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THE INTERNAL AUDITOR'S INFORMATION TECHNOLOGY COMPETENCY MEASUREMENT SCALE DEVELOPMENT

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Abstract

The rapid diffusion of information technology resulted from Covid-19 pandemic has affected contemporary businesses, and accordingly, it imposes challenges on the auditing profession. Consequently, the form of business evidence has changed from physical documents into databases. Hence, auditors no longer need to rely on samples to evaluate controls, instead auditors can analyze their data using software. Several authors have proposed measurement scale for IT competencies but failed to specifically focus on internal auditors' IT competency. Hence, this paper developed the measurement scale of internal auditors' IT competency in conducting the audit process. This measurement scale is crucial as IT competencies play an important role in determining the effectiveness of auditors. Five internal auditing practitioners have been interviewed to define the relevant Information Technology competencies for internal auditors in items development phase and 106 respondents were involved in scale development phase. The scale was validated by administering survey to 202 respondents. It can be confirmed that the scale proposed is uni-dimension and has adequate validity and reliability to measure internal auditors' IT competency. By assessing the IT competency accurately, it can be used for internal auditors staffing purposes. Thus, it could enhance the efficiency and effectiveness of internal auditors in exercising their duties as the third line of defense.

Keywords: Comeptamcy Measurment, Covid 19 Pandemic, Internal Auditor, Inforamtion Technology

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1. Introduction

Recently the use of Information Technology (IT) in the business world has been a necessity. It is hard to find a business that does not involve the use of IT at all. Consequently, internal auditors as the third line of defense should adapt and prepare themselves to face such an IT environment. The use of technology and the knowledge of how information technology works have become very essential to all levels of internal audit positions (Bailey, 2010; Henderson et al., 2013; Thottoli, 2021) and an essential part of the Internal Auditor's Common Body of Knowledge (CBOK) (Bailey, 2010; Cangemi, 2015; IIA, 2020; Moeller, 2016).

The significance of internal auditors' IT competency in their daily activities could be summarized into four reasons. First, it is required by the standards. The International Standard for the Professional Practices of Internal Auditing (ISPPIA) para 1220.A2 required that the internal auditors consider the utilization of technology in data analysis. Para 1210. A3 states that internal auditors are required to have sufficient competencies in technology-based audit techniques and knowledge about IT risk and control. Para 2110.A2 stipulates those internal auditors must assess whether the implemented IT governance can support the organization's objectives.

Second, the IT system enables all business activities to be done paperless. The transactions' maker, checker, and approver process were conducted in the system. It changes the evidence form from physical paper documents to digital database evidence (Oldhouser, 2016; Rakipi et al., 2021; Vona, 2017). Consequently, internal auditors must adapt, and they can no longer conduct conventional audits anymore, and the use of IT to support the audit process is a must (Héroux & Fortin, 2013; Madani, 2009; Rakipi et al., 2021; Wicaksono et al., 2018).

Third, the effect of audit evidence form changes has led to more sophisticated fraud. Fraudsters hide fraud scenarios in the company's databases so that it is challenging to detect them manually without sophisticated tools (Vona, 2017). If that is the case, then the data mining and analytics audit software play a significant role in supporting an auditor with IT competency to uncover the fraud scenarios (Abiola, 2014; Barman et al., 2016; Grandstaff & Solsma, 2019; Mohammadi et al., 2020; Ngai et al., 2011; Yue et al., 2007; Yao et al., 2018).

The Fourth is the need for a fast and effective audit process and timely reports. IT competencies will help auditors a lot in operating several tools such as electronic work papers, an automated tool to monitor and track audit remediation and follow-up, an automated tool to manage the information collected by internal audit, an automated tool for data analytics, a software or a tool for data mining, flowchart or process mapping software, software or a tool for internal audit risk assessment, an automated tool for internal audit planning and scheduling, continuous/real-time auditing, internal quality assessments using an automated tool (Cangemi, 2015). These can reduce the workload and the time pressure on the auditor; in turn, it can reduce auditor dysfunctional behavior (Zakaria et al., 2013).

Unfortunately, internal auditors' digital information technology fitness is still in the beginner stage (PricewaterhouseCoopers, 2019). The IT competency has not been able to assist internal auditors to carry out their duties effectively and efficiently. Moreover, the IT competency for internal auditors is not well defined, and still lack of agreement on the IT competencies that internal auditors need to possess. While, recently, there have been many studies that will study the impact of IT Competency internal auditors on

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various dependent variables, which need a measurement scale for self-assessing the perceived internal auditors' IT competency. Related to internal auditors, there was a survey conducted by Cangemi (2015). It provided a list of internal auditing related software that internal auditors need to master in assisting them to carry out their jobs. However, it was not intended to become a measure scale. Thus, this study aims to develop a valid and reliable self-assessing internal auditors' IT competency measurement scale to be used for future research.

2. Literature Review

Previous studies provided various definitions of IT competency for various subjects. Ku Bahador and Haider (2012) defines IT competency for an accountant as the set of IT skill and other supporting soft skills in maintaining an accounting information system. Genevieve Bassellier et al. (2001) defines IT competency for a business manager as the set of IT knowledge someone must possess to exhibit IT leadership in the area of business. Other researchers define IT competency for IT managers as a combination of three critical components: IT knowledge, IT operation, and IT objects (Tippins & Sohi, 2003), or as a competency to support effective IT management (Croteau & Raymond, 2004).

In general, IT competencies refer to the employee's perceived degree of familiarity of using an operating system, office software, and hardware (Peng et al., 2015) or the knowledge, skills, and attributes of a person that allows him to reach IT effectiveness in fulfilling the daily duties (Ni & Chen, 2016). IT competency is also defined as the knowledge, skills, attitude, and abilities that a person must possess to be successful in handling his works and developing his professional career (Devece Carañana et al., 2016). Moreover, Carnaghan (2004) defines it as what would be demonstrated by activities such as using software for particular purposes to support daily activities.

IT competency refers to what would be demonstrated by internal auditors, such as the ability to use various software and technologies to perform their daily audit activities effectively (Carnaghan, 2004). This definition assumed that the internal auditors' IT knowledge and IT skill are reflected from their ability to operate and to behave after interpreting the result of the software and tools. It is in line with the competency definition of Hannon et al. (2000), which is the ability to utilize skill and knowledge in work activities that can be assessed through performance. In this study, IT competency is self-assessed by the internal auditors using a questionnaire survey about the perceived competencies (skills, knowledge, and behavior) in using software and technology to perform their audit assignments. Questionnaires in research have become a common practice and have been considered the most accurate method, especially if the research involves many respondents in measuring a latent variable (Sekaran & Bougie, 2016). It also creates convenience for target respondents in providing the required data in sufficient time and without pressure so that the collected responses are more realistic, reliable, and honest (Gosselin, 1997).

Currently, various instruments for measuring IT competency have been proposed by many researchers. Bahador et al. (2012) measured IT competency with four dimensions: technical skills, organization skills, conceptual skills, and people skills; however, the construct is more intended to measure general accountant IT competency in maintaining their accounting information system. For external auditor, IAESB (2007) proposed the IT competencies standards with four dimensions: competency in assessing overall IT control environment, competency in assessing planning of financial

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accounting system, competency in evaluating financial accounting system, and competency in using IT to communicate audit result. Tsai et al. (2017) proposed a Likert scale self-reported questionnaire survey to assess perceived auditors' IT competency in Taiwan. They applied three dimensions of technology, conceptual and realization competency. The first dimension covered data protection, data security, data recovery, and data access, while the second dimension covered the internet and its security, new software/application review, virus, and computer defense. The last dimension covered the capability to use working software, auditing software, and database management software. However, the items covered in the three dimensions mainly were detailed parts of IT auditors' expertise. This study aims to assess the perceived IT competency of internal auditors in supporting their audit assignments and is not intended to measure the IT competency of IT auditors.

3. Methodology

In developing the scale, this study follows the iterative steps, as shown in figure 1, suggested by Boateng et al. (2018), consisting of the item development, scale development phase, and scale evaluation phase.

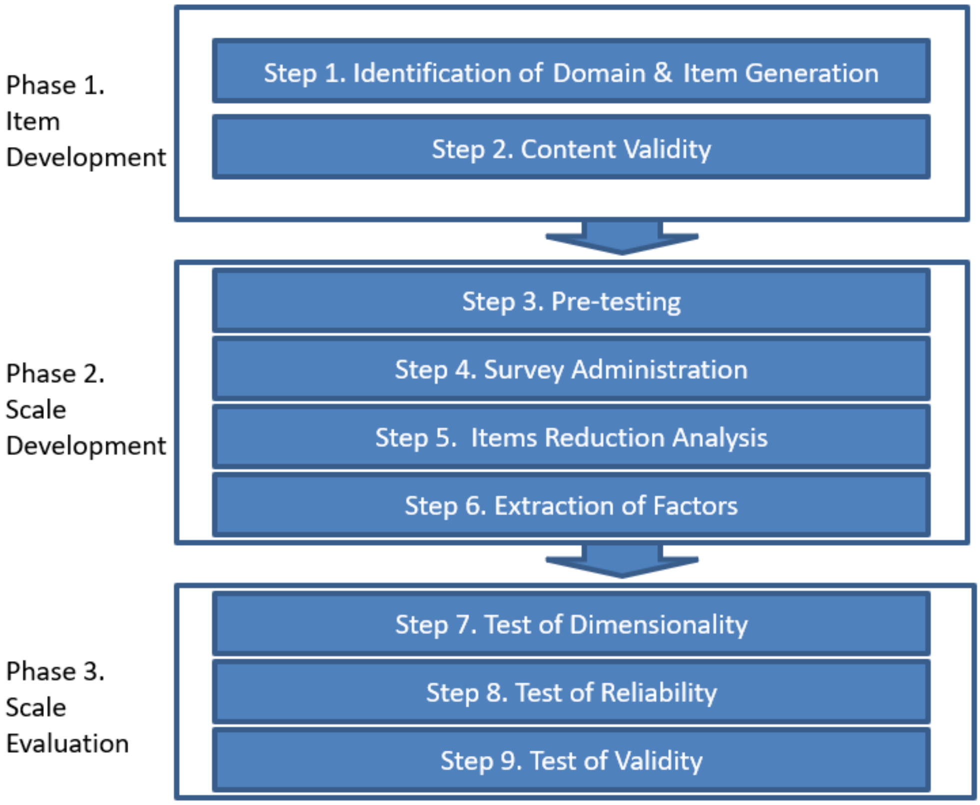

Figure 1. The Iterative Steps of Measurement Scale Development

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3.1. The Items Development Phase

Items of the construct were taken from the survey of Cangemi (2015) and to confirm and gain insight on the most critical software in internal auditing practices, two round discussions with five experts of internal auditors practitioners were conducted. The experts are required to have more than 15 years of experience as internal auditors to be eligible. From the discussion, some insights were gained, such as significant differences between IT competency for internal auditors and IT competency for IT auditors. The IT auditor needs the competency to support them in reviewing the reliability, security, and accuracy of the IT implemented by entities; at the same time, IT competency for internal auditors is the mastery of tools and software to help internal auditors perform well in carrying out audit assignment. Other inputs from the panel are to eliminate the items' redundancies; for example, ITC04 and ITC09 are supposed to be redundant. Based on the ISACA's definition of CAATs (Computer Aided Audit Tools), which is any use of technology to support audit, it includes the multipurpose audit software that can be used to select, match, recalculate, and report data. Thus, the data mining and data analytics software are also included in CAATs. The result of the items development phase is highlighted in table 1.

Table 1. Measures of internal auditors' IT Competency

No	Items	Mean
	Do you agree that the level of your current IT competence in .... can lead you to perform well in doing your daily activities?	
ITC01	using flowchart or process mapping software to understand business processes	3.2
ITC02	using risk assessment software to determine the focus of the audit	3.2
ITC03	using software to streamline internal audit planning or scheduling	3.2
ITC04	using software to automate organizing information collected during the audit process	3.8
ITC05	using software for data mining	4.0
ITC06	using software for data analytics	4.0
ITC07	**using a CAAT (Computer-Assisted Audit Techniques) (deleted)**	
ITC08	using Continuous / real-time auditing software	3.8
ITC09	**using electronic working paper (deleted)**	
ITC10	using software to monitor/trace follow-up on audit recommendations	3.4
ITC11	using software to run an internal audit quality program	3.6

In the second-round discussion, the experts were required to assess the item statements validity by giving responses in the form of a four-point Likert scale: Very Irrelevant (1), Irrelevant (2), Relevant (3), and Very Relevant (4) in assessing tone at the top item statements. The result of the experts' assessment is highlighted in table 1. in the form of statistical means. The means value below the possible median value (2.50) can be interpreted as irrelevant or very irrelevant; thus, the related item should be removed from the items list (if any). Since there is no median value below 2.5, no items are irrelevant to measure the IT competency of internal auditors.

The internal audit experts agreed on the fact that the items can assess the IT Competency. Likewise, the experts also agreed that the measurement was practical and applicable to internal auditors. The validity of the constructs is reflected by the Fleiss Kappa interrater value (Boateng et al., 2018). Fleiss kappa is used to measure the degree of agreement level between multi raters/more than two raters

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(Fleiss, 1971). Based on the calculation of the online Kappa calculator (http://justusrandolph.net/kappa/), for four categories (very irrelevant, irrelevant, relevant and very relevant), 9 item statements after the elimination of ITC07 and ITC 09 and the results of five expert raters was 0.53, which is classified as strength of agreement is categorized as moderate strength of agreement (Landis & Koch, 1977).

3.2. The Scale Development

The next step was a pre-test. The pre-test of the scale was performed by five academicians and ten internal auditing practitioners to get feedback to improve the scale, especially in terms of ease of understanding and other technical matters. It was suggested that the scale would be easier to understand if the same questions were combined instead of repeated in all items. The following stage was administering pilot testing; henceforth, 106 respondents were used for analysis. The demographic profile of respondents was highlighted in table 2.

Table 2. Demographics of Respondents in Pilot Study (n=106)

Item		Overall (N=106)	
		Frequency	%
Gender	Male	77	72.6
	Female	29	27.4
Age	30 years or below	10	09.4
	Over 30 - 40 years	36	34.0
	Over 40 - 50 years	34	32.1
	Over 50 years	26	24.5
Job Position	Chief Audit Executives	22	20.8
	Sr Manager/ Manager	22	20.8
	Assistant Manager/Senior	26	24.4
	Auditor	36	34.0
Years of Experience as an auditor	3 years – 7 years	38	35.8
	Above 7 years – 11 years	32	30.2
	Above 11 years – 15 years	17	16.0
	Above 15 years	19	18.0
Education Background	Accountant	63	59.4
	Non-Accountant	43	40.6

Exploratory Factor Analysis (EFA) was conducted to reduce Items and extract dimensions. Firstly, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) test were conducted to assess whether the data has sufficient inter-correlation degree among the items for further processing with EFA. Bartlett's test threshold should be significant at least 0.05 significance level, and the KMO-MSA should be higher than 0.500 (Hair et al., 2019). Both tests show an acceptable result (as highlighted in Table 3.) Bartlett's test was significant at a p-value = 0.000, and the KMO-MSA was 0.893, which is higher than 0.500. Moreover, the Measure of Sampling Adequacy) for each item (as shown in table 4.) ranged from 0.883 to 0.923, which were also in the acceptable range as suggested by

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Hair et al. (2019). Thus, the results of the tests indicated that the data was appropriate for further data analysis with EFA.

Table 3. KMO and Bartlett's Test

Description	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.893
Bartlett's Test of Sphericity - Approx. Chi-Square	828.605
df	36
Sig.	0.000

Table 4. Individual Items MSA (Anti Image Correlation)

		ITC01	ITC02	ITC03	ITC04	ITC05	ITC06	ITC08	ITC10	ITC11
Anti Image Covariance	ITC01	0.421	-0.059	-0.080	0.053	-0.040	-0.017	-0.057	-0.090	0.048
	ITC02	-0.059	0.264	-0.126	0.021	-0.010	0.020	-0.068	0.008	-0.028
	ITC03	-0.080	-0.126	0.238	-0.055	0.034	-0.052	0.037	-0.004	-0.049
	ITC04	0.053	0.021	-0.055	0.258	-0.087	0.029	-0.116	-0.054	-0.010
	ITC05	-0.040	-0.010	0.034	-0.087	0.258	-0.153	0.025	-0.020	-0.023
	ITC06	-0.017	0.020	-0.052	0.029	-0.153	0.257	-0.058	-0.015	0.000
	ITC08	-0.057	-0.068	0.037	-0.116	0.025	-0.058	0.225	0.050	-0.073
	ITC10	-0.090	0.008	-0.004	-0.054	-0.020	-0.015	0.050	0.384	-0.134
	ITC11	0.048	-0.028	-0.049	-0.010	-0.023	0.000	-0.073	-0.134	0.241
Anti Image Correlation	ITC01	0.923*	-0.176	-0.251	0.161	-0.123	-0.052	-0.184	-0.225	0.151
	ITC02	-0.176	0.903*	-0.502	0.082	-0.040	0.078	-0.279	0.027	-0.109
	ITC03	-0.251	-0.502	0.886*	-0.221	0.138	-0.209	0.158	-0.014	-0203
	ITC04	0.161	0.082	-0.221	0.887*	-0.337	-0.113	-0.482	-0.173	-0.039
	ITC05	-0.123	-0.040	0.138	-0.337	0.870*	-0.595	0.114	0.082	-0.084
	ITC06	-0.052	0.078	-0.209	-0.113	-0.595	0.883*	-0.240	-0.049	-0.002
	ITC08	-0.184	-0.279	0.158	-0.482	0.114	-0.240	0.874*	0.171	-0.315
	ITC10	-0.225	0.027	-0.014	-0.173	0.082	-0.049	0.171	0.909*	-0.440
	ITC11	0.151	-0.109	-0.203	-0.039	-0.084	-0.002	-0.315	-0.440	0.913*

Note: * Measures of Sampling adequacy (MSA)

Based on the extraction sum of squared loading, it was indicated that the scale was uni-dimension with 70.326% of total variance explained as shown in table 5. Hair Jr et al. (2019) suggested the total variance explained should be higher than 0.60. Thus, the scale can explain 70.326% of the variance, which is acceptable.

Table 5. Extraction Sum of Squared Loading

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	6.329	70.326	70.326

Note: Extraction Method: Principal Component Analysis

At the items' level, the validity was assessed by the communalities and the matrix factor loading. Hair Jr et al. (2019) suggested that the communalities should be higher than 0.50, and any matrix factor loading below 0.55 should be eliminated. The values of the communalities ranged between 0.590 and

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0.773 (as highlighted in table 6), which were at an acceptable level. At the same time, the values of the matrix factor loading ranged 0.768 and 0.879 (as highlighted in table 7), which were also at an acceptable level. Thus, the items on the scale were valid.

Table 6. Communalities

Items	Extraction
ITC01	0.590
ITC02	0.707
ITC03	0.745
ITC04	0.728
ITC05	0.690
ITC06	0.712
ITC08	0.764
ITC10	0.621
ITC11	0.773

Note: Extraction Method: Principal Component Analysis

Table 7. Matrix Factor Loading

Items	Component
ITC01	0.768
ITC02	0.841
ITC03	0.863
ITC04	0.853
ITC05	0.831
ITC06	0.844
ITC08	0.874
ITC10	0.788
ITC11	0.879

Note: Extraction Method: Principal Component Analysis

3.3. The Scale Evaluation

The scale evaluation aims to test the reliability and validity of the scale at different times and datasets. A new survey was administered, and 208 responses were collected, but only 202 were valid for further analysis using confirmatory factor analysis (CFA). The respondents' demographic profile was depicted in table 8.

Table 8. Respondent's Demographics Profile

Item		Overall (N = 202)	
		Frequency	%
Gender	Male	140	69.3
	Female	62	30.7
		202	100.0
Age	30 years or below	26	12.9
	Over 30 - 40 years	70	34.6
	Over 40 - 50 years	62	30.7

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Item		Overall (N = 202)	
		Frequency	%
	Over 50 years	44	21.8
		202	100.0
Job Position	Chief Audit Executive	38	18.8
	Sr Manager/Manager	54	26,8
	Assistant Manager/Sr Auditor	76	37.6
	Auditor	34	16.8
		202	100.0
Years of Experience as an auditor	3 years – 7 years	76	37.6
	Above 7 years – 11 years	55	27.3
	Above 11 years – 15 years	33	16.3
	Above 15 years	38	18.8
		202	100.0
Education Background	Accountant	117	57.9
	Non-Accountant	85	42.1
		202	100.0

The table 9 depicts the descriptive statistics for each item of the IT competency scale. This scale contained nine items using the 6-point Likert scale (1=Strongly Disagree, 6=Very competent). The mean score ranged from 3.777 to 4.629, while the standard deviation of the score ranged between 0.936 and 1.213. All items recorded the left-tailed skewed data distribution. The kurtosis result indicates that the data distribution tends to be mesokurtic as it is still in the range of -1 to +1 (except for ITC01 and ITC04).

Table 9. Descriptive Statistics

Item	Mean	Overall Mean	Std. Deviation	Kurtosis	Skewness
ITC01	4.594	4.303	1.031	1.138	-1.006
ITC02	4.010		1.210	-0.712	-0.508
ITC03	4.248		1.116	0.064	-0.696
ITC04	4.629		0.936	1.535	-1.016
ITC05	4.218		1.095	-0.327	-0.579
ITC06	4.297		1.025	-0.010	-0.623
ITC08	3.777		1.213	-0.947	-0.253
ITC10	4.426		1.037	0.563	-0.872
ITC11	4.188		1.119	-0.443	-0.613

Among the nine items, ITC04 'automation of organizing the information collected during audit process' produced the highest mean score (mean=4.629, std. dev.=0.936). It indicated that the internal auditors perceive themselves as having high competence in the automation of organizing the information collected during the audit process. Meanwhile, the ITC08 'executing audit assignment using continuous/real-time auditing software' reported the lowest mean score value of 3.777, indicating that the internal auditors have relatively lower competence in using the software than those in other items. It can be understood since continuous/real-time auditing is a relatively new approach to doing internal auditing. Overall, the mean score value for the IT competency construct is 4.303.

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Reliability is to what extent the results are consistent when the scale is repeated in the same identical circumstances at different times. The reliability can be assessed using Cronbach's alpha (CA) and Composite Reliability (CR). Hair et al. (2019) suggested that the acceptable levels of CA and CR were in the range of 0.700 – 0.950 and 0.708 – 0.950, respectively. As highlighted in tables 10 and 11, the CA was 0.929, and the CR was 0.941, which are acceptable. The result of bootstrapping test of CA and CR also are significant at alpha 0.05. Therefore, the scale has no reliability issues.

The validity test aims to assess the degree to which a scale indeed measures the intended construct. It can be assessed using the Average Variance Explained (AVE) and the factor loading of each item. It suggested that the AVE should be higher than 0.500, which means that the minimum acceptable level of the items can explain at least 50% of the variance of the latent construct (Bagozzi & Yi, 1988). The factor loading should be higher than 0.708 (Hair et al., 2019). As depicted in Tables 12 and 13, the AVE and All factor loading are higher than the threshold level, and the bootstrapping tests' results are significant at alpha 0.05. Thus, the validity is not an issue for the scale.

Uni-dimensionality can be assessed using CFA by ensuring the factor loadings are higher than the threshold and have the same direction (Awang, 2015). As depicted in Table 13, all factor loadings were higher than 0.708 and same positive direction. Thus, the uni-dimensionality was confirmed.

Table 10. Cronbach Alpha (CA) Bootstrapping Test

				Confidence Interval	
Constructs	**Cronbach Alpha**	**T Statistics**	**P Values**	**5.00%**	**95.00%**
ITC	0.929	98.127	0.000	0.913	0.943

Table 11. Composite Reliability (CR) Bootstrapping Test

				Confidence Interval	
Constructs	**CR**	**T Statistics**	**P Values**	**5.00%**	**95.00%**
ITC	0.941	79.288	0.000	0.928	0.954

Table 12. 1 AVE Bootstrapping Test

				Confidence Interval	
Constructs	**AVE**	**T Statistics**	**P Values**	**5.00%**	**95.00%**
ITC	0.638	18.619	0.000	0.584	0.690

Table 13. Factor Loading Bootstrapping Test

	Factor			Confidence Interval	
Items	**Loading**	**T Statistics**	**P Values**	**5.00%**	**95.00%**
ITC01 <- ITC	0.751	17.283	0.000	0.673	0.812
ITC02 <- ITC	0.796	19.047	0.000	0.720	0.847
ITC03 <- ITC	0.837	21.983	0.000	0.768	0.880
ITC04 <- ITC	0.717	13.819	0.000	0.622	0.792
ITC05 <- ITC	0.819	21.024	0.000	0.749	0.872
ITC06 <- ITC	0.818	21.552	0.000	0.750	0.868
ITC08 <- ITC	0.789	20.827	0.000	0.722	0.836
ITC10 <- ITC	0.821	29.689	0.000	0.774	0.865
ITC11 <- ITC	0.832	29.509	0.000	0.782	0.870

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4. Discussion

Currently, the IT competency measurements scale for internal auditors is urgently needed. Some IT competency measurement scales are proposed for accountants, external auditors, business managers, IT auditors, and IT managers, but they still lack of those for internal auditors. The global common body of knowledge of the Institute of Internal Auditors has defined the software and tools that are needed to be mastered to support their daily jobs, but not for a measurement scale yet. Currently, the scale consists of nine items and uni-dimension; however, this scale has to be periodically updated because the tools and software used to audit were continuously developing to become more sophisticated.

IAESB (2007) proposed the external auditors' IT standard competencies with four dimensions: Assessing overall IT control environment, Planning of Audit Assignment, Doing Evaluation, and Communicating audit result. In this paper, the knowledge and the skill in IT governance, risk and control environment are covered in the competency in using risk and control assessment software and business process mapping. The results from the software or tools in risk assessment and process business mapping were used to prioritize the areas that must be audited first in the audit planning and scheduling software. In doing evaluation or audit field work, the auditors were equipped by data mining, data analytic and continuous/real time audit software. Finally, communicating the result, follow-up recommendation and audit quality assessment are used to reflect the fourth dimension. It is in line with the definition of Hannon et al. (2000) competency which is the knowledge, the skill and the proper behavior of the auditors as the reaction from the result of the software or tools.

5. Conclusion, Limitation and Recommendation for Future Studies

This study was done to fulfill the need for a valid self-assessing the perceived internal auditors' IT competency measurement scale. The scale's items are taken from Cangemi (2015) survey that defines the tools and software to be mastered by internal auditors to support their audit assignments. This study involved the experts' panel in initial validating the items. Then, the proposed items were purified by statistical exploratory factor analysis (EFA), and lastly, they were validated by the confirmatory factor analysis (CFA). It can be confirmed that the scale proposed, as shown in the appendix, is uni-dimension and has adequate validity and reliability to measure internal auditors' IT competency.

In measuring the IT competency, this paper assumes that internal auditors' IT skills and IT knowledge are reflected from the ability to utilize and behave based on the result provided by the software and tools in supporting their audit assignments. The scale did not directly measure the IT knowledge, IT skill, and the internal auditors' behavior in interpreting the result of audit tools and software, as defined by Hannon et al. (2000) it became the limitation of the scale. Another limitation is using a self-assessment scale that tends to inflate the competency (Kruger & Dunning, 1999).

These limitations provide opportunities for future studies. The studies which measure the fundamental IT competency -by assessing the IT knowledge, the IT skill, and the behavior of an internal auditor who is IT competence- need to be developed. Moreover, the non-self-assessment scale should be developed to anticipate the tendency of the inflated perceived competency.

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