. Cloud accounting is the latest technological breakthrough in the accounting industry that can be accessed anytime and anywhere via an internet connection. Cloud accounting can improve organizational performance [31], increase efficiency and effectiveness [32], and prepare and present financial reports more accurately and timely [18]. Therefore, having expertise in cloud accounting will be a plus for employees [33]. The boundaries between accounting and technology are becoming increasingly blurred so it is not surprising that companies are looking for people who are not only skilled in accounting but also have technology skills. Middle management and higher management require the same technology and information systems skills.

Job advertisements are one of the important instruments in seeing the trend of skills needed by the

world of work. A comprehensive analysis of the various requirements contained in job advertisements can provide an overview of the graduate profile desired by the world of work. Content analysis of job advertisements is a new phenomenon in the analysis of labor market needs and reflects the real situation in the world of work and can be used in curriculum development. Job advertisement studies do not predict future skill requirements [30], but they can at least anticipate future needs. Based on the findings of this job advertisement study, it is necessary to follow up with a prospective study to identify the competency requirements needed by professional accountants in the future.

#### V. CONCLUSIONS AND RECOMMENDATIONS

Most job advertisements require applicants to have MS-Office skills and expertise in using accounting software. Technology and information system expertise that is needed by professional accountants is MS-Office, especially advanced Microsoft Excel, accounting software such as SAP software, Xero software, QuickBooks software, and cloud-based accounting software. In addition, expertise in databases, ERP software, financial technology, tax software, and IT literacy is also required. Skills like this are needed by both middle and higher management.

This study looks at current skill requirements and does not predict future skill requirements. Therefore, it is necessary to follow up with a prospective study to identify the skill requirements needed by professional accountants in the future. The results of this study can be used as a basis for conducting prospective studies.

#### ACKNOWLEDGMENT

This research was supported by a research grant from the Bali State Polytechnic with a contract number 941/PL8/PG/2021. We would like to thank the Research Center and Community Service for their support. We also thank all those who have assisted in carrying out this research.

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