Expert System Model of the Entrepreneurship Personality Test

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Abstract: This research describes how to build an adaptive and integrated personality assessment model capable of directing themselves in the spirit of a career in accordance with their own personality. Web-developed assessment with expert system model. This research is condoned to assist vocational high school students in determining their career choices in accordance with their own personality especially in the field of entrepreneurship, and decreasing unemployment rates coming from vocational high schools. This research is a research and development method with four stages model (4D). The object of this research is the vocational students who have taken entrepreneurship subject. The sample used is 300 students and the data analysis uses confirmatory factor analysis (CFA) with SEM model (Structural Equation Modelling). Based on the results of the data analysis we obtained a valid constraint in determining the entrepreneurship personality that is Persuader, Creative, Risk Taker, Leader, and Ambitious. Further, the next step is designing a web based entrepreneurial personality test application using expert system model. The results of this personality test generated a career recommendation of students in accordance with the personality of entrepreneurship they have.

Keywords: Personality; Entrepreneurship; Expert System; Structural Equation Modelling; Confirmatory Factor Analysis.

1. Introduction

Entrepreneurship is an attitude, character and ability of a person to realize innovative ideas into the real world creatively to face the challenges of life. The role of entrepreneurship in a developing country cannot be ignored, they become the main driving force in accelerating the pace of a country's economy. Progress of a country through entrepreneurship has been proven by some developed countries such as America, Japan and including our neighbouring countries are still cognate, namely Singapore and Malaysia.

The growth of entrepreneurs in America to date is 12%, then Japan 10% of its population as entrepreneurs, and more than 240 small, medium and large Japanese companies are in Indonesia. The high spirit and entrepreneurial spirit that is owned by the Japanese state, making them as the richest country and dominate the market in Asia. Singapore with an area of 697 km2 and the population until 2016 was recorded as many as 781,728 people, has 7.2% entrepreneur. Malaysia has more than 3% of entrepreneurs, while Indonesia with an area of 1,904,569 km2 and population up to 2016 recorded as many as 258,316,051 people, only has 0.18% entrepreneur [1]. According to David McClelland that a country can be said to prosper if it has at least 2 percent of entrepreneurs, so we can conclude that if Indonesia wants to be a prosperous country it must have 5,166,321 entrepreneurs [2].

Government and educational institutions are also aware of the important role of entrepreneurship. Several efforts have been made to instil and foster entrepreneurship spirit of students. Among the efforts that have been done are as follows: 1) Establishment of Campus Entrepreneurship Center such as BSI Entrepreneurship Center (BEC), Incubator Center ITB Business, Student Welfare Cooperative (KOKESMA) ITB, Community Business and Entrepreneurship Development (CDED) at STMB Telkom, Binus Entrepreneurship Center (BEC) in Binus. Through campus entrepreneurship center many activities are conducted such as seminars, talk shows, short courses, workshops, workshop,
business practices, business cooperation, Entrepreneurship Expo, and Entrepreneurship Challenge. 2) Entrepreneurship Priority by making entrepreneurship courses into important courses that need to be given to the students. 3) Development of Entrepreneurship Student Program (PMW). This program is initiated by Dikti to increase student entrepreneurship interest by giving fund allocation to students whose entrepreneurial plan they are chosen by diki. 4) Independent Entrepreneur Program for Students. this program is funded by PT Bank Mandiri Tbk to provide financial assistance to students who want entrepreneurship. 5) Program for Increasing the Competence of Labor and Productivity for Students. 6) Business Capital Giving Program for students.

Entrepreneurship education and entrepreneurship programs provided by government and high school to college are basically aimed at educating students or students to choose a job as an entrepreneur, as well as to give birth to a society that has the character and attitude of entrepreneurship such as innovative, creative, taking into account risks (wise in taking risk), confident, industrious, and have high self-esteem despite whatever field they are in.

In line with the above, the National Education System Act (UUSPN) no. 20 of 2003 article 3 also states that national education function to develop the ability and form the character and civilization of a dignified nation in order to educate the nation's life, aims to the development of potential learners in order to become human beings who believe and pious to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen.

Government programs, colleges and vocational schools in developing entrepreneurship souls have been good enough. But the objectives of the government and the national education system in directing students for career in the field of entrepreneurship are still not achieved, besides the goal to make people who have a noble character, healthy, knowledgeable, competent, creative, independent, and being a democratic and responsible citizen is also still not achieved. This we can prove based on data from Central of Statistics 2017 highest open unemployment rate at vocational education level of 9.84%. That number increased by 0.79% compared to 2016.

Based on the data and statements above found various problems that hinder the development of entrepreneurship in Vocational High School. They are: 1) lack of vocational career guidance in schools (specialized in the field of entrepreneurship), 2) lack of personality tests to determine the career of students, 3) the high cost required to conduct entrepreneurship personality tests, 4) the limited psychological institutions especially in West Sumatra. Based on the above descriptions, smart solutions are required to reduce unemployment rates in vocational high schools by developing a model of personality tests capable of directing the choice of vocational high school students according to their personalities. This research focuses on career choice in entrepreneurship, the goal is that vocational high school students are not looking for work, but creating and providing their own job.

2. Literature Review

2.1. Personality

Personality is a characteristic, a mindset, a feeling, and a passion that makes a person unique [3]. There are many models available for entrepreneurship personality assessment such as Myers Briggs Type Indicator (MBTI) [4], DISC Assessment [5], Strength Finder [6], Big Five Personality Traits [7], Holland RIASEC [8] etc.

Myers Briggs Type Indicator (MBTI): It has been a widely known and accepted personality assessment test around the globe since last 55 years. This test is based upon Carl Jung Typology theory and describes human personality in four fundamental dimensions as extroversion/introversion, sensing/intuition, thinking/feeling, and judging/perceiving [4]. The test categorizes the human personality type in one of the popular sixteen categories that further exemplify human personality with reference to its basic nature and preferences. Since the test is descriptive and analytic in nature that is why one needs to be very good at analytical interpretation and psycho-analytic profiling.

DISC, it is a simple, applied and more intuitive personality assessment test, introduced way back in 1928. DISC performs behavioural assessment keeping four principal and key behaviours as benchmark which includes: Dominance, Influence, Stability and Compatibility. DISC explicitly concentrates on behavioural preferences that’s why it’s more applied, explanatory and comprehensible as compared to MBTI [9].
Strength Finder: Gallup in 2001 introduced this new personality assessment technique [8]. Strength finder technique revolves around 34 basic talents (strength) themes that encompass a human’s personality and invites people to reveal their strength and use it in order to be more successful and productive in life. The test is more related to Positive psychology undertaken for personality assessment. The strength finder test is more restrictive on a proactive strategy, in contrast with MBTI and DISC [7]. It lacks the intuitive model that team members can be moved [7, 8]. It seems difficult to remember 34 strengths where relationship among them is not clearly described. It also does not explicitly specify top weaknesses, either individuals or teams.

According to John Holland 1973, individuals are attracted to a certain career because of their personality and the various variables that lie behind it [9]. Career choices are expressions with identification of certain occupational stereotypes. The logic between self and perception of an occupation and the acceptance or birth of the main determinants of career choice. The harmony between one's view of himself and his preferred occupation forms a "personal style capital". Central to Holland's theory is the concept that the individual chooses a career to satisfy his personal pleasure orientation. If the individual has developed a dominant orientation, then it is more likely to gain satisfaction in the appropriate occupational environment. However, if he has not been able to make a choice, then the likelihood of getting that satisfaction will be lost [9]. The personal pleasure orientation supported by the appropriate work environment will determine the lifestyle choices of individuals. In the career decision-making process, Holland assumes that the level of achievement in a career is determined primarily by individual self-evaluations. Intelligence is seen as less important than personality and interests.

2.2. Expert System

In general, the expert system is a system that seeks to adopt human knowledge into computers designed to model the ability to resolve problems like an expert. With this expert system, ordinary people can solve the problem or just seek quality information that can only be obtained with the help of experts in their field. This expert system can also help the activities of experts as experienced assistants and have the required knowledge.

In general, expert system is a system that seeks to adopt human knowledge to the computer, so that the computer can solve problems as commonly used by experts. Along with the opinion [10], expert system is a system that uses human knowledge entered into the computer to solve problems that are usually solved by the expert. From the expert's opinion, we can draw the conclusion that the understanding of the expert system is a system that is incorporated into the computer, so that the computer can solve problems such as experts.

3. Material & Methodology

3.1. Data

The object of this research is the vocational students who have taken entrepreneurship subject, the sample used is 300 samples. The data analysis uses confirmatory factor analysis (CFA) with SEM model (Structural Equation Modelling), based on the results of the analysis conducted data obtained a valid constraint in determining the entrepreneurship personality that is Persuader, Creative, Risk Taker, Leader, Ambitious then designed a web based entrepreneurial personality test application using expert system model. From the results of this personality test generated a career recommendation of students in accordance with the personality of entrepreneurship it has.

3.2 Method

Procedure development is the exposure of the procedures taken in making the product. The development procedure is different from the development model in exposing the product design components developed. In the development procedure contains an explanation of the properties of the components at each step of the discussion. In accordance with the methods of development that have been mentioned, the following explanation of development procedures 4-D personality traits entrepreneurship (Figure 1).
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1. Defining Stage
   The purpose of this stage is to define the needs in developing an entrepreneurship personality test model. Activities in this stage are initial and final analysis, object analysis, conceptual analysis and indicator analysis and objective formulation.

2. Design
   Design is the second stage in the development of entrepreneurship personality test model, where the design phase includes:
   a. Constraint assignment. The constituent is a certain type of concept that is in a higher level of abstraction of the concept and is created for certain theoretical purposes. The constancy in this research is entrepreneurship personality derived from personality theory and entrepreneurship.
   b. Operational Concepts (Behavioural Indicators). The behavioural indicator is a description of the dimension that has provided a fairly clear picture of the attitudes and behaviours of the dimension. This indicator is very necessary later to design the question items to be given to the respondent.
   c. Scaling. Scaling is an attempt to develop measurement instruments against individual judgments.
   d. Blue print. Blue print is a basic guide in developing a measuring tool, the blue print will be the direction of writing rather the measurement items do not run from the expected destination.

3. Develop
   Develop stage is the third stage in four-D model, where this stage aims to validate and test the product that has been developed, at this stage of development there are 2 steps that need to be done are: Expert appraisal is a technique to validate or assess the feasibility of product design. This activity is evaluated by experts in the field of psychometry. The suggestions provided are used to improve the material and the design of the test that has been prepared. After the design is revised, the next stage is Developmental testing.
   Developmental testing is a product design experiment on a real object (respondent). At the time of this trial sought response data, reactions or comments from the target user model. Problems with the Testing Developmental testing will be brought to the FGD meeting with competent experts in the field. The result of the FGD will be revised to 2 and then re-tested on the respondent, and if there is still a deficiency it will be revised to 3. After the product is repaired then tested again to obtain the results in accordance with the initial goal.

4. Disseminate
   The dissemination stage is the last stage of the four-D model which in this stage includes three activities: validation testing, packaging, diffusion and adoption. At the validation testing stage, the revised product at the development stage is then implemented on the actual target. At the time of implementation measurable measurement of achievement goals.

Figure 1. Main Flow of Thiagarajan, Semmel & Semmel Development Model.
3.3 Personality type

The types of personality according to Holland are the result of the interaction of innate and environmental factors and this interaction leads to preferences for specific types of activities, which lead individuals to certain types of behaviours. In Table 1, there is a personality code, personality type and the characteristics of each personality type.

<table>
<thead>
<tr>
<th>Personality Code</th>
<th>Personality of Entrepreneurship</th>
<th>Characteristic features</th>
</tr>
</thead>
<tbody>
<tr>
<td>K01</td>
<td>Ambitious</td>
<td>Always willing to work hard, smart and sometimes lici, clever use of time and others to pleasure and achieve his own goals. If working in teams he wants to always highlight his ideas. He wants others to admit that his idea is better than anyone else. He will try to get his idea. An ambitious person is also usually thirsty for praise.</td>
</tr>
<tr>
<td>K02</td>
<td>Risk Taker</td>
<td>Always willing to work hard, smart and sometimes lici, good at making use of the time. This type really likes a challenge, they often choose challenges from moderate to severe (risky), something that triggers their adrenaline is a happiness and pleasure for them. A challenging adventure they love. They have a strong belief in something, when in making decisions they calculate carefully in accompanied with complete data and information. This type also has a high sense of responsibility for the task or work in carrying out.</td>
</tr>
<tr>
<td>K03</td>
<td>Persuader</td>
<td>The type of persuaders often think about what is happening right now, looking for the best in life, wanting to share with their friends. They are open in various situations, can improvise to achieve the desired result. They are active people who want to solve their problems rather than just discuss them. They are the most adept at influencing others. Promoting is art for him. They are a man of action. They know all the important people and everything that needs to be done because they are very clever, always knowing where the fun and action. They like to indulge in better things in life and to bring others with them. Their purpose in life is to sell their potential and ideas to others. They easily gain the trust of others.</td>
</tr>
<tr>
<td>K04</td>
<td>Leader</td>
<td>These types have a far-sighted vision, they plan something not just for today, they plan for the long term. They have good speech skills, with the ability to speak that has them able to control others to do the work without having to force and rule. Those with this type are more likely to be examples. They</td>
</tr>
</tbody>
</table>
3.4 Construct Validity

Construct Validation is the validity that challenges the extent to which test items are able to measure what is really being measured in accordance with a specific concept or defined conceptual definition. In the assessment of personality of entrepreneurship, the measured constants are Persuader, Creative, Risk Taker, Leader and Ambitious, from validity test result by using CFA analysis (Confirmatory Factor Analysis) found a close relationship of each of the collisions with Personality entrepreneurship, strong relationship between one contract and another contract. But, there is no relationship between each of the collisions with Ambitious as depicted in Figure 2.

![CFA Personality Entrepreneurship construct of SEM Model](image)

**Figure 2. CFA Personality Entrepreneurship construct of SEM Model**
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The latent variable (factor) is Entrepreneurship Personality (kep), while the indicators to be tested are Persuader (Per), Creative (Kre), Risk Taker (Ris), Leader (lea), and Ambitious (amb). Tests conducted can be seen in Table 2.

### Table 2. Goodness of Fit Index Statistic SEM

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria</th>
<th>Cut Of Value</th>
<th>Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$X^2$ (Chi Square)</td>
<td>$\leq 207.53$</td>
<td>1101.84</td>
<td>Fit</td>
</tr>
<tr>
<td>2</td>
<td>TLI</td>
<td>$\geq 0.09$</td>
<td>0.64</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>3</td>
<td>GFI</td>
<td>$\geq 0.09$</td>
<td>0.76</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>3</td>
<td>CFI</td>
<td>$\geq 0.09$</td>
<td>0.69</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>4</td>
<td>NFI</td>
<td>$\geq 0.09$</td>
<td>0.61</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>5</td>
<td>RMSEA</td>
<td>$\leq 0.08$</td>
<td>0.01</td>
<td>Fit</td>
</tr>
<tr>
<td>6</td>
<td>SRMR</td>
<td>$\leq 0.05$</td>
<td>0.01</td>
<td>Fit</td>
</tr>
</tbody>
</table>

3. Results and Discussion

Students must fill in the participants' data (Figure 3). After charging, then click the save button, then the data will be stored in the database. After registering, the thing done is getting approval from the admin in order to do the next process.

![Registration User](https://www.estech.org)

**Figure 3. Registration User**

Entrepreneurship Personality Test form is a form that contains the question of personality traits Entrepreneurship. Before answering the question of Entrepreneurship personality tests, participants are required to fill in the code of participants who have been obtained after the first registration. After the participant code is filled then, will appear the name of participants, gender, selected courses and photos of test participants. In this talent test form is raised the questions that have led to assess the talents of participants towards Entrepreneurship. The answer to the question given in the form of Likert scale have the weight of each answer. The right answer according to the personality of Entrepreneurship will get a high score.
Before the entrepreneurship talent test came up, the participants first clicked the list of choice questions. Problems that have been answered will change color from red to green, so participants can know how many questions have been answered and that have not been answered. If the participants have finished working on the matter then, the participants can click the end of the work button until the participants can know the score and description of the test results that have been done as shown in Figure 4.

![Computer based test for entrepreneurship personality CBT-EP](image)

**Figure 4.** Entrepreneurship Personality Test Form

4. Conclusion

In this study, researchers have succeeded in determining the most influential indicators in determining the entrepreneurial personality of Risk Taker, Persuader, Ambitious, Leader, Creative based on John L. Holland's career guidance theory. Based on the indicators of entrepreneurship personality that has been found then the expert system model was designed to create a model computer-based entrepreneurship personality test using expert system model with Forward Chaining technique.

References


