



A Confirmatory Factor Analysis of Thai Accounting Graduates' Desirable Skills in the 21st Century

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Abstract

In the 21st century, some trends and changes affect the accounting profession in many ways. Innovation and technology make business operations adapt to new environments. Therefore, accountants' skills must change in this era. This research aimed to develop and validate the model of Thai accounting graduates' desirable skills in the 21st century by using a questionnaire as a tool to collect data from a sample of 125 accountants of quality accounting firms. Data were analyzed using descriptive statistics and confirmatory factor analysis. The results indicated that the confirmatory factor model of Thai accounting graduates' desirable skills proposed was consistent and accurate with the empirical data. Three factors that covered Thai accounting graduates' desirable skills included accounting knowledge and skills, business knowledge and skills, and working and lifelong learning skills.

Keywords: Confirmatory factor analysis, Desirable skills, Thai accounting graduates

Introduction

The 21st-century trends have changes that affect the accounting profession in many ways. Future accountants or those in the accounting profession need to pay attention to these changes, especially in the digital economy, in which innovations in cloud computing and big data have played a massive role in business development. As a result, business operations need to develop relevant technological skills, including adaptation and open-mindedness, to preparing for new things and environments that changed. The characteristics of professional accountants must change in this era. They need to develop more soft skills such as converting information into information for decision making,

presenting both oral and written, having leadership skills in decision-making, linking strategy to company objectives, and having good visibility and communication. However, there are specific roles where technology can replace people (Federation of Accounting Professions [FAP], 2016). Therefore, professional accountants have to change their roles to become more valuable. For example, a bookkeeper may change roles to become an expert or a consultant. The auditors have to change the audit method from numerical analysis to find the audit's significance, which is not based solely on the financial statements' numbers. It may be implied that any other important information can change or influence a stakeholder's thinking.

Accountants in the 21st century should have such critical attributes as understanding technology changes and having a positive attitude towards technology, learning, and increasing technology use, including developing networking or coordination skills with other departments. Because an accountant's role in this age is not just to combine, analyze, record, summarize, and present reports. Accountants need to be more aware of their role as corporate decision-making providers rather than a collector (Jaiyen et al., 2017). They must also serve as an advisor to executives or businesses efficiently and meet organizations' needs in the dynamic and rapidly changing digital age, which is a fundamental role in enabling organizations to survive and compete (Sriviroj & Aiamchuen, 2019). Besides, professional accountants should have essential skills in today's work, such as (1) language skills, which is the most crucial skill of modern accountants because may require to negotiations and discussions with executives who may be a foreigner—mostly English, which is the official language of international communication. If an accountant is fluent in English, it will be beneficial for him. (2) Business skills because modern accountants do not just work in accounting; they need to understand business. This will help them more understand the work that they need to do. Necessary business knowledge and skills are knowledge and skills of investment, strategic planning, marketing, and financial management. They should also have skills in analyzing news and information to help them develop themselves to be up-to-date and analyze and dissect financial information properly (International Accounting Education Standards Broad [IAESB], 2014; FAP, 2016).

From the reasons above, education or human resource development related to accounting or the accounting profession must be adapted and prepared, such as adding accounting courses specific to study knowledge and skills in accounting and soft skills. In this regard, the International Federation of Accountants (IFAC) has set

an international educational standard. (IES) to provide educational institutions that offer accounting courses to systematically set a method for recruiting accounting students and manage professional accounting education programs that will give graduates a high level of professional accounting knowledge and develop themselves as a professional accountant in the future.

IES 2nd edition divides the knowledge in the accounting curriculum into three parts include (1) accounting, finance, and related knowledge, (2) business and organizational knowledge, and (3) professional skills. In this professional skill area, IES requires professional accountants to have five skills: (1) Intellectual skills—how to enable learners to choose information or news correctly and suitable for the businesses. (2) General technical skills and specific technical skills related to the profession—how to make learners professional capabilities. (3) Interpersonal and communication skills—how to make learners interpersonal, present their ideas and persuade people to accept speaking and writing. (4) Personal skills—how to provide learners with good professional attitudes, ethics, and lifelong learning abilities. (5) Business and organizational management skills—how to give students the ability to lead and apply the right tools or technology to assist in decision-making and develop work efficiency and productivity. IFAC also emphasizes skills in information technology (IT) and accounting information systems in preparation for the digital economy. Including 16 skills of personal in the 21st century that everyone should have to achieve lifelong learning, divided into three main groups: (1) Foundational literacies are skills that can be used as a tool for learning and daily life ICT literacy, financial literacy. (2) Competencies can handle complex challenges such as critical thinking, problem-solving, creativity, communication, and collaboration. (3) Desirable characteristics are adapting to changing environments, such as leadership, social and cultural awareness, and social and environmental responsibility,

such as leadership, social and cultural awareness, and social and environmental responsibility (IAESB, 2014; International of Federation of Accountants [IFAC], 2017).

The previous studies about the desirable skills of accountants or accounting graduates were focused on professional skills in accounting and professional ethics. Some performance skills were studied in these studies but were just common skills such as leadership, responsibility, work motivation, and work experience (Bunwut & Intakhan, 2016; Rodjam & Mungsing, 2019; Thonglard et al., 2017). This research highlights the importance of skills necessary for learning and addressing complex 21st-century challenges, such as knowledge and business skills for investment, strategic management, quantitative analysis, and decision-making science; the competencies of individuals in the 21st century to achieve lifelong learning, such as critical thinking, creativity, social and cultural awareness, and social and environmental responsibility, etc. (IAESB, 2014; IFAC, 2017). This study aims to develop and validate the model of Thai accounting graduates' desirable skills in the 21st century, hoping that the findings and knowledge gained will use as guidelines for the development of accounting education in order to obtain a qualified graduate accounting and skills that are consistent, fit, and support current and future changes and situations.

Literature Reviews

Qualifications of a professional accountant according to IES requirements

The International Education Standard (IES) that issued by the International Federation of Accountants (IFAC) defined the qualifications of a professional accountant were as follows (IFAC, 2017; Thai Accounting Center [TAC], 2018):

1. A professional accountant must be graduated with a minimum bachelor's degree or equivalent in accounting from an institution offering accounting courses, which has established a systematic method for

admission and management on professional accounting education programs' content. This will enable graduates to have a high professional accounting knowledge level and develop themselves as a professional accountant in the future.

2. A professional accountant must have professional skills in various fields include intellectual skills, general and technical skills, personal skills, interpersonal and communication skills, and business and corporate management skills.

3. A professional accountant must have positive values and attitudes toward the profession based on ethics, including social responsibility, honesty to the profession, and the ability to keep secrets, and independence.

4. A professional accountant must have a long and intense accumulation of experience to demonstrate that they are professionally knowledgeable and skilled accountants. They also have the knowledge and positive attitudes towards the profession based on ethical conduct, with the department responsible for close supervision and having a standard and regular audit process.

5. A professional accountant must pass a professional competence assessment to assess professional knowledge and skills and be professional values, attitudes, and ethics.

IES also defined that a professional auditor must have competence in auditing, advanced financial accounting and reporting, information technology skills, and practical accounting experience. Importantly, pass the professional auditor's proficiency assessment.

Accounting Knowledge and Skills

Accounting knowledge and skills (AKS) are knowledge and skills directly related to the accounting profession. It refers to cognitive skills, cognitive abilities, and experience in accounting principles and concepts (Srichanphet, 2002). It contains knowledge and competence in financial accounting, managerial accounting, cost accounting, accounting information system, auditing, taxation, and

accounting profession ethics (Srichanphet, 2002; Thonglard et al., 2017; Veerasathavanich, 2005). Seven factors were considered and assigned as observable variables that are a factor of the first component of Thai accounting graduates' desirable skills in this study, namely: (1) Financial Accounting (AKS1), (2) Managerial Accounting (AKS2), (3) Cost Accounting (AKS3), (4) Accounting Information System (AKS4), (5) Auditing (AKS5), (6) Taxation (AKS6), and (7) Accounting Profession Ethics (AKS7).

Business Knowledge and Skills

Business knowledge and skills (BKS) are becoming increasingly important for professional accountants. They were called for a proactive role in organization management. While previously, an accountant's role may have been limited to collecting information for other agencies to use, but nowadays, accountants have more roles in many operations of an organization (FAP, 2016; IAESB, 2014). Therefore, they are necessary to have more business knowledge, aware and have an around-view of corporate and business management skills, including strategic planning, project management, personnel and resource management, competence in personnel motivation and development, leadership, and professional consideration and decision making (Veerasathavanich, 2005; Watanawilai & Sittipolvanitchakul, 2011). Seven factors were considered and assigned as observable variables that are a factor of the second component of Thai accounting graduates' desirable characteristics in this study, namely: (1) Human Resource Management (BKS1), (2) Strategic Management (BKS2), (3) Knowledge Management (BKS3), (4) Investment (BKS4), (5) Marketing (BKS5), (6) Finance (BKS6), and (7) Quantitative Analysis and Decision Sciences (BKS7)

Working and Lifelong Learning Skills

Working and lifelong learning skills (WLS) are features that a person in the 21st century should have for achieving the development of work and lifelong learning. The second edition of IES defines personal skills for accounting graduates to have life-long learning capabilities in preparation for the digital economy, divided into three main groups (IAESB,

2014): (1) Foundational literacies are skills that can be used as tools for learning and in everyday life, such as ICT or digital literacy, language literacy. (2) Competencies are skills to deal with complex challenges, such as critical thinking, problem-solving, creativity, communication, and collaboration. (3) Desirable qualities are traits in adapting to changing environments, such as leadership, social and cultural awareness, and social and environmental responsibility. These skills were considered and assigned as observable variables that are a factor of the third component of Thai accounting graduates' desirable characteristics in this study, namely: (1) Language Literacy (WLS1), (2) Digital Literacy (WLS2), (3) Critical Thinking (WLS3), (4) Problem-Solving (WLS5), (5) Creativity (WLS5), (6) Communication (WLS6), (7) Collaboration (WLS7), (8) Leadership (WLS8), (9) Social and Cultural Awareness (WLS9), and (10) Social and Environmental Responsibility (WLS10).

From relevant literature reviews, the hypotheses of this study were formulated as follows:

H1: Thai accounting graduates' desirable skills can be measured by accounting knowledge and skills (AKS), business knowledge and skills (BKS), and working and lifelong learning skills (WLS).

H2: Accounting knowledge and skills can be measured by financial accounting, managerial accounting, cost accounting, accounting information system, auditing, taxation, and accounting profession ethics.

H3: Business knowledge and skills can be measured by human resource management, strategic management, knowledge management, investment, marketing, finance, and quantitative analysis and decision sciences.

H4: Working and lifelong learning skills can be measured by language literacy, digital literacy, critical thinking, problem-solving, creativity, communication, collaboration, leadership, social and cultural awareness, and social and environmental responsibility (WLLS10).

Methodology

Participants

The participants in this study were accountants of 162 quality accounting firms in Thailand. The sample size was determined based on Hair, Black, Babin and Anderson's (2010) criteria, which indicates the sample size for the confirmatory factor analysis was 5-10 units per one observed variable and suggested that if the estimation of Maximum Likelihood (ML) analysis is used, the sample size should be at least 100 units. Twenty-four observed variables were assigned to this study. Thus, the sample size should be more than 120 ($N > 120$). Two hundred forty participants were selected by stratified random sampling, with samples in each accounting firm determined by population proportion and selected by simple random sampling.

Instrumentation and Data Collection

An anonymous questionnaire was used to collect information in this study, including two parts: Part 1 contained six multiple-choice questions to collect general information of participants about gender, age, education level, working experience in the accounting profession, working position, and having a professional accounting license. Part 2 contained 24 closed-ended questions to collect data about Thai accounting graduates' desirable skills, including accounting knowledge and skills (7 questions), business knowledge and skills (7 questions), and working and lifelong learning skills (10 questions). Questions in part 2 were questions that five rating scales (1-5) based on the Likert's rating scale (Likert, 1932) for using to assess the participants' responses ranging as follows: 1 = Lowest agree, 2 = Low agree, 3 = Medium agree, 4 = High agree, and 5 = Highest agree.

The questionnaire was examined the content validity by five experts. The index of item-objective congruence (IOC) of all questionnaire questions greater than .60 (Hambleton, 1984). The questionnaire was then tested with thirty non-sample accountants to determine its reliability using Cronbach's alpha coefficient method

(Cronbach, 1951). The questionnaire's reliability was 0.90, and the reliability of the questionnaire used to measure the variable of accounting knowledge and skills, business knowledge and skills, and working and lifelong learning skills were 0.92, 0.95, and 0.95, respectively. In this study, 240 questionnaires were sent via mail to participants in 162 accounting firms. The 132 questionnaires were responded to and returned from participants of 122 accounting firms. The researcher examined and selected 125 questionnaires that were accurate and complete for data analysis.

Data Analysis

Descriptive statistics such as frequency and percentage were used to analyze the general data of respondents. CFA was used to examine the desirable characteristics of Thai accounting graduates in the 21st century by examining the proposed model's consistency with the empirical data. The fit indices for determining the model-fit of CFA in this study included chi-square test (χ^2), relative chi-square (χ^2/df), comparative fit index (CFI), root mean square residual (RMR), and root mean square error of approximation (RMSEA) (Byrne, 2001; Kline, 2005; Schreiber et al., 2006; Schumacker & Lomax, 2004). The model-fit indices are shown in Table 1.

Table 1 Criteria for fit indices of CFA

Indices	Cutoff Criteria
chi-square probability level (<i>p</i> -value)	<i>p</i> -value > .05
relative chi-square (Ratio of χ^2 to <i>df</i>)	The ratio of χ^2 to <i>df</i> < 2 or < 3
comparative fit index (CFI)	> .90
root mean square residual (RMR)	< .06 to .08 the smaller, the better; 0 indicates perfect fit
root mean square error of approximation (RMSEA)	< .06 to .08 with confidence interval

Research Results

A majority of participants were female (77.6%), aged below 30 years (48.8%), who graduated with a bachelor’s degree in accounting (64.8%), their job positions were officers (33.6%), their work experience was 1-5 years (40.0%). 8.8% of participants were professional licenses in accounting include Certified Public Accountant (CPA) of 7, Certified Internal Auditor (CIA) of 3, Tax Auditor (TA) of 22.

Before analyzing CFA results, Determinant, Bartlett’s Test of Sphericity, and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (*KMO*) was used to test multicollinearity or singularity, the identity matrix, and the sample size validity statistically. The results can be seen in Table 2.

Table 2 The analysis results of correlation coefficients, determinant, Bartlett’s test of sphericity, and *KMO* of observed variables’ correlation coefficient matrix are indicators of Thai accounting graduates’ desirable characteristics.

Factors	Indicators	Correlation Coefficients	Determinant	Bartlett’s Test of Sphericity	KMO
Accounting Knowledge and Skills (AKS)	7	.574** - .793**	.004	$\chi^2 = 673.147^{**}, df = 21,$ $p < .01$.899
Business Knowledge and Skills (BKS)	7	.543** - .805**	.002	$\chi^2 = 742.826^{**}, df = 21,$ $p < .01$.917
Working and Lifelong Learning Skill (WLS)	10	.311** - .833**	.001	$\chi^2 = 951.110^{**}, df = 45,$ $p < .01$.909

Note. ** $p < .01$

Data in Table 2 show that the correlation coefficient matrix of indicators of three latent variables that are a factor of Thai accounting graduates’ desirable skills had statistical determinants of .004, .002, and .001 indicates that there is no multicollinearity or singularity of component indicators (The determinant should be a value greater than .0001, if less than this indicates that the relationship between the indicators is very high, the indicators should be eliminated).

Bartlett’s Test of Sphericity results test that a correlation coefficient matrix is an identity matrix? The results obtained χ^2 were 673.147, 742.826, and 951.110 at the statistical significance of .01 level, indicates that the correlation coefficient matrix was not an identity matrix (The statistical significance level should be less than .05). Furthermore, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (*KMO*) measure of sampling adequacy was statistically measured to test the sample size validity. The *KMO* value result was .899, .917, and .909

(should be greater than .50, if a sample size was appropriate) (Field, 2017). These results indicate that this data set is appropriate for analyzing CFA.

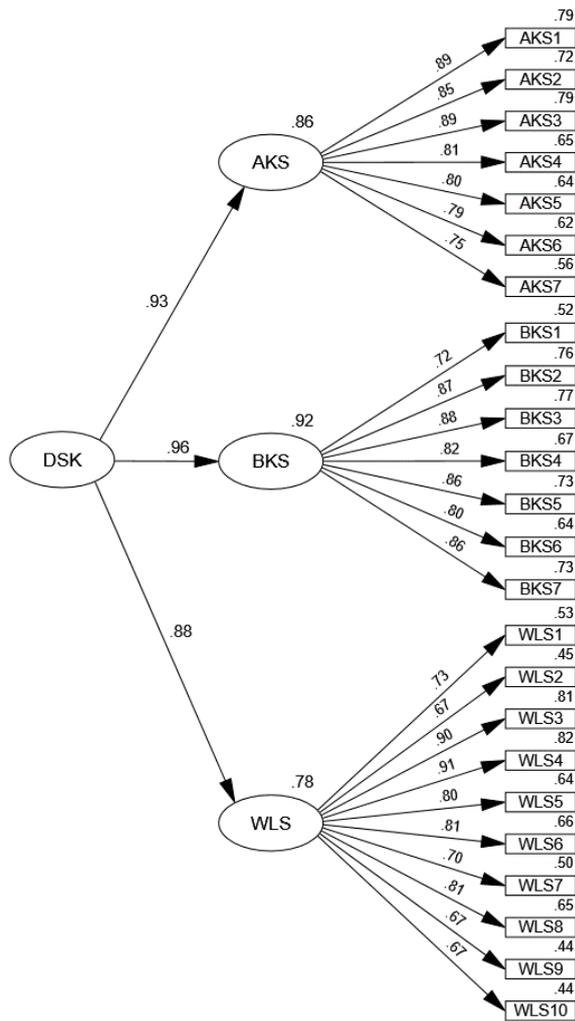
The CFA results are shown in Table 3 and Figure 1. Factor loadings for every indicator- both first order and second order were significant at the .01 level. The weights of all twenty-four first-order factors were in a positive range from .666 to .906. The weights of all three second-order factors were .882, .928, and .961. The highest indicator was business knowledge and skills (.961), the second was accounting knowledge and skills (.928), and the third was working and lifelong learning skills (.882). The fit indices for CFA developing Thai accounting graduates’ desirable skill indicators showed that the proposed model was consistent with the empirical data after the model was adjusted. The chi-square was insignificant ($\chi^2 = 256.719, df = 224, p = .066$). The relative chi-square was less than the cutoff score of 2 ($\chi^2/df = 1.146$). The comparative fit index was

close to 1 ($CFI = .988$), and RMR and $RMSEA$ (.029 and .034, respectively) values were less than the cutoff score of .06. These indices indicated that the proposed model was consistent with the empirical data with a good fit.

Table 3 Results of CFA for developing indicators of the desirable skills of Thai accounting graduates

Construct/Indicators	factor loadings		t	R ²	CR	AVE	α
	b(SE)	β					
First-Order							
AKS					.937	.655	.934
AKS1	1.000	.889	scaling	.790			
AKS2	1.021(.075)	.851	13.539**	.724			
AKS3	1.161(.079)	.891	14.788**	.794			
AKS4	.902(.074)	.807	12.129**	.652			
AKS5	1.013(.100)	.798	10.145**	.636			
AKS6	.938(.080)	.788	11.705**	.621			
AKS7	.852(.081)	.746	10.555**	.557			
BKS					.940	.655	.943
BKS1	1.000	.722	scaling	.521			
BKS2	1.435(.148)	.872	9.716**	.761			
BKS3	1.280(.130)	.880	9.844**	.774			
BKS4	1.321(.146)	.819	9.049**	.672			
BKS5	1.343(.141)	.857	9.501**	.734			
BKS6	1.300(.146)	.801	8.895**	.642			
BKS7	1.384(.146)	.857	9.506**	.735			
WLS	1.036(.144)	.882	7.172**	.778	.935	.594	.936
WLS1	1.000	.726	scaling	.527			
WLS2	.817(.108)	.669	7.532**	.447			
WLS3	1.124(.110)	.900	10.212**	.810			
WLS4	1.075(.105)	.906	10.286**	.820			
WLS5	.956(.106)	.803	9.065**	.645			
WLS6	1.022(.113)	.809	9.042**	.655			
WLS7	.816(.104)	.704	7.831**	.496			
WLS8	1.035(.115)	.809	9.033**	.655			
WLS9	.772(.104)	.667	7.403**	.444			
WLS10	.778(.116)	.666	6.698**	.444			
Second-Order							
DSK					.946	.854	.925
AKS	1.190(.136)	.928	8.724**	.861			
BKS	1.000	.961	scaling	.923			
WLS	1.036(.144)	.882	7.172**	.778			

Note. ** $p < .01$



Chi-square = 256.719, df = 224, p = .066, CMIN/DF = 1.146, RMR = .029, CFI = .988, RMSEA = .034

Figure 1 Significance fit of the proposed model to the empirical data

Construct Reliability and Validity

Construct reliability was conducted by internal consistency reliability test, including Cronbach’s alpha and composite reliability (CR) were considered to evaluate internal consistency reliability. As illustrated in Table 3, all items of Cronbach’s alpha (α) exceeded a minimum threshold of .70, ranging from .925 to .943 (BrckaLorenz et al., 2013), and all items’ CR reached the minimum threshold of .70, ranging from .935 to .946 (Hair et al., 2014). Furthermore, the average variance extracted (AVE) were considered to evaluate convergent validity. As illustrated in Table 3, all items’ AVE values were more significant than the minimum threshold of .50 (Hair et al., 2014).

These Cronbach’s alpha, CR, and AVE values indicated that all indicators were represented the latent constructs with validity and reliability.

Discussion and Conclusion

The study’s findings showed that the proposed model of Thai accounting graduates’ desirable skills was consistent with empirical data. It consists of three factors and twenty-four indicators as expected (hypotheses set accepted: H1-H4). The desirable skills sorted by standardized factor loadings descending were business knowledge and skills ($\beta=.923$), accounting knowledge and skills ($\beta=.861$), and working and lifelong learning skills ($\beta=.778$). It shows that all three factors covered the Thai accounting graduates’ desirable skills of the 21st century. It is consistent with many researchers’ previous studies on accounting graduates’ or accountants’ desirable skills (e.g., Sakthachak & Sukwattanasinitt, 2019; Rodjam & Mungsing, 2019; Thorncharoenkul, 2018; Thonglard et al., 2017; Jearasukon et al., 2019; Bunwut & Intakhan, 2016). The research results also suggest that business knowledge and skills include knowledge and skills in human resource management, strategic management, knowledge management, investment, marketing, finance, quantitative analysis, and decision-making sciences are the most crucial attributes of graduates to pursue in the accounting profession, besides professional knowledge and skills in accounting. It is consistent with previous studies (e.g., Changkomchome & Vuthimedhi 2019; Linjee et al., 2020). This may be because the current business model has changed significantly from the traditional business model. The professional accountants’ skills must be changed in this era. They must be influential advisors to executives or businesses and meet organizations’ needs in the dynamic and rapidly changing digital age, which is the fundamental role organizations can survive and compete (Sriviroj & Aiamchuen, 2019).

Additionally, the study results indicate other essential skills of accounting graduates, work and lifelong learning

skills, a characteristic that people in the 21st century, divided into three main groups: (1) foundational literacies are skills that are used as a tool for learning and everyday life such as ICT literacy, financial literacy. (2) competencies are skills in managing complex challenges such as critical thinking, problem-solving, creativity, communication, and collaboration. (3) characteristic qualities are skills for adapting to changing environments, such as leadership, social and cultural awareness, and social and environmental responsibility (IAESB; 2014). These features make people different from technology because technology is still unable to do this kind of sensitive matter, so although there are some roles that technology can take over, there are still some roles that technology cannot do yet (FAP, 2016).

The study's results emphasize the accountants' desirable skills that need to be changed from traditional skills to accommodate the changing work or profession contexts in the 21st century. Changes in business structures and styles require broader accountant competencies that are not limited to accounting knowledge and skills but also business skills and operational and learning skills required to undertake work in this century, such as skills for investment, strategic management, quantitative analysis, decision-making science, critical thinking, creativity, social and cultural awareness, and social and environmental responsibility. Accountants must act as a business advisor, providing the information necessary to develop the business potential to survive and compete in the future. In conclusion, under the context of the accounting profession in the 21st century, accounting graduates must be developed in accounting knowledge and skills, business knowledge and skills, and working and lifelong learning skills to become an accountant with appropriate knowledge and skills in the accounting profession and to develop themselves to work effectively in this century's environment that various developments change rapidly.

Suggestions

From this study's results, it was found that accounting knowledge and skills, business knowledge and skills, and working and lifelong learning skills were Thai accounting graduates' desirable skills in the 21st century. Therefore, educational institutions offering accounting courses should establish guidelines and methods for developing and managing accounting study programs and teaching content that will enable graduates to have skills in all three areas to develop themselves as professional accountants in the future.

Reference

- BrckaLorenz, A., Chiang, Y., & Nelson Laird, T. (2013) *Internal consistency reliability*, Available: http://fsse.indiana.edu/pdf/pp/2013/FSSE13_Internal_Consistency_Reliability.pdf [3 October 2019]
- Bunwut, S., & Intakhan, P. (2016) The study of new generation characteristics of accountants under the ASEAN community (การศึกษาขององค์ประกอบคุณลักษณะของนักบัญชียุคใหม่ภายใต้ประชาคมเศรษฐกิจอาเซียน), *Journal of Modern Management Science*, vol. 9, no. 1, pp. 167-177. (in Thai)
- Byrne, B. M. (2001) *Structural equation modeling with AMOS basic concept, application, and programming*, New Jersey: Lawrence Erlbaum Associate.
- Changkomchome, T., & Vuthimedhi, Y. (2019) The efficiency management model of accountant competency development of the certified accounting practice firms in Thailand (ตัวแบบการจัดการการพัฒนาสมรรถนะของผู้ทำบัญชีที่มีประสิทธิภาพในสำนักงานบัญชีคุณภาพในประเทศไทย), *Journal of Humanities and Social Sciences Thonburi University*, vol. 13, no. 2, pp. 77-91. (in Thai)
- Cronbach, L. J. (1951) Coefficient alpha and the internal structure of tests, *Psychometrika*, vol. 16, no. 3, pp. 297-334.
- Federation of Accounting Professions (FAP). (2016) *Trends in technology that may affect the accounting profession* (แนวโน้มของเทคโนโลยีที่อาจส่งผลกระทบต่อวิชาชีพบัญชี), Paper presented at FAP International Conference 2016 Thailand Digital Economy: Accounting Professions, Centara Grand at Central World, Bangkok, Thailand, 21 October 2016. (in Thai)

- Field, A. (2017) *Discovering statistics using IBM SPSS Statistics*, 5th edition, London: Sage.
- Hair, J., Black, W., Babin, B., & Anderson, R. (2010) *Multivariate data analysis: A global perspective*, 7th edition, New Jersey: Pearson Education.
- Hair, J., Black, W., Babin, B., & Anderson, R. (2014) *Multivariate data analysis with readings*, 7th edition, England: Pearson Education Limited.
- Hambleton, R. K. (1984) 'Validating the test scores', in R. A. Berk (ed.), *A guide to criterion-referenced test construction*, pp. 199-223, Baltimore and London: The Johns Hopkins University Press.
- International Accounting Education Standards Board (IAESB). (2014) *International Education Standard (IES) 2: Initial professional development – technical competence (Revised)*, Available: [https://www.ifac.org/system/files/publications/files/IAESB-IES-2-\(Revised\)_0.pdf](https://www.ifac.org/system/files/publications/files/IAESB-IES-2-(Revised)_0.pdf) [3 October 2019]
- International Federation of Accountants (IFAC). (2017) *Future of accounting profession: Three major changes and implications for teaching and research*, Available: <https://www.ifac.org/knowledge-gateway/business-reporting/discussion/future-accounting-profession-three-major-changes> [3 October 2019]
- Jaiyen, P., Manichai, K., Khiangthi, T., & Bunphap, N. (2017) Accountants with modern technology (นักบัญชีกับเทคโนโลยีสมัยใหม่), *Journal of Pacific Institute of Management Science*, vol. 3, no.1, pp. 196-207. (in Thai)
- Jearasukon, P., Klinpratoom, P., & Aeksapsang, J. (2019) A confirmatory skill forensic accounting: The aspect of auditor governance (การวิเคราะห์องค์ประกอบเชิงยืนยันของโมเดลทักษะการบัญชีสืบสวน: มุมมองของผู้ปฏิบัติงานด้านการตรวจสอบภาครัฐ), *Journal of Liberal Arts and Management Science*, vol. 6, no.1, pp. 13-29. (in Thai)
- Kline, R. B. (2005) *Principle and practice of structural equation modeling*, New York: The Guilford Press.
- Linjee, C., Homkaew, K., & Boon-Iam, S. (2020) Knowledge and Professional skills of accountants at the certified accounting practice in Thailand (ความรู้และทักษะวิชาชีพของนักบัญชีสำนักงานบัญชีคุณภาพในประเทศไทย), *Journal of Arts Management*, vol. 4, no. 1, pp. 34-45. (in Thai)
- Rodjam, C., & Mungsing, R. (2019) A confirmatory factor analysis of accountants' competency in desirable accountants' qualifications (การวิเคราะห์องค์ประกอบเชิงยืนยันสมรรถนะของนักบัญชีตามคุณลักษณะนักบัญชีที่พึงประสงค์), *Journal of Humanities and Social Sciences Ratchapruek University*, vol. 5, no. 1, pp. 29-44. (in Thai)
- Sakthachak, K., & Sukwattanasinitt, K. (2019) Factors affecting working efficiency of digital accountants working in Thai government offices (ปัจจัยที่ส่งผลต่อประสิทธิภาพการทำงานของนักบัญชีดิจิทัลที่ทำงานในหน่วยงานของรัฐไทย), *Hatyai Academic Journal*, vol. 17, no. 1, pp. 17-31. (in Thai)
- Schreiber, J., Stage, F., King, J., Nora, A., & Barlow, E. (2006) Reporting structural equation modeling and confirmatory factor analysis results: A review, *The Journal of Educational Research*, vol. 99, pp. 323-337.
- Schumacker, R. E., & Lomax, R. G. (2004) *A beginner's guide to structural equation modeling*, 2nd edition, New Jersey: Lawrence Erlbaum Associates.
- Srichanphet, S. (2002) Accounting professionals with IEG issue 9 (นักวิชาชีพบัญชีกับ IEG ฉบับที่ 9), *Chulalongkorn Business Review*, vol. 24, no. 92, pp. 12-19. (in Thai)
- Sriviroj, S., & Aiamchuen, K. (2019) Thai accountants in the 4.0 era (นักบัญชีไทยในยุค 4.0), *EAU Heritage Journal Social Sciences and Humanity*, vol. 9, no. 1, pp. 19-28. (in Thai)
- Thai Accounting Center (TAC). (2018) *Qualifications of professional accountants according to the requirements of IES (คุณสมบัติของนักบัญชีมืออาชีพตามข้อกำหนดของ IES)*, Available: <http://tac.prosmes.com/Article/Detail/21682> [3 October 2019] (in Thai)

Thonglard, B., Kuma, K., & Tipwivatpotjana, S. (2017) Thai Qualifications Framework for Higher Education, TQF: HEd of graduate qualifications of accounting program. Faculty of Management Science Lampang Rajabhat University (คุณลักษณะบัณฑิตที่พึงประสงค์ตามกรอบมาตรฐานคุณวุฒิระดับอุดมศึกษาแห่งชาติของสาขาวิชาการบัญชี คณะวิทยาการจัดการ มหาวิทยาลัยราชภัฏลำปาง). *Lampang Rajabhat University Journal*, vol. 6, no. 1, pp. 76-89. (in Thai)

Thorncharoenkul, N. (2018) Accounting staff competencies affecting the effectiveness of job performance: A case of manufacturing industry in Muang Samutprakarn district (สมรรถนะของพนักงานบัญชีที่ส่งผลต่อประสิทธิผลการทำงาน กรณีศึกษา สถานประกอบการธุรกิจอุตสาหกรรม อำเภอเมือง จังหวัดสมุทรปราการ), *Private Institute of Higher Education Association of Thailand*, vol. 24, no. 1, pp. 58-70. (in Thai)

Veerasathavanich, C. (2005) International Education Standards (IES) (มาตรฐานการศึกษาระหว่างประเทศ (IES), *Association of Certified Accountants and Auditors of Thailand*, vol. 1, no. 4, pp. 1-20. (in Thai)

Watanawilai, N., & Sittipolvanitchakul, J. (2011) The potential development of Thai accounting profession on economic liberalization (การพัฒนาศักยภาพของวิชาชีพบัญชีไทยต่อการเปิดเสรีทางเศรษฐกิจ), *Executive Journal*, vol. 32, no. 3, pp. 16-25. (in Thai)