International Journal of Applied Business & International Management
Vol.3 No. 1 (2018)

International Journal of Applied Business & International Management

P-ISSN: 2614-7432 ; E-ISSN: 2621-2862

Website: www.ejournal.aibpm.or/IJABIM

Research paper, Short communication, and Review

Psychometric Evaluation of Newly Developed Self-Assessment of Entrepreneurial Competencies

Benedicta Prihatin Dwi Riyanti
Universitas Katolik Indonesia Atma Jaya
Correspondence author: benedictariyanti@yahoo.com
Christiany Suwartono
Universitas Katolik Indonesia Atma Jaya
christiany.suwartono@atmajaya.ac.id

ABSTRACT

Entering the ASEAN economic community today, Indonesia actively encourages the number of entrepreneurs. One of the primary resources is from the graduates of the vocational high school. The school needs a strategic way to evaluate the improvement of its entrepreneurship curriculum. Therefore, we designed a self-assessment of entrepreneurial competencies. The authors developed an assessment consists of various soft skill and hard skill competencies. Participants were asked to assess own abilities, according to the statements provided. The participants were 258 graduated vocational students from Yogyakarta and Jakarta. From 137 preliminary items, we took 24 best items. Results showed that three-factor model provided an adequate fit for the data. Business management capabilities, strategic thinking skills in managing the business, and the ability to see the opportunities emerged as first-order factors. The reliability estimation with the internal consistency method involved the Cronbach's alpha for all subtests showed excellent results. Future studies are still needed to test the predictive power of the test tool to the success of graduates who become an entrepreneur.

Keywords - competencies, entrepreneurship, scale construction, self-assessment, vocational school.

I. INTRODUCTION

Entrepreneurship education has always applied to various parts of the world. The real purpose of entrepreneurship education is not only encouraging a transformation in attitude but also increasing the number of students who see the start-up business as a career opportunity (Holmgren & Form, 2005). Moreover, the educators might facilitate the process of entrepreneurship by creating awareness of the possibilities for entrepreneurship (Lee & Wong, 2006). With the providing education on entrepreneurship and raising awareness of the potential business opportunity through entrepreneurship, they might be creating a higher likelihood of a person to be self-employment and even better, creating workplace to others. In many developed countries, the effort to encourage an employee to become an entrepreneur has been an ongoing project in several local governments. Being an entrepreneur is thought to be a part of the solution due to its real contribution to the state's economy (Monsen, Mahagaonkar, & Dienes, 2012). The same context goes to entrepreneurship education in Indonesia.

According to Potter (2008), entrepreneurship education is one of the critical elements which can improve the attitude of the entrepreneurship. The purpose of entrepreneurship education is to raise awareness and interest on people to choose this career option. Also, to make people more eager and able to open a new business. Vyakarmam (2009) summarized that entrepreneurship education has three objectives, namely (1) for personal development, (2) for the development of business, (3) for the development of entrepreneurial skills. Also, based on

the opinion of Vyakarnam (2009) ideal entrepreneurship, the education should include aspects of knowledge (theory), skills (practice), and the development of the personality of the prospective entrepreneurs. Thus, the purpose of entrepreneurship education is to form a core competence of entrepreneurship.

Entrepreneurial competencies influence significantly to business success (Ahmad, Halim, & Zainal, 2010; Man, Lau, & Chan, 2002; Sarwoko, Surachman, Armanu, & Hadiwidjojo, 2013). Therefore we designed a self-assessment of entrepreneurial competencies to capture the core of entrepreneurial competencies. Competence defined as the knowledge, skills, and ability of the individual (personality) that directly affect the performance (Spencer & Spencer, 1993). Knowledge and skills usually associated with technical competence, while personality is generally related to non-technical competencies (Sherman, 2004). Another perspective by Scarborough, Wilson, and Zimmerer (2009), divides the competence of an entrepreneur into 10 competencies, namely (1) the knowledge about the type of business to be done, (2) knowledge of the basics of business management, (3) the attitude of earnest on the business accomplishments , (4) possession of sufficient capital, (5) the ability to manage finances, (6) the ability to manage time, (7) the ability of human resource management, (8) the ability to provide customer satisfaction by providing goods and services of quality, (9) the strategic ability in running the business, (10) the ability to create clear rules / guidelines. Besides Scarborough et al. (2009), Chou, Shen, Hsiao and Chen (2010) also developed the technical competencies in business students, namely (1) entrepreneurial spirit, (2) Marketing competence, (3) Economic competence, (4) Financial competence, (5) Accounting competence, (6) Management competence, (7) Globalization competence, (8) Law competence, (9) Resources planning competence, (10) Information technology competence.

The author used perspectives from Spencer and Spencer (1993) combined with perspective of Chou *et. al.* (2010) to create an assessment of entrepreneurial competencies, as required by the educational program that encourages entrepreneurship as a career choice and educational processes to facilitate learners to evaluate the resources and facilities that would enhance the competence of student's entrepreneurship. Therefore, we constructed a self-assessment to measure the extent of the technical competence and non-technical owned vocational students who recently graduated. This test can also be used as an evaluation tool for the success of vocational education programs, particularly in measuring the competency of graduates that have the potential to become entrepreneurs.

II. BACKGROUND

Entrepreneurship Education in Indonesia

Education in Vocational High School in Indonesia has two objectives: (1) preparing vocational school students to become skilled workers, (2) preparing students to become entrepreneurs. Through Presidential Instruction No. 9 of 2016 on the revitalization of Vocational Secondary School to improve the Human Resources (HR) Indonesia. Formal or vocational education seeks to change the mindset of vocational graduates who not only become graduates ready to work but become graduates ready for entrepreneurship and independent (Subijanto, 2012).

Becoming a skilled worker, a student in vocational schools are provided with production units as resources for students to develop productive professional competencies. Kusumandari (2013) said that entrepreneurship education in SMK 75% practice and 25% theory. The model from Kusumandari proved successful in creating an entrepreneurial spirit.

Entrepreneurship Education

Entrepreneurship education aims to prepare someone, especially young people, to be a responsible person, intensified individuals who want to become entrepreneurs or think like entrepreneurs by deploying them in learning through experiences in real life where they can take risks, manage the results and learn from their results. The purpose of entrepreneurship education not only preparation regarding theoretical but also practical skills or training. According to Vyakarmam (2009) entrepreneurship education divided into the following three components: personal development, business development, and the development of entrepreneurial skills. Personal development in entrepreneurship education is expected to build confidence, motivate progress, strengthening the entrepreneurial mindset, and fostering a desire to achieve and inspire the emergence of action. The business development includes the development of knowledge regarding technical, financial, and skills that must be owned by entrepreneurs, including the expected business as well as the functional aspects of the curriculum. Therefore, the development of entrepreneurial skills includes social skills training,

networking, creative problem solving, observant to look an opportunity, manual dexterity, interviews, presentations, leadership, teamwork, dealing with the bureaucracy, as well as the norms of the local culture and how all it affects the business. Shane, Locke, and Collins (2003) added that competencies could be learned from the input (the antecedent of competencies), processes (task behavior that leads to competence), or result (achieving a standard of competencies in the field of functional). Moreover, Man and Lau (2005), the lack of entrepreneurial competence possessed by an entrepreneur will have severe consequences in some aspects, such as management conflicts, miscommunication with critical stakeholders, business strategy mistakes, and even leading to the failure of his business. Soejono, Mendari, and Rinamurti (2015) state that entrepreneurial competence has an essential role in business performance. Entrepreneurs with high levels of entrepreneurial competence are assumed to be more able to face the competitive world of entrepreneurship and can better adapt to changes caused by globalization.

Entrepreneurial Competencies

Competence as an intrinsic attribute of an individual can be used to predict the behavior and performance in the workplace (Spencer & Spencer, 1993). However, competence also can be seen as the capacity to fulfill what is required by the job within an organization so that the organization can achieve the expected results (Gangani, McLean & Branden, 2006). Rivai and Sagala (2010) described competency as a fundamental characteristic of individuals associated with effective performance or superior competencies that differ from those of another average competency level.

Types of competence

Rosas, Macedo, and Camarinha-Matos (2009) and Sherman (2004) explained that competence divided into hard and soft competency. Hard competency is the capability to perform the activities, tasks or processes intended to generate a real output. It includes knowledge and general skills (such as reading, writing, or typing) and unique (such as knowledge of the product, fill out specific forms, or create something). This type of competency relates to technical, therefore hard competency sometimes also called technical competency. Meanwhile, soft competency is the capability which related to personality. It is generally related to non-technical competencies.

In the field of entrepreneurship, based on the scope of responsibility and work, experts develop constructs about entrepreneurial competence. Arafeh (2016) develops critical entrepreneurial competencies consisting of three clusters. The first cluster, namely achievement competencies. It consists of opportunity-seeking and initiative, persistence, fulfillment commitment, demand for quality and efficiency, taking a calculated risk. The second cluster is planning competencies. It consists of goal seeking, information seeking, systematic planning, and monitoring. The third is power competencies cluster. It consists of persuasion and networking, independence and self-confident. Scarborough *et al.* (2009), divides entrepreneurial competence into knowing your business, knowing the essential business management, having the proper attitude, having adequate capital, managing finances effectively, managing people efficiently, managing people, satisfying customer by providing high quality product, knowing how to compete, copying with regulations and paperwork. Spencer and Spencer (1993) explain that there are thirteen basic dimensions of entrepreneurship. These thirteen dimensions become a feature commonly possessed by an entrepreneurial spirit. The thirteen dimensions are as follows: (1), Initiative, (2) Viewing and Enabling Opportunities, (3) Perseverance, (4) Finding Information, (5) Focusing on High Performance Levels, (6) Commitment to Work , (7) Orientation on Efficiency, (8) Systematic Planning, (9) Problem Solving, (10) Self Confidence, (11) Persuasive Ability, (12) Strategies to Influence, (13) Firmness. Other experts Chou, Shen, Hsiao and Chen (2010) developed the technical competencies in business students, namely (1) entrepreneurial spirit, (2) Marketing competence, (3) Economic competence, (4) Financial competence, (5) Accounting competence, (6) Management competence, (7) Globalization competence, (8) Law competence, (9) Resources planning competence, (10) Information technology competence. Ahmad et al. (2010) using the measurement of entrepreneurial competencies covering: strategic, conceptual, opportunity, relationship, learning, personal, ethical, familism. The soft competency is the ability to perform the behavior is beneficial or necessary for the completion of the task. Soft competency relates to interpersonal relationship so soft competency sometimes also called non-technical competency. The non-technical competencies of an entrepreneur according to Spencer and Spencer (1993) covering 13 competencies, namely: (1) initiative, (2) look and take advantage of opportunities, (3) persistence, (4) search for information, (5) a focus on high performance level , (6) commitment

to the job, (7) orientation on efficiency, (8) the systematic planning, (9) solving problems, (10) self-confidence, (11) the ability of persuasion, (12) a strategy to influence (13) firmness. Those 13 competencies are becoming a character that is owned by entrepreneurial people. For this research, we used hard skill entrepreneurial competency concept from Chou et al. (2010). The original instrument according Chou *et. al*. consisted of 10 competencies but for the purpose of this study, we have only used five competencies this assuming vocational education level develop only five of these competencies. Selection of the five hard skill competencies is based on the vocational school curriculum, namely (1) human resource management competence, (2) marketing competence, (3) production competence (4) management competence, and (5) financial competence Meanwhile, for soft skill competencies, researchers used the concept of soft skills competencies of Spencer and Spencer (1993).

III. METHODOLOGY

Participant

The population of this study is the vocational students in Yogyakarta and Jakarta. The characteristics of the sample of this study are vocational students who had just passed the national exam in 2016. The total of participants is 258 individuals. Data collected in several vocational schools in Yogyakarta and Jakarta. The participants were asked to respond to a relatively short time to each statement that appears on the questionnaire. They aged between 16 - 21 years old (M = 17.94, SD = .66). Of the participants, 13.2% have major from culinary art, 11.6% from accounting, 11.2% from engineering motorcycle, others came from fashion, architecture, and so forth. Most of the participants are male (50.78%) and 49.22% female. Around 37.21% of participants have entrepreneur parents.

Instrument

The first author constructs the test based on two theories (Chou et al., 2010; Spencer & Spencer, 1993). She develops 137 items. These items include topics about the initiative, seeing opportunities, perseverance, information seeking, high-performance focus, commitment to the job, efficiency, systematic planning, problem-solving, self-confident, persuasive skill, influencing strategy, assertiveness, human resource management, marketing, production, management capability, and financial capability. The instrument formed a questionnaire with seven possible answers. The selection of possible answers ranged from not very good ability (1) to high capacity (7). Participants were asked to give a self-assessment of their abilities in various competencies, according to the statements that have provided.

Statistical Analysis

A statistical technique used for the analysis item was corrected item-total correlation of each item. Then look for the best 24 items from the highest corrected item-total correlation coefficients. Once the final version of the items found, we test the reliability of Cronbach's alpha technique (Kaplan & Saccuzzo, 2013). To determine the structure of the instrument, we did exploratory factor analysis (EFA). We used principal component analysis as the extraction method and varimax with Kaiser normalization as the rotation method. All data analyses performed with the aid of SPSS version 22.

We continued with confirmatory factor analysis (CFA) to Validate the internal structure of the self-assessment scale using LISREL 8.80 (Jöreskog & Sörbom, 2006). Several goodness-of-fit indices were computed: Chi-square ratio (χ^2/df), Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), Comparative Fit Index (CFI; Bentler, 1990), Goodness of Fit Index (GFI; Jöreskog & Sörbom, 1996), Standardized Root Mean Residual (SRMR; Bentler, 1995), and Tucker-Lewis index (TLI; Tucker & Lewis, 1973). A chi-square ratio of less than 5, CFI ≥ .90 and SRMR ≤ .10 were used as an index of an acceptable model (Kline, 2005). For more details of these fit indices see Hu and Bentler (1999) and Kline (2005).

IV. FINDINGS

The corrected item-total correlation ranged between .08 - .74 (M = 800.89, SD = 83.64) with Cronbach's alpha was .98 for 137 items. The very high value of Cronbach's alpha may be undesirable when developing a psychological scale. The value is perceived as a redundancy; several items are precisely measuring the same element. Therefore, the redundant items must be removed. Next, we eliminate the 11 items that have corrected item-total correlation below .40. The results are satisfactory, but we thought it is still not efficient to administer all the items.

Then, we did content analysis and eliminated the items that have similar content. Finally, we choose 24 best items based on the biggest corrected item-total correlation coefficients.

Then, further analysis conducted for 24 items with exploratory factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was .95, and Bartlett's test of sphericity was significant ($\chi^2_{(276)} = 4276.33$, $p < .05$). The diagonals of the anti-image correlation matrix were all over .5, supporting the inclusion of each item in the factor analysis. These results suggest that this sample size is adequate for the application of factor analysis study. Given these overall indicators, factor analysis was conducted with all 24 items. Principle components analysis was used because the primary purpose was to identify the factors underlying the instrument. The initial eigenvalues showed that the first factor explained 49.18% of the variance, the second factor 9.65% of the variance, and a third factor 4.79% of the variance. This three-factor solution explained 63.62% of the variance of the entrepreneurship competencies construct for vocational students.

Table 1. Factor loadings based on a principal components analysis for 24 items (N = 258)

Item's content	**Factor-1**	**Factor-2**	**Factor-3**
Knowing how to make something more precious and valuable			.79
Develop existing opportunities			.75
Search for and collect as much information			.72
Responsible for my work.			.66
Thinking logically and systematically.		.74	
Having excellent analyses capability.		.73	
Finding innovative solutions to a problem.		.76	
Analyzing a problem.		.78	
Looking for some approaches to problem-solving.		.72	
Eliminating the adverse judgment of others against me		.55	
Fostering cooperation for the attainment of a goal		.48	
Managing resources		.53	
Task delegation	.56		
Creating a marketing strategy	.66		
Specify the market options	.71		
Creating a product marketing team	.76		
Determining the type of goods/services produced	.80		
Determining the number of goods produced	.80		
Make a variety of different types of products	.77		
Adjusting the production schedules	.75		
Planning a stock of goods	.79		
Organizing the division of labor	.77		
Determining the types of archives/records	.72		
Making work rules	.73		

Note: F1 = Business management capabilities; F2 = Strategic thinking skills in managing the business; F3 = The ability to see the opportunities.

We named the three factors as business management capabilities, strategic thinking skills in managing the business, and the ability to see the opportunities. The correlations between factors were shown in Table 2.

Tabel 2. Correlation coefficients between factors

	The ability to see the opportunities (1)	Strategic thinking skills in managing the business (2)	Business management capabilities (3)
(1)	1		
(2)	.682**	1	
(3)	.550**	.685**	1

**. Correlation is significant at the .01 level (2-tailed).

The correlations between strategic thinking and business management capabilities were the strongest ($r_{(256)}$=.68, p<.01, r^2=.47). The result suggests that a competent entrepreneur should have a helicopter view of his/her line of business to create their business roadmap that can be translated by a strong sense of identifying their market, types of products, and workforce. A similar structure was also found by Arafeh (2016). He found three key entrepreneur competencies. Therefore, we did CFA. We tested whether the there-factors structure was adequate. The model results were χ^2/df = 2.76, the more detail of the goodness of fit indexes shown in Table 3. However, the model needs four modifications between internal factors (See Table 4).

Tabel 3. The Goodness-of-Fit Indices from Confirmatory Factor Analysis

Model	**χ^2**	**df**	***p-value***	**RMSEA**	**SRMR**	**CFI**	**TLI**	**GFI**
Criteria			*> .05*	*< .08*	*≤ .10*	*≥ .95*	*≥ .95*	*≥ .90*
Three factors	676.79	245	.00	.08	.05	.98	.98	.82

Table 4. The Modification Indexes

Modification Index	**Statements**
1	Knowing how to make something becomes more valuable and valuable
	Developing opportunities
2	Thinking logically and systematically.
	Analyze well.
3	Creating a marketing strategy
	Determining the preferred market
4	Determining the type of goods/services to be produced
	Determining the number of goods produced

The modification indexes (Table 4) indicated there still several overlap content items. Future development could address the items that had modification indexes more specified. The result of validity test with CFA technique showed that three-factors model with four modification fit (adequate) with field data. The study found three significant constructs in explaining entrepreneurial competence.

Moreover, we did reliability analysis for all three factors and the whole scale. The details of each factor and scale presented in Table 5.

Table 5. The reliability of the Entrepreneurship Competencies Scale

Construct to be measured	**The range of corrected item-total correlation**	**Cronbach's Alpha**	***M***	***SD***	**No. of Items**

Construct to be measured	The range of corrected item-total correlation	Cronbach's Alpha	*M*	*SD*	No. of Items
The ability to see the opportunities.	.60 - .72	.84	23.68	3.55	4
Strategic thinking skills in managing the business.	.58 - .74	.89	47.50	5.71	8
Business management capabilities.	.66 - .79	.94	71.00	9.25	12
Entrepreneurship competencies	.54 - .75	.95	142.18	16.33	24

Based on Kaplan and Saccuzzo (2013), the overall scale and its factors are reliable.

V. CONCLUSION

The Self-Assessment of Entrepreneurial Competencies is a 7-point Likert scale; developed to measure vocational student's potential for entrepreneurship skill either hard and soft competencies. The Cronbach's alpha for 24 items was .95. Further analysis of the scale structure reveals three factors. The three factors are the ability to see the opportunities, strategic thinking skills in managing the business, and business management capabilities.

Construct validity is a unitary factor of validity that consists of five sources of evidence (Brown, 2010). That evidence includes test content, response processes, internal structure, relations to another variable, and consequences of testing. This competency measurement tool also proved to be significantly correlated with the external criterion of intention to become an entrepreneur. This proves that this instrument can be used as a tool to detect the success of educating entrepreneurship in Vocational High School. The limitation of this study is we should consider having a greater generalization of the results to be implemented; therefore in the future, the study needs various participants either from state or private vocational high schools in various provinces in Indonesia so that the data could reflect the competence of graduates of vocational students in Indonesia. The second limitation is that this measurement tool specifically self-assessment of the entrepreneurial competence of vocational high school graduates, this tool is not to measure the competence of entrepreneurs in general. Third, further research still needed to validate these factors and construct with others external criteria like the successfulness of their entrepreneurship business. Also, other measuring tools are still needed to validate the entrepreneurial competence in general like the measurement of entrepreneurial competence using different method than self-assessment such as situational judgment test approach. The legal implication of this research is that the Self-Assessment of Entrepreneurial Competencies can be used as an evaluation tool in the field of entrepreneurship education to test the effectiveness of entrepreneurship education. The Self-Assessment of Entrepreneurial Competencies is reliable based on the Cronbach's alpha and valid based on construct validation with Confirmatory Factor Analysis method.

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