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Development and validation of a new career maturity questionnaire for vocational high school students

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Abstract

For vocational school students, career maturity is an important part of the curriculum. The evaluation of career maturity can be done using a questionnaire. The existing career maturity instruments of CMI and revised CMI show low internal consistency. This research aims to develop new instruments for measuring career maturity. The instrument consists of a 20-item Career Maturity Questionnaire and is constructed based on the theory of vocational career maturity. Exploratory factor analysis (EFA) was conducted to examine the measurement property of the new questionnaire. The results of the analysis show that the construct consists of three factors deriving from four factors of the vocational career maturity theory. Two factors are consistent with the vocational career maturity theory. The last factor is found to be the combination of career planning and self-concept. The Indonesian vocational career maturity comprises three factors (1) Career Planning and Self Concept, (2) Career Decision Making and (3) Career Exploration. The questionnaire contains sixteen items giving the required factor loadings. Further research can investigate the concurrent validity of the instrument.

Keywords: career maturity, vocational school, exploratory factor analysis, development, validation;

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1. Introduction

The globalization era is popular with its liberal economy dan free trade, especially in the services field and workforce. To prepare the workforce with relevant skills and abilities, vocational education is provided. The increasing demand for quality workforce and tight competition in the industry result in the increasing number of vocational schools (Ritonga, 2018). This growing number of schools should be followed by quality education. Quality education may lead to the development of the country's workforce skills and the effectiveness of the workforce in the industry (Stephen, 2021). Vocational education can contribute to economic growth by strengthening the human capital of the state (Field et al., 2009).

Vocational education has some levels. Secondary vocational school is one of the vocational education levels. This level of education prepares students to be in the workforce with good skills needed by the industry or for working independently. The school aims to transfer a wide range of skills including cognitive and noncognitive skills to students so that they can contribute to the growth of the economy (Clayton et al., 2003; Unesco, 2012).

The vocational education system needs to be supported by student self-efficacy, especially their point of view of their career in the future. Secondary high school is the developmental stage of students' career maturity (Álvarez González, 2008). In this stage, the young adults will conceptualize and decide the pathway to their career in the future (Sultana, 2004; Swanson & Fouad, 2014).

Career maturity is one of the most researched constructs related to Career development. It is acknowledged as an important element of vocational development for students (Bozgeyikli et al., 2009; Powell & Luzzo, 1998). Construct related to career maturity has been developed for decades and criticized for its linear property, contrasted with career development nonlinear model (Rottinghaus et al., 2005; Savickas, 1997). Career adaptability is proposed as a nonlinear alternative to the career maturity (Lee et al., 2021; Maggiori et al., 2017; Ryba et al., 2017). Since the instrument constructed in the current study is for high school students which have a relatively stable career exploration process, the suitable construct is career maturity.

Scale based on career maturity has been widely developed. One of them is Career Maturity Inventory (CMI). As an instrument, CMI and its revised version, CMI-R, show a low internal consistency (Busacca & Taber, 2002). The career maturity inventory developed by Savickas and Porfeli (2011) has a good psychometric value but it was established for school students up to Grade 12. Moore and McLean, (1977) also developed a career maturity questionnaire but it focuses on college students. There are no questionnaires focusing on vocational high school students with their characteristics. The current study established a new questionnaire based on the vocational career maturity theory developed by Crites, (1969) for vocational high school students and investigated the psychometry property of the questionnaire.

2. Methods

2.1. Instruments

The instrument used in this study was constructed based on the theory of vocational career maturity. There are 4 parts of this theory: (1) career exploration, (2) career planning, (3) vocational self-concept, and (4) career decision-making (Crites, 1969). The instrument is a 20-item instrument. The items were established for students of vocational schools in Indonesia. Participants response to each item by choosing one of 5-level Likert scale ranging from "strongly disagree" to "strongly agree". In data collection, the questionnaire used was the Indonesian version.

2.2. Participants

The study sample comprised 1126 students of vocational high schools aged 15 – 18 years. The participants voluntarily filled out the electronic questionnaire.

2.3. Statistical Analysis

The statistical analysis of the data was done using JASP 0.14. JASP is an open-source application. The instrument was analyzed using exploratory factor analysis (EFA). EFA is a multivariate technique to examine and group some items in some latent variables (Auerswald & Moshagen, 2019; Schreiber, 2021). The steps of the analysis are shown in fig.1
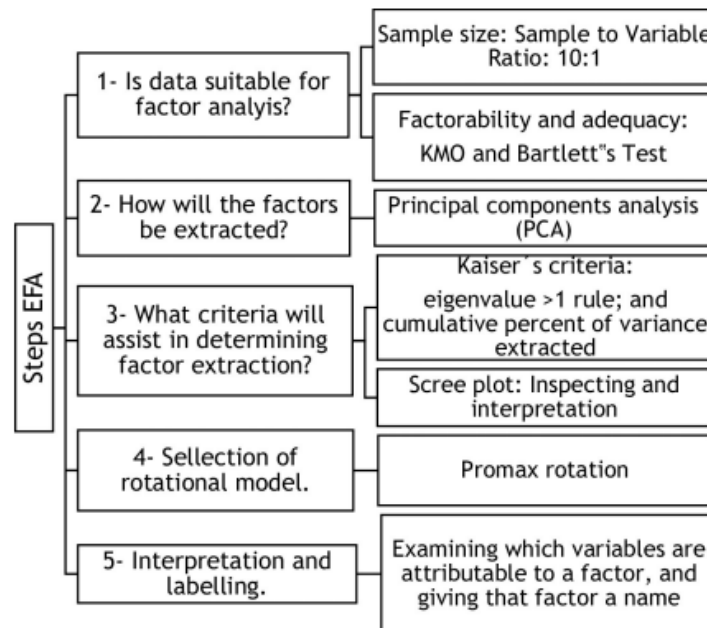

Figure 1. Five Steps of EFA to test an instrument.(Nunes et al., 2020)

These five steps are discussed in the results section.

3. Results

Since the sample size is 1126 and the number of items is 20, the sample to the variable ratio of 10:1 is fulfilled (Shmueli et al., 2019). To check the adequacy of the sample, Kaiser-Meyer-Olkin index (KMO) is a suitable tool (Shrestha, 2021). The table below shows the KMO index of questionnaire items.

Table 1. Kaiser Meyer Olkin Index of the Item on The Questionnaire

Aspects	Items	Code	MSA
Career exploration	I always look for job that I want	EXP1	0.894
	I discuss my career with my family, teacher dan friends	EXP2	0.900
	I always seek for more than one job opportunities	EXP3	0.882
	If I get job information, I will use the information to prepare myself for the job.	EXP4	0.893

	I have arranged my career in the future	EXP5	0.922
Career planning,	After graduated from vocational school, I have a mature plan to develop my career	PLAN1	0.893
	I have planned some alternative ways for my career in the future	PLAN2	0.922
	I sharpen my career plan	PLAN3	0.927
	In my point of view, career planning is a crucial step for career development.	PLAN4	0.798
	I always excited to follow a skill development program	PLAN5	0.936
Vocational self-concept	I know my talents and interest very well	SA1	0.878
	Knowing strength and weakness is necessary	SA2	0.875
	I can investigate factors that may support and hind my career	SA3	0.915
	I can adapt in a new condition	SA4	0.938
	To get my dream job, I will use my best efforts	SA5	0.953
Career decision making	I choose jobs based on my talents and interests	IND1	0.912
	In choosing a job, I consider a good working environment of the job	IND2	0.942
	I choose the major I take in vocational high school by my self	IND3	0.877
	By studying at a vocational school, I have imagined what I will be in the next 5-10 years from now	IND4	0.883
	I am responsible for things I choose related to my career in the future.	IND5	0.917
Overall MSA			0.908

The KMO index of the questionnaire is equal to 0.908. KMO index values between 0.8 and 1.0 are considered adequate (Shrestha, 2021). Moreover, the KMO index above 0.9 has a good degree of shared variance(Beavers et al., 2013). Another pre-analysis test for factor analysis was the Sphericity test of Bartlett. The test should be statistically significant as a requirement to advance to EFA (Watkins, 2018).

Table 2. Bartlett's test

X²	df	p
6058.232	190.000	< .001

The result indicates that the test is statistically significant. Since the KMO index and Bartlett test of sphericity give the required result, EFA may be conducted. The first step of EFA is factor extraction. There are some methods to identify the number of factors based on the eigenvalue of the correlation matrix. The methods are scree plot, Kaiser criteria and the gold standard method of parallel analysis

(Braeken & Van Assen, 2017). The parallel analysis consistently shows an accurate number of factors (Auerswald & Moshagen, 2019).
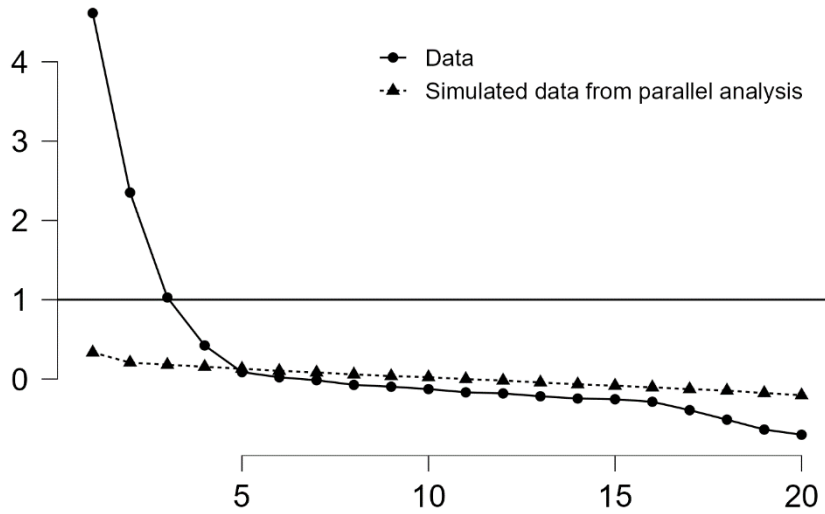

Figure 2. Scree plot of EFA on items

The scree plot method is a heuristic method using a line graph with an eigenvalue on the y-axis and the number of factors on the x-axis (Ledesma et al., 2015). Scree plot is used to determine the optimum number of factors that can reflect a latent variable (R. Cattell, 2012; R. B. Cattell, 1966; Hair, 2011). The rule of thumb on the eigenvalue of the scree plot is that it has to be larger than 1 (Nunes et al., 2020). The result shows that the optimum number of factors in the career maturity latent variable is three.

Table 3. Parallel Analysis Result with Promax Rotation

	Factor 1	Factor 2	Factor 3	Uniqueness
EXP1			0.739	0.521
EXP2			0.457	0.758
EXP3			0.493	0.754
EXP4			0.583	0.599
PLAN1	0.572			0.671
PLAN2	0.452			0.675
PLAN3	0.463			0.637
PLAN4	0.487			0.846
SA1	0.461			0.65
SA2	0.523			0.598
SA3	0.523			0.661
SA4	0.418			0.704
IND1		0.514		0.664
IND3		0.774		0.543
IND4		0.556		0.626
IND5		0.54		0.587

Note. Applied rotation method is promax.

Parallel analysis is regarded as the best method to determine the number of factor (Beauducel & Hilger, 2021; Goretzko et al., 2019; Lim & Jahng, 2019; Lim & Jahng, 2019). Parallel analysis indicates that the instrument developed has three factors. Table 3 shows that all item has factor loadings of more than 0.4 which is regarded as acceptable loadings for a newly developed instrument (Hair et al., 2021; Hulland, 1999). Factor loading shows the contribution of the item to its construct (Dijkstra, 2014; Joseph F Hair Jr et al., 2021). Higher loading means that the item has a higher contribution to its construct.

The table above indicates that the Career Maturity Questionnaire consists of 3 factors. Some items (EXP5, PLAN5, SA5 and IND2) are excluded from the questionnaire. Items with factor loadings less than 0.4 should be omitted from the model (Joseph F Hair Jr et al., 2021). The items showing good psychometric properties will be investigated for reliability. The next step is to check the construct reliability using McDonald's Omega, Cronbach alpha and Guttman's Lambda2 scale. McDonald's Omega is a more optimal measure of composite reliability than Cronbach Alpha (Hayes & Coutts, 2020) because Cronbach Alpha always gives a lower bound of reliability (Hair et al., 2019; Sarstedt et al., 2022). Even though omega shows an optimal measure of composite reliability, the Lambda2 scale gives a more accurate estimation of the composite reliability (Cho, 2021). The table below shows McDonald's Omega, Cronbach alpha and Guttman's Lambda2 scale.

Table 4. Internal Consistency of the Questionnaire

Scale	McDonald's ω	Cronbach's α	Guttman's λ2
Career Maturity Questionnaire	0.831	0.830	0.834

Internal consistency for a new instrument, an internal consistency score of 0.5 can be regarded as adequate (Fornell & Larcker, 1981) and 0.6-0.7 for exploratory research (Joe F. Hair Jr. et al., 2017). The internal consistency for advanced research should be between 0.7 and 0.9 (Nunnally & Bernstein, 1994). The career maturity questionnaire has internal consistency of 0.834 which is satisfactory for a new instrument. The factor extraction result is presented in the table below.

Table 5. Factors of Career Maturity Questionnaire for Vocational School Students

Factors	Items
Career Planning and Self-Concept	PLAN1, PLAN2, PLAN3, PLAN4, SA1, SA2, SA3, SA4
Career Decision Making	IND1, IND3, IND4, IND5
Career Exploration	EXP1, EXP2, EXP3, EXP 4

The result shows that three factors of career maturity of students at vocational high schools have good psychometric measurements. It can be concluded that career maturity of students at vocational high schools has three factors (1) career planning and self-concept, (2) decision-making in career, and (3) career exploration. The name of the factors was decided based on the vocational career maturity theory, but the analysis shows that career planning and self-concept were merged into one factor.

4. Discussion

Items of the questionnaire built based on career maturity theory show a good psychometric property. Most of the items show factor loadings that exceed 0.4. The factor extraction using parallel analysis indicates that the career maturity construct consists of 3 factors, different from the 4 factors of

career maturity theory by Crites, (1969). The current study shows that career maturity in Indonesian students of vocational high school has three factors: (1) career planning and self-concept, (2) career decision-making, and (3) career exploration. A uniquely varied factors lie on the first factor which regard career planning and self-concept as single factors. In this point of view, the result may be considered as supporting the career maturity theory.

Career planning focuses on how vocational high school students plan and take steps to get their dream job (Lau et al., 2019) whereas self-concept is the way students perceive themselves (Fenning & May, 2013). These two variables may correlate with each other. Students showing good self-concept develop a positive attitude toward career planning (Hughes, 2011). This relationship may affect items in career planning and self-concept to merge in one factor.

The 16-item Career Maturity Questionnaire (CMQ) shows an adequate internal consistency score contrasted with *career maturity inventory (CMI)* and *career maturity inventory-revised (CMI-R)* which have a weak internal consistency (Busacca & Taber, 2002). Therefore, CMQ can be used in other research to quantify career maturity of students in vocational high school. The present research also has limitations. The validation of the instrument does not include the existing instrument of career maturity. This kind of validation is called concurrent validity.

5. Conclusion

The findings of the current study show that the 16-item Career Maturity Questionnaire has an adequate psychometric property. The questionnaire may be used to measure the career maturity construct especially the career maturity of vocational high school students. Career maturity at a vocational high school in Indonesia has three factors: (1) career planning and self-concept, (2) career decision-making, and (3) career exploration. These factors are consistent with the classic theory of vocational career maturity.

6. Recommendations

Further research could validate CMQ with an existing questionnaire that measures the same construct. Since the validation of CMQ is done with Indonesian students, it may also be developed and tested in other countries with a different culture. Since the instrument has been tested using exploratory factor analysis, it can be tested using confirmatory factor analysis.

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