



Reliability and Validity of RIASEC Holland's on Predicting Success Career for Vocational Students

Thamrin^{1*}, Giatman², Nuhasan Syah³

^{1*}Electronics Engineering, ^{2,3}Civil Engineering,

Faculty of Engineering, Universitas Negeri Padang

*Corresponding Author. Email: thamrin_elka@ft.unp.ac.id

Abstract: This study aims to test the reliability and construct validity of the Holland RIASEC instrument, which is a psychometric approach to examining human personality based on six domains, namely Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. This instrument is used to measure and recommend the type of work that suits students' personalities in the vocational field. This study uses a non-experimental method with a quantitative research approach and involved 178 vocational students at Universitas Negeri Padang. The data analysis techniques used are Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA). The results showed that the reliability of the six Indonesian version of Holland's personality was quite high, with Cronbach's alpha values between 0.601 and 0.699. In addition, there was a positive correlation between Holland's personality. Construct validity showed a fit model with a p-value of 0.26972 and RMSEA = 0.02. This indicates that the empirical data is in line with the RIASEC typology model, which is the theoretical concept.

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Introduction

Humans need education that is in line with the development of the times to face the challenges of life. Vocational education is one of the study options that offers skills needed by the labor market, especially in the industrial sector. However, facts show that vocational education is actually the cause of many educated unemployment in Indonesia (Flores et al., 2021; Sangalad, 2022; Tentama & Heryasa, 2022). The main factor that causes this is the mismatch between the chosen job and the personality of vocational education graduates. This situation is very detrimental and requires a solution from the government. The latest data shows that only 6.6% of educated workers in the field of engineering education in Indonesia and only 3.2% of them work according to their field of study, resulting in horizontal and vertical mismatch among vocational education graduates in Indonesia (Bozionelos et al., 2020a; Suharno et al., 2020).

Personality is a unique pattern of individual behavior in facing the dynamics of life, including in the work world (Bozionelos et al., 2020b; Suharno et al., 2020; Tanzilli et al., 2022; Tlili et al., 2023). Holland also reinforced the statement above with his research on the suitability of work and personality can improve performance and satisfaction. Holland found six types of personality and work environment: Realistic, Investigative, Artistic, Social, Entrepreneurial and Conventional (RIASEC) (Flores et al., 2021). Holland's Personality Type Theory states that career choices must match personality and in Holland's model, the

relationship between personality and environment is grouped more specifically (Bitetto et al., 2023).

According to Holland's RIASEC model, there are six different personality types that are relevant to different work environments. This model, which is shaped like a hexagon, can help individuals identify careers that match their personalities. Holland created a career selection test based on this model. However, when this model is used in Indonesia, there are language barriers that cause confusion for students and negative impacts on their career choices (Darni et al., 2020; Darni, Mursyida, Samala, et al., 2021)

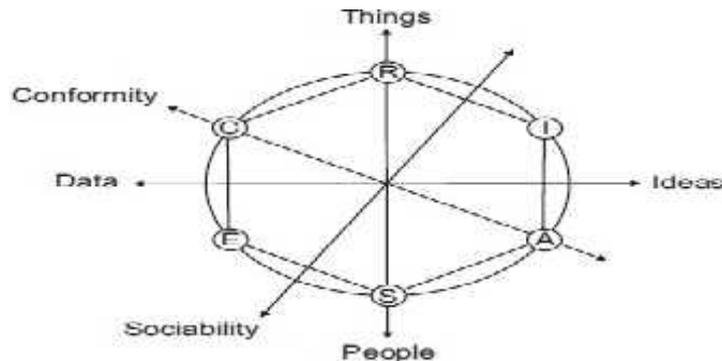


Figure 1. Hexagonal Pattern on Holland's Personality (Gottlieb et al., 2021)

In solving the linguistic problems in the adapted Holland personality instrument in Indonesia, the Holland RIASEC personality instrument in Indonesian was made with 106 questions, which require yes or no answers. Each Holland personality type has a different number of questions, namely: 18 questions for Realistic (R), Investigative (I), Artistic (A), Social (S), and Enterprising (E) types, and 16 questions for Conventional (C) type. The questions can be seen in Table 1.

Table 1. RIASEC Holland Questions

No.	Personality Type	Number of Questions
1	Realistic (R)	18
2	Investigative (I)	18
3	Artistic (A)	18
4	Social (S)	18
5	Enterprising (E)	18
6	Conventional (C)	16

Validity and reliability are important in research measurement, as they ensure that measurements are connected to the construct being measured. The reliability measure determines the consistency of test scores and their susceptibility to external factors. The reliability coefficient, denoted by the letter r , ranges from 0.00 to 1.00, with higher values indicating greater reliability and consistency. However, tests are not completely reliable, so $r = 1.00$ is an impossible score to achieve (Moafian et al., 2019)

Validity is crucial when testing and deciding to use an assessment tool. It refers to the accuracy and precision of a measurement tool in performing its function. A test has high validity if it provides accurate and precise results in accordance with its purpose. Reliability focuses on consistency, while validity assesses usefulness (Eddy et al., 2020). Validity evidence states that conclusions and predictions are categorized through test results, with various types of validity examined in detail. All evidence can establish the level of test usefulness with certain individuals and situations.

Content validity relates to the extent to which a scale accurately represents a construct. The evaluation results of the experts on the implementation of the RIASEC

Holland instrument in certain fields of study have an extraordinary impact. This is influenced by the accuracy of the scale items and their relationship with key concepts, which are important actors in a Holland personality instrument. In this study, content validity was evaluated by seven psychologists. According to these experts, the RIASEC scale is widely used in Indonesia for career planning and provides accurate guidance for individual career development. Holland's theory of career choice, which proposes six basic personalities to consider when matching the psychological and career situation of an individual, this instrument is widely recognized and used because of its simple explanation, can be empirically evaluated, easy to use, and the results are easy to understand. The most appropriate instrument to evaluate with the RIASEC type is Self-Direct-Search - SDS. Holland's six basic personalities are: Realistic, Investigative, Artistic, Social, Entrepreneurial, and Conventional.

Table 2. Further details about Holland's six basic personalities

Personality Type	Characteristics	Relevant Occupations	Relevant Courses
Artistic	Tends to avoid conventional and interpersonal situations	Pilot, farmer, horticulturist, builder, engineer, military personnel, mechanic, and others	English, Mathematics, Science, Workshop, Technology, Computer, and others
Investigative	More oriented towards concepts and theories	Scientist, researcher, chemist, forestry technician, and others	English, Mathematics, Science, Computer, Technology, and others
Artistic	Oriented towards imaginative and abstract matters	Artist, illustrator, photographer, songwriter, actor, and others	English, Social Sciences, Music, Drama, Arts, Computer, and others
Social	Possesses good verbal ability and interpersonal skills	Teacher, nurse, police officer, social worker, and others	English, Social Sciences, Mathematics, Science, Health, and others
Enterprising	Uses verbal skills to lead and influence others	Salesperson, lawyer, executive, travel agent, and others	English, Mathematics, Business Studies, Accounting, Economics, and others
Conventional	Prefers structured activities	Secretary, receptionist, bank teller, computer operator, and others	English, Mathematics, Business Studies, Accounting, Computer, and others

Content validity is related to the extent to which a scale accurately represents the proposed construct (Moafian et al., 2019; Roebianto et al., 2023). The evaluation results of the experts on the application of the RIASEC Holland instrument in certain fields of study have an extraordinary impact. This is influenced by the accuracy of the scale items and their relationship with key concepts, which are important actors in a Holland personality instrument. In this study, content validity was evaluated by seven psychologists. According to these experts, the RIASEC scale is widely used in Indonesia for career planning and provides accurate guidance for individual career development. Holland's theory of career choice,

which proposes six basic personalities to consider when matching an individual's psychological state and career, is widely recognized for its straightforward explanation, empirical evaluability, ease of use, and easy-to-understand results. The most appropriate instrument recommended for evaluation with the RIASEC type is the Self-Directed-Search (SDS). Holland's six basic personalities are: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Table 2 shows further details about Holland's six basic personalities.

Every individual has two different but overlapping personalities. This can be used to improve their work performance in the workplace. In addition, the overlap of these two different personalities can also be shown by the factor analysis results, by looking at the magnitude of the correlation coefficient between the two pairs of personality dimensions. The correlation coefficient is a value that indicates the strength or weakness of the linear relationship between two variables. This can be seen in the correlation coefficient between the letter pair R and I = 0.84 with a standard error of 0.07. The value of 0.84 indicates a strong linear relationship between the personality dimensions R and I. (Darni et al., 2020; Darni, Mursyida, & Samala, 2021; Darni & Mursyida, 2022) The personality correlation model is shown in Figure 2.

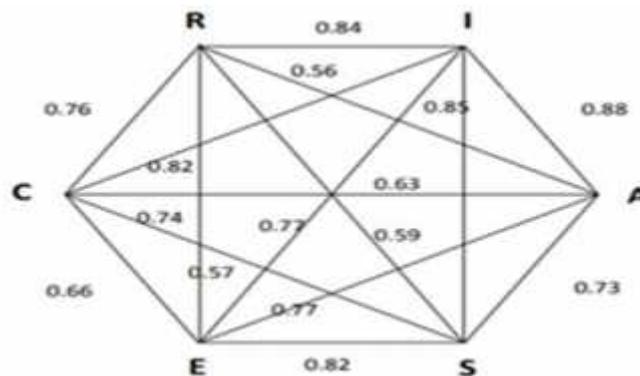


Figure 2. The Pattern and Correlation Value of The Hexagonal RIASEC Holland.

The SDS instrument has been translated into 25 languages and used by over 22 million people worldwide. Holland's theory of career choice proposes six basic personalities and has broad empirical support (Lerche et al., 2023; Rasheed et al., 2023; Robert & Brown, 2004). However, when adopted in Indonesia, linguistic inconsistency problems have resulted in misunderstandings for students. Research in various countries has shown the validity and reliability of Holland's instrument, but cultural contextual factors may affect its applicability (Amukune et al., 2023; Fekih-Romdhane et al., 2023). This study aims to re-measure the validity and reliability of Holland's career interest instrument in Indonesia.

Research Method

This study uses a non-experimental method with quantitative research approach to collect data using a linguistically modified Holland personality instrument. The instrument was distributed online system to 3 study programs at Universitas Negeri Padang. Data from the results of the instrument were analyzed using Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA). The participants of this study were 178 final semester students from 3 different study programs at Universitas Negeri Padang. The research instrument used a linguistically modified Holland personality instrument to make it easy for users in Indonesia to understand. The instrument consisted of 106 questions, each requiring a yes or no answer.

In this data collection process, it was done online by distributing the career choice website link to 178 students who were in three different study programs, namely Informatics, Informatics Engineering Education and Remote Sensing Technology. Next, students are asked to register and fill in their personal data, then log in and answer the career choice instrument that contains 106 questions about themselves. During the filling of the instrument there is no time limit, students are asked to answer honestly because it will affect the results of their career analysis.

The data analysis process in this research consists of several stages. The first stage is to perform construct validation using Confirmatory Factor Analysis (CFA) (Sangalad, 2022; Van Roy et al., 2008). In CFA, there are assumptions about the data structure, called the measurement model (Goretzko et al., 2023; Schamberger et al., 2023) at will be tested for its validity based on empirical data, called construct testing (Baharum et al., 2023; Mahfud et al., 2023). The construct testing will show whether each item in the scale matches the component being measured, which contains each dimension of the measurement instrument being studied. Data from the results of the construct testing are then used as hypotheses in CFA. The basic logic of CFA is as follows:

- 1) To verify the hypothesis: whether one specific construct is measured by all items. The purpose of this initial stage is that a model can be considered to match the data (S) if there is no discrepancy (residue) between the data and the theory (). In this situation, is the matrix of correlations among items based on H0, while S is the matrix of correlations among items derived from observation. If there is a notable difference between data and theory, then a model is considered to mismatch the data. The null hypothesis that states “there is no difference between matrix and matrix S” is then examined with chi-square. If chi-square is not significant or $p > 0.05$, then the null hypothesis is “not rejected”. This implies that the unidimensional theory can be accepted, where only one factor is measured by its items. (Nurmalasari, 2019).
- 2) The author evaluates the items to see how well they measure the intended construct. The author uses these criteria to determine the validity of the items in CFA: a). Check the significance of the item for the construct. The item is significant if $t > 1.96$, otherwise it is not. b). Check the sign of the factor loading coefficient of the item. The item should have a positive coefficient if it is scored favorably (on a Likert scale of 1-4), and a negative coefficient if it is scored unfavorably. If the sign does not match the scoring, the item is not valid. c). Check the correlation of measurement errors of the item. The item is not good and should be removed if it has too many correlated errors. This means that the item measures something else besides the intended construct. (Nurmalasari, 2019).

Results and Discussion

1. Internal Consistency Reliability Results

Cronbach’s alpha was calculated for each of the six RIASEC Holland Personality types in Indonesian, based on 178 students from Padang State University. Cronbach’s alpha values are presented in Table 3.

Table 3. The result of calculating the Cronbach's alpha coefficient.

RIASEC	Cronbach's alpha
Artistic (A)	. 621
Conventional (C)	. 669
Enterprising (E)	. 699
Investigative (I)	. 628

Realistic (R)	. 601
Social (S)	. 600

2. The results of the comparison of RIASEC Holland scores in Indonesian version among study programs.

Table 4 shows how the RIASEC scores of students in the Informatics, Informatics Engineering Education, and Remote Sensing Study Programs compare in the first semester. The frequency of Holland's personality based on these scores is as follows:

Table 4. Comparison of student's Holland Personalities frequencies

Majors	Realistic (R)	Investigative (I)	Artistic (A)	Social (S)	Enterprising (E)	Conventional (C)
Remote Sensing Technology	56%	63%	70%	74%	66%	61%
Informatics	61%	63%	58%	71%	61%	62%
Informatics Engineering Education	64%	65%	80%	76%	68%	73%

The table shows the comparison of RIASEC Holland scores among three study programs. There is variation in personality preferences among the programs. For instance, the Informatics Engineering Education program has the highest score in the Artistic (A) personality 80%, while the Informatics program has the highest score in the Social (S) personality 71%. The Remote Sensing Technology program has the highest score in the Investigative (S) personality 74%.

3. The Results of Factor Analysis Using Structural Equation Modeling (SEM)

Factor analysis provides construct validity evidence for the Indonesian version of Holland's RIASEC. This is also the final verification that the 106 items tested represent Holland's RIASEC interest areas. The varimax procedure was used to rotate the principal component analysis with a six-factor solution. Figure 3

Realistic		Investigative		Artistic		Social		Enterprising	
Item	Load	Item	Load	Item	Load	Item	Load	Item	Load
q3_R	.519	q13_I	.698	q1_A	.655	q5_S	.648	q9_E	.443
q8_R	.537	q16_I	.606	q4_A	.725	q6_S	.611	q11_E	.523
q10_R	.762	q18_I	.603	q14_A	.652	q7_S	.574	q20_E	.644
q15_R	.591	q19_I	.672	q17_A	.735	q22_S	.668	q21_E	.518
q26_R	.573	q25_I	.505	q32_A	.609	q23_S	.541	q30_E	.571
q31_R	.642	q29_I	.460	q33_A	.581	q28_S	.566	q34_E	.518
q36_R	.608	q13_I	.198	q35_A	.593	q16_S	.199	q11_E	.582
q37_R	.663	q44_I	.462	q40_A	.659	q59_S	.561	q51_E	.575
q42_R	.540	q18_I	.720	q17_A	.131	q62_S	.565	q53_E	.568
q45_R	.591	q50_I	.621	q49_A	.635	q63_S	.670	q55_E	.606
q51_R	.567	q52_I	.539	q58_A	.615	q61_S	.669	q61_E	.507
q65_R	.768	q60_I	.578	q68_A	.690	q67_S	.515	q69_E	.487
q82_R	.813	q66_I	.709	q80_A	.728	q72_S	.488	q74_E	.667
q85_R	.558	q73_I	.478	q81_A	.723	q78_S	.488	q75_E	.467
q96_R	.484	q76_I	.445	q90_A	.563	q84_S	.666	q89_E	.520
q99_R	.697	q77_I	.485	q91_A	.643	q88_S	.503	q95_E	.516
q100_R	.721	q93_I	.551	q102_A	.720	q94_S	.582	q97_E	.442
q101_R	.590	q98_I	.617	q105_A	.695	q104_S	.564	q106_E	.636

Figure 3. The Varimax Procedure using Structural Equation Modeling (SEM).

The purpose of this stage is to validate the Holland personality instrument. Construct validity is a kind of logical internal validity of an instrument that indicates how well the instrument reflects a theoretical trait or construct that it aims to measure. The theoretical trait or construct that needs validation is Holland's 6 personality types that are related to certain jobs. This construct validation process uses factor analysis. The factor analysis model applies Structural Equation Modeling (SEM) on this personality type as shown in Figure 4.

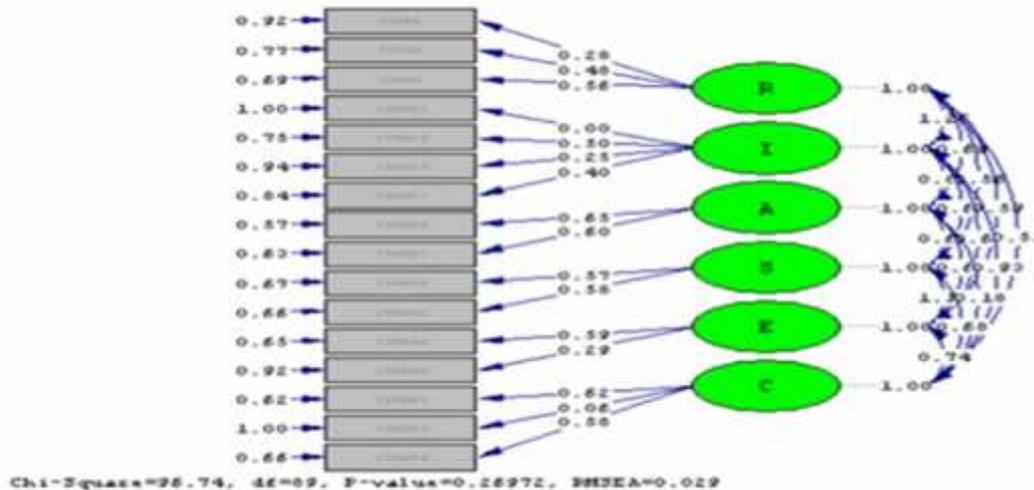


Figure 4. RIASEC Holland's using Structural Equation Modeling (SEM)

Discussion

In traversing several elements of life, personality represents a distinctive behavioral pattern that includes difficulties, teamwork, tension, unease, and decision-making (Darni et al., 2020; Darni, Mursyida, & Samala, 2021). Personal achievement and professional performance are substantially influenced by the fit between one's personality and chosen profession (Yuliasari, 2021). The Holland personality instrument has, however, mainly been used in Western contexts. It frequently results in linguistic anomalies and student misunderstandings when Indonesia is introduced. As a result, adaptations are essential to satisfy regional needs. Using confirmatory factor analysis and Cronbach's alpha, this study evaluates the reliability and validity of the career selection evaluation within the context of engineering education. Three results of RIASEC Holland's measurements were obtained for three study programs, namely: Informatics Engineering (Social: 71%), Informatics Engineering Education (Artistic: 80%), and Remote Sensing Technology (Social: 74%).

The study reveals significant Cronbach's alpha values, ranging from 0.601 to 0.699, indicating reliability. Intercorrelations within Holland's Personality traits are positively established. The positive intercorrelations are as follows: R correlates positively with (I, A, C, E), but weakly with S; A displays positive correlations with (I, R, E, S), weakly with C; C exhibits positive correlations with (I, R, S, E), weakly with A; S correlates positively with (A, I, E, C), weakly with R; E displays positive correlations with (S, A, I, C), weakly with R; I correlates positively with (R, A, S, C), weakly with E. Additionally, the factor analysis on Holland's personality typology validates, supported by $p = 0.26972$ and $RMSEA = 0.02$, indicating model fitness (p value > 0.05 and $RMSEA < 0.05$). This underscores empirical alignment with the RIASEC typology. The hexagonal RIASEC model's factor analysis confirms strong correlations among adjacent types, compared to opposing types. All positive correlations within this typology denote moderate variables, illuminating distinctions and congruencies among personality types.



The results reveal pairwise congruence between moderate personality types: R and I (0.84), indicating alignment between Realistic and Investigative types. These types share a preference for practical engagement, less influenced by social environments, often choosing fields like laboratory work, science, and mechanics. Another match exists between E and S (0.82), signifying suitability for Enterprising and Social types, marked by strong verbal skills and influential abilities. Relevant professions include social workers, educators, lawyers, and tour guides. Similarly, a congruence emerges between I and A (0.88), fitting Investigative and Artistic types. These share a depth in artistic expression and creative prowess, apt for roles like architects and decorators. A matching tendency surfaces between C and R (0.76), favoring Conventional and Realistic types. These individuals possess aligned verbal and structured abilities, excelling in organized communication. Professions such as secretaries, reporters, and bank employees suit this combined personality composition.

Aside from moderate pairwise congruence, minor pairwise congruence is also observed, where certain similarities exist but lack a prominent tendency among them. This depicts the Holland RIASEC hexagon with opposing congruence and lower correlation compared to moderate congruence. Among these minor congruences, R and E (0.57) share a single trait – verbal skills. Another minor congruence emerges between R and S (0.59), centered on verbal skills. Additionally, other minor congruences include C and I (0.56) and C and A (0.63). The moderate pairwise congruence mentioned significantly impacts work performance; individuals with moderate congruence tend to achieve more and experience higher job satisfaction compared to those with minor congruence.

Conclusion

A confirmatory factor analysis method and Cronbach's alpha were used to validate and show the reliability of the linguistically created Holland's measuring instrument. The six Holland personality types have a sufficiently high Cronbach's alpha, ranging from 0.601 to 0.699, according to the reliability prediction of the Indonesian version. RIASEC The six personality types were linked to six factors by Holland's factor analysis. A closer look at the constructs revealed that the variables have a clear connection to the item's aims, and the Holland Personality factor intercorrelations showed a positive correlation. With $p = 0.26972$ and $RMSEA = 0,02$ the factor analysis results show that this model fits data well. Following are examples of the dominant personality types found in each study program tested: Information engineering education is social (71%), artistic (80%), and remote sensing technology (74%).

Recommendation

Applying this instrument to a sample of students who have completed the relevant field of study and determining whether or not the results are consistent are some potential proposals for future research. To confirm that the HOLLAND instrument is in line with similar testing tools, additional criteria are also necessary. For example, the RMIB interest test or other tests for profession selection. If possible, participants' performance is also evaluated in relation to their interests. The HOLLAND instrument should be interoperable with other similar instruments, and future research should evaluate it using students who have completed the field of study.

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