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Career Decision Self-Efficacy Scale-Short Form with Indonesian University Graduates: A Rasch Model Approach

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Abstract. The Career Decision Self-Efficacy Scale (CDSE)-Short Form is a 25-item intended to assess people's belief in their capacities to make a career decision. This study analyzed the psychometric properties of CDSE-SF using RASCH in the sample of 391 (64% male; 88% female) university graduates in Indonesia. The results indicated that the CDSE-SF are (1) unidimensional except for item number 13 and 17; (2) item measure test showed the greatest value is item number 13 and the lowest value is item number 1; (3) each response of category is functioning well, (4) the item reliability is 0,98 and the person reliability is 0,95, and (6) item number 1, 16, 18, and 22 are detected to have DIF across gender. Overall, the results indicated that based on the psychometric properties of the CDSE-SF Indonesian version, this 5-item scale was satisfactorily reliable and valid to measure self-efficacy of career decision-making.

Keywords:
CDSE-SF;
Rasch model;
university graduates;
5-point Likert-type format response.

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INTRODUCTION

People need to pay attention to the career that they will go through in the future because a career is not only choosing a job but also about a set of jobs, occupations, and education path (Hidayat, Cahyawulan, & Robbani, 2019). Self-efficacy is an important aspect to make a career decision (Grier-Reed & Ganuza, 2012). Career decision self-efficacy (CDSE) is based on self-efficacy theory that was explained by Bandura (1977) which described someone's believes in their abilities to succeed.

One of the biggest career theory frameworks, social cognitive career theory (SCCT), describes the importance of self-efficacy. The initial work by Lent and Hackett (1987) explained that the expectations of personal efficacy are crucial to all aspects of human development. During times, SCCT has been developed to adapt in nowadays situations. One of the developed theories in SCCT is career self-management which is strongly recommended to use in the digital work era. As a basic assumption of its theory, Lent (2016) used CDSE to assess self-efficacy during his verification of the career self-management concept

Betz (1981; Taylor & Betz, 1983) conceptualize CDSE as self-efficacy in the progress of career decision-making. The association between the inability to choose a career is a person who has low self-efficacy correlates with a low expectation of task and specific behavior that needs career decision-making skills (Taylor & Betz, 1983).

The concept of self-efficacy for career decision-making has been used in a variety of people characteristics. In the first place, the concept was used to measure the CDSE of college students (Taylor & Betz, 1983). Subsequently, it spreads to other age levels, such as high school (Chiesa, Massei, & Guglielmi, 2016; Gushue & Whitson, 2006) and university graduates (Bullock-Yowell, Andrews, McConnell, & Campbell, 2012; Guan et al., 2013). Some of the research even discussed CDSE for specific populations such as women (Albaugh & Nauta, 2005; Brown, Reedy, Fountain, Johnson, & Dichiser, 2000; Falco & Summers, 2019), immigrants (Patel, Salahuddin, & O'Brien, 2008; Wambu, Hutchison, & Pietrantoni, 2017), and disability (Luzzo, Hitchings, Retish, & Shoemaker, 1999).

The CDSE is the most frequently used scale in career intervention. It is developed based on five career competencies that were described by Crites (1978; 1972), which are self-appraisal, occupational information, goal selection, planning, and problem-solving. Self-appraisal assesses psychological conditions to evaluate and measure individual abilities. Occupational information is related to individual knowledge about employers in various jobs. Goal selection is individual competency to choose career goals that are associated with interest and sure about it. Planning is associated with a plan that is created to achieve a career goal. Problem-solving is about what a person should do to face challenges.

Initially, the CDSE was developed with 10-items on each scale, which total item of the measurement is 50 items. Getting the result from 346 subjects, it was reported that the reliability of the scale are ranging from 0.86 to 0.89 (Taylor & Betz, 1983). The study suggested that the concept of self-efficacy for career decision-making is a useful framework for understanding, assessment, and treatment for vocational indecision.

Because 50 items were considered too long, Betz (1996) develop a short version of CDSE that consist of 5 items on every scale. Collected responses from 180 college students, it was reported that CDSE-Short Form (SF) has coefficient alpha ranging from 0.73 to 0.94 (Betz et al., 1996). It was reported that the short version of CDSE has better psychometric characteristics than the long one. The short version of CDSE sounds very promising for research and counseling purposes because it only takes half the time of the original.

In the early 2000s, Betz (2005) adapted the CDSE-SF from using a 10-point response ranging from 1 (not confidence at all) to 10 (complete confidence) into a 5-point response. It was decided because that time researchers began to shorten the response to measure self-efficacy. The research collected data through 3 group samples, of which all of the samples are university students. The alpha range of the 5-point response is higher than the 10-point response, which is from 0.78 to 0.87. The result suggested that even the shorter version is the least effective, but it shows a similar result.

The CDSE-SF has been adapted into many languages, for instance, Chinese, Korean, African, Portuguese, French, Turkish, and Italian (Buyukgoze-Kavas, 2014; Chaney, Hammond, Betz, & Multon, 2007; Gaudron, 2011; Hampton, 2005; Miguel, Silva, & Prieto, 2013; Nam, Yang, Lee, Lee, & Seol, 2011; Presti et al., 2013). Therefore, some CDSE-SF adaptations had used the Rasch model to evaluate its psychometry properties. As Makransky (2015) tested on a sample of high school students in Australia with the result (1) clear evidence of multidimensionality, (2) four of five scales, except self-appraisal, had a good fit to the PCM, and (3) DIF was detected for item number 1 and 15 by gender. Research from Miguel (2013) tested a sample aged 17 to 22 years to create a CDSE-SF scale with a Portuguese version. The study showed that CDSE-SF is unidimensional. Another result suggested that there are no differences according to gender. Research from Nam (2011) tested a sample of college students in Korea. The study showed that most items are unidimensional (except 17, 13, and 25). Additionally, the CDSE-SF can discriminate against various levels of CDSE.

In this study, we aimed to evaluate the psychometric properties of the Indonesian version of CDSE-SF, based on the Rasch measurement model. We examined its capacity to assess self-efficacy of career decision-making in Indonesian University alumni, in terms of dimensionality of assessment, item fit, response category functioning, reliability, and differential item functioning.

Georg Rasch developed the Rasch model in 1960 to analyze data with dichotomous score responses. The Rasch model assumes that if the data fit with the model, the item parameters can be estimated independently from the calibrated sample, and the person parameters can be freed from item difficulty (Masters, 1982). The Rasch Model was formed because of the limitations of True Score Theory, namely on item dependencies and test indices (bi-serial, point bi-serial, item-total correlations, p-values, and reliability indices) and item dependency of person ability (Chan, Ismail, & Sumintono, 2014; Smith, Conrad, Chang, & Piazza, 2002).

Rasch Model is a measurement model that requires unidimensionality assumptions, namely assumptions that emphasize that one construct is measured from items that had been set (Andrich, 2004; Smith, 2002). The Rasch Model uses the results of a unit of estimation of ability and difficulty called logit. This unit of measure has an understanding that the ability of test-takers in logit shows natural log odds in answering questions that will explain zero point on the scale (Kyngdon, 2008; Ludlow & Haley, 1995).

Because it is used to measure instruments with dichotomous answer choices, the Rasch model develops several models to measure instruments whose answer choices are polyatomic. First, the Andrich Rating Scale Model (RSM), which David Andrich discovered in 1978, is developed to measure rating scale instruments with the same pattern of category response (Andrich, 1978). Second, the Masters Partial Credit Model was discovered by Geoff N. Masters in 1982, which separates the scoring method from different item responses in one instrument (Masters, 1982). The CDSE-SF instrument uses the Rating Scale Model as its measurement model because the CDSE-SF criteria have the same category response in the scale.

The Rating Scale model must fulfill three fundamental assumptions: latent trait unidimensionality, parallel item characteristic curve, and local independence to separate person parameter to item responses (Mair & Strasser, 2018). Differential Item Functioning (DIF) will be checked in this study as it is an essential aspect of the Rasch Model (Christensen & Kreiner, 2010).

METHOD

A total of 391 alumni (215 males and 344 females) from the public university in the Special Capital Region of Jakarta, Indonesia have participated in the research. The respondents were graduated in 2015-2020. Most of the participants are working as the employee (87%), and the rest of them have graduated degree students (4%), not possible looking for a job (2%), still looking for a job (4%), and entrepreneurs (2%). The mean age is 26.50-year-old (SD=3.43).

Career Decision Self-Efficacy-Short Form (CDSE) is a 25-item that measures a person's belief to make a career decision (Betz et al., 1996). CDSE-SF is a shortened version of the 50-item CDSE that the scale was developed from Crites five-career competencies from Career Maturity Inventory, which are *self-appraisal, occupational information, goal selection, planning,* dan *problem solving* (John O. Crites & Savickas, 1996). Respondents will give possible answers from the Likert scale that range from 1 (not confidence) to 5 (complete confidence) (Betz et al., 2005).

Some of the items were adapted to the current situation, for instance, item number 1 "Find information in the *library* about occupations you are interested in" have been adapted to "Use the *Internet* to find information about occupations that interest you" (Chaney et al., 2007).

Originally, CDSE-SF was developed to collect data from high school students or university students. Regarding that, some of the items were changed to make them compatible with the participants' situation as university graduates. For example, item "*Determine the steps to take if you are having academic trouble with an aspect of your chosen major*" has been changed to "*Determine the*

steps to take if you are having academic trouble with an aspect of your chosen occupation" (Bullock-Yowell et al., 2012).

The adaptation process of CDSE-SF followed Gudmundsson's (2009) steps in translating and adapting psychological instruments.

Rasch data analysis was carried out using the Winsteps Program (Linacre, 2021). Due to the nature of the response category being the same in one instrument, we used RSM as one of the measurement models (Andrich, 1978). RSM has a model in the form:

$$P(X_{ni} = k) = \frac{1}{\gamma_{ni}} exp\left(\sum_{t=0}^{k} \tau_{it} + k(\theta_n - \delta_i)\right)$$

Where P equals probability, n is person, k is category, i is the item, then ni is the normalizing factor. The delta (δ) parameter is the item location parameter, and the tau (τ) parameter is the threshold (Adams, Wu, & Wilson, 2012). The RSM developed by Andrich is called a version of PCM, which adds an expectation that explains that the response category has been defined and functions the same for each item in the instrument (Masters, 2010). RSM has advantages in testing large samples to measure parameters and allow empirical judgment in the response category on the Likert Scale (Fox & Bond, 2015).

The Rasch Model analysis carried out also tested other facilities contained in the Rasch Model. The facilities are a) Unidimensionality, to measure the single latent trait of measuring performance on items in the questionnaire (Brentani & Golia, 2007), b) Local Dependency is one of the assumptions to see if item 1 is related to other items. The condition is if the correlation of residual is zero. Local dependency will bias the measurement results and affect unidimensionality in the test (Baghaei, 2007); c) Analysis of per item Rasch model is done by looking at fit items by making infit, and outfit mean squares (MNSQ) the benchmarks. The expected logit value is 1.0, with values ranging from 0.5 to 1.5, which means the logit item value with a range outside the expected score was excluded (Linacre, 2021). PT-Measure also had some value to be observed in the instrument, as the negative value makes data not compatible with the latent trait, and it makes the item not work properly (Saggino et al., 2020); d) wright map to see the location of difficulty and person ability items (Hilaliyah et al., 2019); e) Rating scale diagnosis to see the well-functioning responses of the item for each category (Ciavolino, Carpita, & Al-Nasser, 2015); f) Reliability and separation indices to maintain the measurement from the defect (Ariffin, Omar, Isa, & Sharif, 2010); and g) DIF analysis to check if the measurement has a different response across the different population (Hagquist & Andrich, 2017).

RESULT AND DISCUSSION

Unidimentionality and Local Independence

The results of the Standardized Residual Variance from Winsteps showed that the raw variance explained by Rasch measures is 51,2%. The score is higher than 20%, so that it can be concluded that the CDSE-SF Indonesian Version is unidimensional (Chou & Wang, 2010).

Local Independence

To test local dependence (LD), we use Yen's Q3 statistics as the critical value to decide whether residual items are likely to correlate with each other. Based on Christensen et al. (2016), we use the minimum value of 0.3, whereas the value above 0.2 would appear to indicate LD.

Based on table 1, we can see that a positive correlation of 0.35, which exceeds the criteria with a critical value above 0.3 is item number 13 with the statement *"Mengganti pekerjaan jika Anda tidak menyukai pilihan pertama Anda"*. and item number 17 with the statement *"Mengganti pekerjaan jika Anda tidak puas dengan yang sudah Anda jalani"*. Both items have the same statement and contain the same meaning. Because it is suspected that it can confuse items, we decided on item 13, which has been modified for three reasons. The first reason is that item 13 contains a less clear statement. Second, because item 13 (MNSQ=1.19) has an outfit mnsq value closer to 1.5 compared to item 17 (MNSQ=1.17). Third, strong consideration is that we did not alter the original construct as previous researchers did.

Table 1. Standardized Residual Correlation of the Highest Correlation Item

Positive Value			Negative Value		
Correlation	Entry Number	Entry Number	Correlation	Entry Number	Entry Number
0,35	13	17	-0,24	7	17
0,23	19	20	-0,24	12	15
0,21	24	25	-0,22	5	15
0,21	5	6	-0,21	3	18
			-0,21	16	19
			-0,21	10	16

Item Measure, Fit Statistics, and Wright Map

Table 2 represents the statistical fit value from the Indonesian version of CDSE-SF, this value is the item difficulty value, and we can see that the MNSQ value of the CDSE-SF construct is in the range of 0.5-1.5. The logit measure value is in the range (-1.34 to 1.43). The greatest value is in item 13, with the statement. "Mengganti pekerjaan jika Anda tidak menyukai pilihan pertama Anda" and the item with the smallest value is in item 1 with the statement "Menggunakan Internet untuk mencari informasi tentang pekerjaan yang Anda minati"

Table 2.

Item	Measure	Infit MNSQ	Outfit MNSQ	PT-Measure
13	1,43	1,19	1,23	0,69
17	1,35	1,17	1,22	0,71
16	1,07	1,34	1,38	0,67
15	1,00	1,40	1,45	0,69
8	0,92	1,48	1,52	0,66
18	0,7	0,88	0,86	0,76
23	0,34	1,22	1,21	0,69
10	0,31	0,89	0,90	0,75
21	0,28	0,78	0,79	0,77
4	0,18	0,88	0,89	0,73
25	0,08	0,74	0,72	0,78
6	0,01	0,70	0,68	0,78
2	-0,02	0,79	0,79	0,75
24	-0,02	0,86	0,85	0,76
5	-0,08	0,87	0,87	0,72
9	-0,47	0,85	0,82	0,77
11	-0,48	0,99	0,96	0,71
14	-0,49	0,80	0,79	0,72
22	-0,51	0,97	0,98	0,71
7	-0,56	0,58	0,56	0,79
3	-0,66	1,03	1,03	0,7
12	-0,89	0,99	0,96	0,7
19	-0,9	1,02	0,99	0,69
20	-1,25	1,18	1,14	0,67
1	-1,34	1,23	1,27	0,6

In this study, the value of PT-measures in the Indonesian version of the CDSE-SF showed a positive correlation from 0.6 to 0.79. This means that all items function properly and correlate with their constructs.

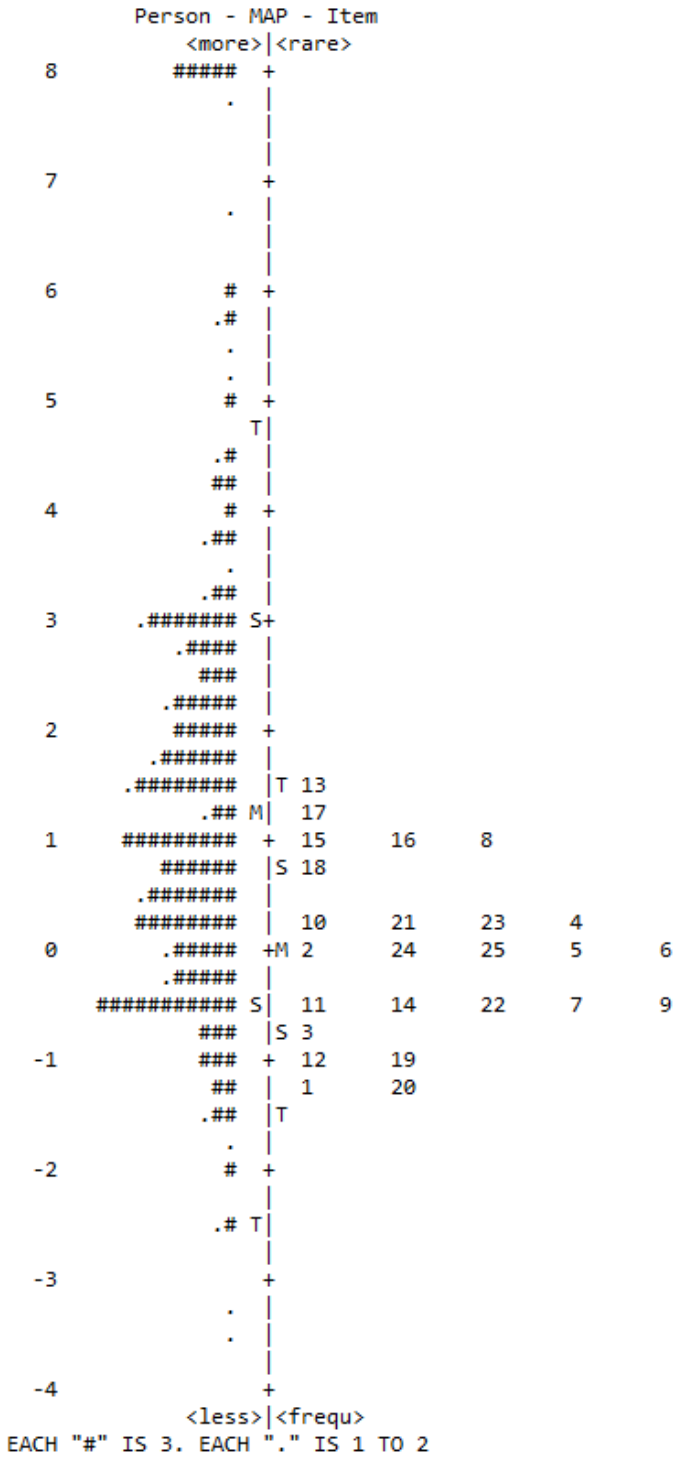

Figure 1. Wright Map

To view item parameters and person ability, the Wright Map is used to see the level of questions and persons on the same logit scale. In figure 1 the respondent average level was 1.52 logit (SD = 2.4) which was above the mean of item measure (mean = 0; SD = 0.76). It can be concluded that Indonesian Career Decision Self Efficacy

tends to be higher than the measurement of attitude

Rating Scale Diagnosis

Table 2. Rating Scale Diagnosis of CDSE-SF

Category	Threshold	Infit	Outfit
Strongly Disagree	None	1,29	1,43
Disagree	-3,52	1,12	1,15
Neither Agree or Disagree	-2,4	0,93	0,91
Agree	0,98	0,9	0,9
Strongly Agree	4,95	1,08	1,04

Table 3 shows that the threshold for CDSE-SF is steadily increasing. Individuals who do not have confidence in choosing their careers tend to choose a response of strongly disagree and disagree, while individuals who have confidence choose a response of strongly agree and agree. This indicates that the response of the CDSE-SF category is functioning well.

Reliability and Separation

Person separation is used to classify people because the sample is large and normally distributed, then we use G (Bond, Yan, & Heene, 2021) which is 4.28. Then the item separation is 7.47. This value shows that the person and item separation produces responses from several diverse groups. Then the reliability of the person is 0.95, with the item reliability being 0.98. A Cronbach alpha value (KR-20) of 0.96 means the excellent category (Taber, 2018).

Differential Item Functioning (DIF)

The Indonesian version of the CDSE-SF DIF results between gender (male vs female) was found to be quite satisfactory. When viewed from the Haenszel probability coat, items with a probability of <0.05 are detected by DIF. The items detected by DIF are item 1 (p: 0.027), item 16 (p: 0.005), item 18 (p: 0.032), and item 22 (p: 0.039). Then, we see the DIF contrast and found two items (item 1 and item 18) flagged as moderately DIF Items. Based on the literature, we made item improvements to maintain items affected by DIF (Shanmugam, 2018).

Discussion

Career decision-making self-efficacy is a powerful construct that has been used for a wide range of career development and intervention. Since its initial development, CDSE-SF is continuously updated and adapted in career fields. Many studies have been confirmed that CDSE-SF is a reliable measurement to assess the self-efficacy of career development.

Based on the CDSE-SE importance in career development intervention, the psychometric evaluation of Indonesian adaptation of CDSE-SF is done. A total of 391 university alumni who graduated in 2015-2020 have participated in this research. This study specifically investigated five psychometric characteristics using Rasch of CDSE-SF which has been adapted into the Indonesian version. First, we examined the dimensionality of measurement. Later, we investigate the item fit. Then, we tested the 5-Likert response category functioning. After that, we looked into the reliability of the instrument. Finally, we explore the differential item functioning across gender.

The findings of the first questions showed that CDSE-SF is unidimensional for a global scale. This result supports previous studies that adapted CDSE-SF into other languages (Miguel et al., 2013; Nam et al., 2011). Different from other psychometric evaluation research, Makransky (2015) suggested testing CDSE-SF dimensionality by each scale.

While in this research, the decision of dimensionality is made based on the raw variance explained, some research has done it in different ways. For instance, Makransky (2015) and Nam (2011) used formal tests to determine the percentage of tests that fall outside between -0.96 to 1.96 and make a decision that if the percentage is lower than 5% then the measurement is unidimensional.

Based on the local dependence analysis, it showed that item numbers 13 and 17 have a high positive correlation. These results are similar to Nam (2011) that in the Korean version of CDSE-SF, both items (and item 25) also have a positive correlation.

The second question was explained by item fit analysis that found the greatest value is in item 13, with the statement. "*Mengganti pekerjaan jika Anda tidak menyukai pilihan pertama Anda*/Change occupations if you did not like your first choice" and the item with the smallest value is in item 1 with the statement "*Menggunakan Internet untuk mencari informasi tentang pekerjaan yang Anda minati*/Use the Internet to find information about occupations that interest you". Those are different with initial CDSE that the most difficult item is "make a career decision and then not worry about whether it was right or wrong" while the least difficult is "talk with a person already employed in the field you are interested in" (Taylor & Betz, 1983).

Concerning the third research question of response category functioning, it is found that the response of the CDSE-SF category is functioning well. The finding is similar to past research that also found that the 5-Likert response is satisfied (Miguel et al., 2013; Nam et al., 2011)

The obtained results indicate that the reliability of the person is 0.95. While the reliability of the item is 0.98. The Cronbach alpha value using KR-20 is 0.96 which means in the excellent category. This result is slightly lower than CDSE-SF that was adapted into Portuguese (Miguel et al., 2013)

Finally, the last research question is explained by DIF analysis that showed CDSE-SF is no significant difference according to gender. This result is similar to initial studies that were described by Betz for CDSE 50-item (Taylor & Betz, 1983) and CDSE-25 items (Betz et al., 1996). This study also supports previous findings of CDSE-SF adaptation (Miguel et al., 2013; Nam et al., 2011).

CONCLUSION AND SUGGETION

The present study uses the Rasch measurement to explain that the CDSE-SF Indonesian version has obtained good reliability values. The result indicates that the set items of CDSE-SF which was adapted into the Indonesian context as a valid tool for measuring self-efficacy of career decision making. Hence, future researchers are recommended to use this measurement to analyze career decision self-efficacy with other variables that could be correlated in career development.

On the other hand, this study only investigated the evaluation of CDSE-SF with the sample who graduated in the special capital city of Jakarta. Therefore, future research needs to explore a similar analysis with the sample that has various cultural backgrounds in Indonesia. Further researches are also suggested to consider the technology used in relation to measurement administration.

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