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Assessing the emerging agribusiness entrepreneurs by using brainwave technology

Assessing the emerging agribusiness entrepreneurs by using brainwave technology

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Abstract. Individual attributes positively influence the success of entrepreneurs, so that it is important to be learnt by potential youths' entrepreneurs by providing mentor from relevant business. To address this, we introduce Electroencephalography (EEG) or brainwave to investigate the attention and meditation level of students in entrepreneur skill and to develop an original approach to entrepreneurship learning about innovation. We constructed an integrated system of EEG brainwave in which each participant could be engaged in a virtual product design activity. The participant's creative behavior, brainwave state, and the level of creativity of their virtual product observed and recorded simultaneously to understand the creative process and their creative product were evaluated afterwards. The experiment involved 20 students of agribusiness study program from different semesters. The result of the students' exam was compared to their level of attention and meditation, then analyzed. The experiment showed that "attention" was more dominated to keep the brainwave technology work rather than to explore many entrepreneur paths explained by the teacher. Further investigation showed the difference of entrepreneur thinking's priority before and after experiment, i.e. creativity-risk taking-decision making into risk taking-creativity-decision because students had different perceptions on how to become the successful agribusiness entrepreneurs after the experiment.

1. Introduction

One of the important stages in the quantitative research process is the determination of the variables that are used as objects [1]. The variables in question include the attitudes, motivation, and interest of students in entrepreneurship in running entrepreneurship [2]. The growth of entrepreneurial interest cannot be done without the existence of education and training that can stimulate one's entrepreneurial spirit. If someone has low education, then he does not have the courage to take risks [3]. This can hinder the development of self-actualization.

Entrepreneurial knowledge supports entrepreneurial values, especially for students, i.e. to foster an entrepreneurial spirit [4]. Attitudes, motivation, and interests are needed for students who are entrepreneurial to be able to identify business opportunities and then utilize business opportunities to create new job opportunities. It is hoped that students' interest and knowledge about entrepreneurship will shape their tendency to open new businesses in the future [5].

The results of research on the factors that influence entrepreneurial interest shows that the variable interest in entrepreneurship is influenced by 60.4% in total by capital, skills, place, and entrepreneurial spirit [6]. Entrepreneurs are people who create a business that is faced with risk and uncertainty, aiming to gain profit and experience growth by identifying opportunities and utilizing the necessary resources [7]. Today, there are many opportunities for entrepreneurship for everyone who is observant about these business opportunities. Entrepreneurial careers can support the welfare of society that is to produce tangible financial rewards [8].

In order to encourage the growth of an entrepreneurial spirit for students and create university graduates who are able to become job creators, it is necessary to provide guidance for students to be able to carry out entrepreneurship [9]. Students are directed to various programs in order to foster entrepreneurial activities within the student environment, such as Entrepreneurship Course, Entrepreneurship Apprenticeship, Business Work Study, and Entrepreneurial Student Program which will be a source of inspiration for students to graduate later.

Hisrich [10] explains that an entrepreneur is a person who creates a business with risks and uncertainties to gain profits and develop business by opening opportunities. Utilizing the resources needed to become an entrepreneur for students needs to be supported by each university in supporting the interest in entrepreneurship for their alumni. Universities need to provide the widest possible opportunity for students to become individuals with trustworthy integrity who have the ability to do business, communicate, work together, and have personality.

Agustina and Sularto [11] shows that the variables of need for achievement, self-efficacy, academic achievement are the dominant variables in influencing the intense entrepreneurship of students. Instrumentation readiness, self-efficacy and work experience are the dominant variables in influencing the intense entrepreneurship of computer science faculty students. It can be concluded that what is meant by interest in entrepreneurship is a desire, connection, and willingness to work hard or try to make ends meet without being afraid of the risk of failure.

The formulation of the problem in this study is whether the attitudes, motivation and interests of students affect students' interest in the entrepreneurship. It is expected that the behaviors, attention and interests of students will grow as an entrepreneur in building the wheels of the national economy. The goal is to find an entrepreneurial model that supports students' interest in the creative economy as a pillar of economy in the future.

The role of the university in developing behaviors, attention, and fostering interest is very important in growing the number of entrepreneurs. The role of universities in developing interest in entrepreneurship and exploring several factors that influence entrepreneurial behavior has been explored by several researchers [12]. These studies explain that entrepreneurial interest that can be directed through entrepreneurship education is influenced by attitudes and interests towards entrepreneurship. The results of this study are expected to support the entrepreneurial model to motivate students, thereby encouraging students' interest in running their business without any doubts starting from the beginning even though the capital is small. Harryson [13] states that the only struggle or way to realize humans who have entrepreneurial morals, attitudes and skills is through education. Education makes individual insights more confident, able to choose, and make the right decisions, increase creativity and innovation, fos morale, character, intellectuality, and improvement.

Motivation is an impulse from within a person that encourages that person to do something, including becoming a young entrepreneur [14]. Most of the successful people in this world have strong motivations that drive their actions. They know very well what the motivation is and maintain that motivation in every action. Dharmawan et al [15] explain that motivation in entrepreneurship includes motivation that is directed towards achieving entrepreneurial goals, such as goals that involve the introduction and exploitation of business opportunities. Motivation to develop a new business is required not only by self-confidence in its ability to succeed, but also by its ability to access information about entrepreneurial opportunities.

Interest in entrepreneurship is defined as a person's desire to work independently (self-employed) or run their own business. Kijkuit and Ende [16] states that students' interest in becoming entrepreneurs is

divided into four groups, namely: 1) interest in starting entrepreneurship in the near term; 2) interest in starting entrepreneurship in the next two years; 3) interest in starting entrepreneurship for the long term; and 4) has no interest in entrepreneurship. The objectives of this study were: 1) to know the level of the behaviors, attention and interests of students in entrepreneurship 2) to get a description of the behaviors, attention, and interests of students in entrepreneurial management.

2. Methodology

2.1. Entrepreneurship

An entrepreneur is a person who combines resources, labor, raw materials, and other assets to produce greater value than before, is also someone who introduces change, innovation and new challenges. Dumasari et al [17] argues that entrepreneurship is defined as a dynamic process of creating additional wealth by individuals who bear the main risk in terms of time capital, and career commitments or providing value for some products or services. The product or service may or may not appear unique, but it is by sharing the means that value will be generated by an entrepreneur by accepting and placing the skills and resources needed.

Mainemelis and Ronson [18] explains that entrepreneurship is the process of creating something new at the value of using the time and effort required, bearing financial, physical and social risks that accompany, receiving the resulting monetary, as well as personal satisfaction and freedom. The definition of entrepreneurship emphasizes four basic aspects of being an entrepreneur: 1) involving the process of creating and creating a new value; 2) demands the amount of time and effort required; 3) involving someone to be an entrepreneur, the most important reward is freedom, then personal satisfaction; and 4) entrepreneurs will respond and create change through action. Entrepreneurial action converges to behavior as a response to decisions based on the consideration of uncertainty about opportunities for profit.

2.2. Entrepreneurship process

The process for developing a new venture occurs in the entrepreneurial process, which involves more than just solving problems in a management position. An entrepreneur must find, evaluate, and develop an opportunity by overcoming the forces that hinder the creation of something new. This process has four distinct stages: 1) identification and evaluation of opportunities; 2) development of a business plan; 3) determination of the required resources; and 4) management of the resulting company.

Opportunity identification and evaluation is a very difficult task. Most of the good business opportunities do not appear suddenly but are the result of the sharpness of an entrepreneur to see the possibility in some cases, the formation of mechanisms that can identify potential opportunities. Attitude is mental or emotional readiness for some type of action on the right thing. In addition, it can be interpreted as something that is learned and how individuals react to situations and determine what to look for in life. A person's attitude is able to mature someone.

2.3. Hypothesis

H_o: $\beta_1 = \beta_2 = 0$, Behaviors and attention variables do not have a significant effect on student interest in entrepreneurship

H_a: $\beta_1 \neq \beta_2 \neq 0$, Behaviors and attention variables have a significant effect on student interest in entrepreneurship

Criteria

F count $\leq F$ table = H_o is accepted

F count $> F$ table = H_o is rejected, H_a is accepted.

2.4. Variable identification

The variables of this study consisted of the independent variable and the dependent variable which presented in Table 2.

Table 1. Research variable

Independent variable	Dependent variable
X_1	Y
X_2	

The research tested two variables, i.e. the independent variable and the dependent variable.
Y = Interest in entrepreneurship
X_1 = Behaviors
X_2 = Attention

2.5. Operational definition of variables and their measurement
The operational definition in this study was carried out to avoid errors in interpreting the analyzed variables which are presented in Table 3.

Table 2. Operational definition

Variable	Operational definition
Entrepreneurial interest *(Y)*	Entrepreneurial interest in this study is defined as the student's interest in doing business budget understanding and additional understanding resulting from the business process that is used as a basis for making decisions.
Behaviors (X_1)	Preference for innovation and transformation in existing institutions or status quo.
Attention (X_2)	Non-specific and limited cognitive resource that is required for mental activities and differs across individuals and tasks

Samples taken from the existing population were carried out by simple random sampling, using an error rate of 5%, from a sampling list that was considered representative [19]. The principle of selecting samples is that every element in the population has the same opportunity to be selected [20].

2.6. Data source
The data used in this study included primary data and secondary data. Primary data was collected and put together directly from the object under study for research purposes. Primary data came from respondents' answers to a list of questions given to the targeted students. Questions in the form of data related to the variables were studied, i.e. entrepreneurial knowledge, business scale, business experience, type of business, and use of accounting information. Secondary data was collected from previous studies or publication by various studies or utilizing existing data. Secondary data used in this study were obtained from books or journals.

2.7. Validity and reliability test
The instrument is valid if the instrument can measure exactly what is being measured. Validity is related to the accuracy of measuring instruments [21]. Validity and reliability tests were carried out using the SPSS for Windows 17.0 series. The validity test is used to measure the validity of a questionnaire. A questionnaire is valid if the questions or statements on the questionnaire are able to reveal something that will be measured by the questionnaire. The validity test is carried out by looking at the results of the corrected item-total correlation with the stipulation that the variable under study is declared valid if the corrected item-total correlation value is greater than the r table [22].

Reliability test was used to measure a questionnaire which was an indicator of the variable. A questionnaire is reliable if a sample's answer to a statement is consistent over time. The measurement of reliability in this study was carried out by using the Cronbach's Alpha statistical test, provided that the variable under study was declared reliable if the Cronbach's Alpha value was > 7.00 [23].

2.8. Data analysis

The data that has been collected then processed using the following methods: 1) data checking and editing, a questionnaire instrument was provided which contained 20 questions about entrepreneurial knowledge; 2) coding the edited data to simplify the data, i.e. marking the numbers 1–4 in each category of answers from all respondents. The value strongly agree was coded with a score of 5, agree score was given a score of 4, disagree score was given a score of 3, disagree score was given a score of 2, and strongly disagree was 1.

Data analysis is very important part of the scientific method because the data analysis can give meaningful number in solving problems. Therefore, the objective of this research is to achieve optimal data analysis by means of linear regression analysis. Linear regression analysis was used to measure the effect of more than one predictor variable (independent variable) on the dependent variable.

2.9. Creativity: behaviors, attention, and meditation

The word creativity has many interpretations. Sometimes it is used to describe a person's capability; sometimes it is used to praise a work; and sometimes it is used to describe daily behaviors [24]. While creativity has multiple meanings and definitions, there are two consistent elements that are commonly recognized: novelty and effectiveness [25]. Conti et al [26] argues that creativity can be seen as a process or a product that is both original and valuable.

2.10. Electroencephalography (EEG)/brainwave

The Electroencephalography (EEG)/brainwave is an electrical output rhythm used by the cyclic pulsing of nerve cells and nerve fibers. An EEG responds primarily to the potential changes in the cerebral cortex. The double electrode placed on the scalp is used to record the potential changes in the cerebral cortex. In the past, the brainwave sensor required complicated preparations because of the electrode needed to be fixed with glue on the head of the participant. However, it is now possible to use simple devices to collect accurate brainwave data. The brain computer interface can be used to collect learners' brain waves [27] and is commonly used to measure the brain's attention, anxiety, or relaxation values.

This study attempted to take a step further by using the brain waves to explore the relationship between attention, meditation, and creative behavior. This study also set the participants in a VR environment to reduce unnecessary audio and visual distractions. The purpose of this study was to create a relatively closed and immersive environment to explore the behaviors and brainwave states of the creative process.

3. Results and discussion

3.1. Instrument test results

Research results are largely determined by the instrument or measuring instrument used. If the instrument used is not or less valid, then the results of the external validity of the instrument are tested by comparing them to find similarities between the existing criteria on the instrument and the existing empirical facts. Therefore, the research instrument used must be tested whether it is valid and reliable or not. The way to test the instruments in this study is using a validity test tool.

The way to collect research data about student interests before and after learning entrepreneurship were done by using a test instrument. The form of test used to collect data in this study was a scoring system using a questionnaire for the old category assessment instrument, namely strongly agree, agree, disagree, disagree and strongly disagree. In addition, it also uses a Likert scale answer choice scoring which shows the level of choice of respondents.

Data were collected using a questionnaire to ask for answers about student interests before and after participating in the experiment. The questionnaire was given to 20 students who were taken randomly and then recapitulated.

3.2. Validity test

Validity test using SPSS for Windows 17.0 series obtained that all question items are valid because each item's corrected Item-Total Correlation value has a value greater than the minimum standard of 0.3. Table 4, 5, and 6 show that all question items are valid because each item's corrected item-total correlation value has a value greater than the minimum standard of 0.3.

Table 3. Behaviors' variable validity test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	18.9231	3.785	0.452	0.596
Item 2	18.9643	3.298	0.395	0.612
Item 3	19.8743	3.853	0.223	0.651
Item 4	19.7456	2.978	0.606	0.557
Item 5	19.6558	2.752	0.526	0.568

Table 4. Attention's variable validity test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	16.7654	2.757	0.538	0.674
Item 2	16.3786	2.707	0.317	0.736
Item 3	16.8370	2.154	0.452	0.692
Item 4	16.7400	2.875	0.655	0.599
Item 5	16.6374	2.109	0.518	0.661

Table 5. Interest's variable validity test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	16.7000	3.045	0.331	0.730
Item 2	16.5333	2.740	0.692	0.598
Item 3	17.1333	2.740	0.539	0.645
Item 4	17.1667	2.764	0.350	0.740
Item 5	16.6667	2.920	0.590	0.637

3.3. Reliability test

Validity test using SPSS for Windows 17.0 series obtained that all question items are valid because each item's corrected Item-Total Correlation value has a value greater than the minimum standard of 0.3. Table 7 show that all question items are valid because each item's corrected item-total correlation value has a value greater than the minimum standard of 0.3.

The results of the reliability test of the behaviors, attention, and interest questionnaire are shown in Table 8. Cronbach's Alpha value of Behaviors is 0.751>0.700. This means that the behaviors questionnaire in this study is reliable. Cronbach's Alpha value of attention is 0.725> 0.700. This means that the attention questionnaire in this study is reliable. Cronbach's Alpha value of Interest is 0.729> 0.700. This means that the interest questionnaire in this study is reliable.

Table 6. Behaviors, attention, and Interest's variables reliability test

Variable	**Cronbach's alpha**	**N of items**
Behaviors	0.751	6
Attention	0.725	5
Interest	0.729	5

3.4. Hypothesis testing

Based on statistical tests using SPSS for Windows 17.0 series, the F count was 2.311. The level of significance used was = 5% (significance of 5% or 0.05, the results were obtained for Ho was rejected,

Ha was accepted). Therefore, we can conclude that the entrepreneurship learning model using EEG has a significant effect on student entrepreneurial interest.

This study was conducted to determine whether learning entrepreneurship using brainwave has a significant effect on student interest in entrepreneurship. Respondents used as research respondents were 20 respondents. Instrument testing shows that these instruments can be used in this research. The results of the validity and reliability tests of all question items are valid because each question item has a corrected Item-Total Correlation value greater than the minimum standard (0.3) and the Cronbach's Alpha value>0.700. This means that all the questionnaires in this study are reliable.

The results of the regression analysis output can be seen that the F value is 2.802, the level of significance uses = 5% (significance 5% or 0.05). The result of hypothesis test shows that F count>F table = Ha is accepted, meaning that the behaviors, attention, and interest in entrepreneurship have a significant effect on students' interest in entrepreneurship.

Based on the posttest, attention variable was more dominated to keep the brainwave technology work rather than to explore on many entrepreneur paths explained by the teacher. The students were afraid that the signal of brainwave will be distracted if they do not pay attention to the teacher. Further investigation was showing the difference of entrepreneur thinking's priority from before experiment and after experiment, i.e. creativity-risk taking-decision making into risk taking-creativity-decision. It happened since the students had differ perception on how become the successful agribusiness entrepreneurs after the experiment.

4. Conclusion

Research on entrepreneurial interest using brainwave technology is proven to be able to increase the level of behavior, attention, and interest of students to achieve better understand of the material presented. The students could apply managerial skills, risk management, business plan making that have been obtained in previous courses. Furthermore, this research developed continuously to increase the level of student's behavior, attention, and interest. One of examples is by using a business simulation model starting from planning, organizing, implementing to evaluating the business. In this way students can have experience in building their business.

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References

[1] Nabi G, Liñán F, Fayolle A, Krueger N and Walmsley A 2017 *Academy of Management Learning & Education* **16** 277–99
[2] Neck H M and Greene P G 2011 *Journal of small business management* **49** 55–70
[3] Becherer R C, Mendenhall M E and Eickhoff K F 2008 *New England Journal of Entrepreneurship* **11** 13–27
[4] Blackburn R and Kovalainen A 2009 *International Journal of Management Reviews* **11** 127–48
[5] Mahoney J T and Michael S C 2005 A subjectivist theory of entrepreneurship *Handbook of entrepreneurship research* (Boston: Springer) pp 33–54
[6] Petrowski M J 2000 *Reference Services Review* **28** 304–12
[7] Dharmawan B, Karim A R and Nurdiani U 2019 *IOP Conference Series: Earth and Environmental Science* **250** 012069
[8] Lubart T I 2001 *Creativity research journal* **13** 295–308
[9] Kor Y Y, Mahoney J T and Michael S C 2007 *Journal of management studies* **44** 1187–212
[10] Hisrich R D 1992 *Journal of Business & Industrial Marketing* **7** 53–7
[11] Agustina C and Sularto L 2011 Intensi kewirausahaan mahasiswa (Studi perbandingan antara fakultas ekonomi dan fakultas ilmu komputer) *Proceeding PESAT (Psikologi, Ekonomi, Sastra, Arsitektur, & Sipil)* **4** 63–9

[12] Dumasari D, Darmawan W, Iqbal A, Dharmawan B and Santosa I 2020 *International Journal of Conservation Science* **11** 87–96
[13] Harryson S J 2008 *R&D Management* **38** 290–310
[14] Downing S 2005 *Entrepreneurship theory and Practice* **29** 185–204
[15] Dharmawan B, Karim A R and Nurdiani U 2019 *IOP Conference Series: Earth and Environmental Science* **250** 012069
[16] Kijkuit B and Ende J V D 2007 *Journal of Management Studies* 2007 **44** 863–82
[17] Dumasari D, Darmawan W, Dharmawan B and Santosa I 2020 *International Journal on Advanced Science, Engineering and Information Technology* **10** 691–702
[18] Mainemelis C and Ronson S 2006 *Research in Organizational Behavior* **27** 81–131
[19] Sugiyono M P 2010 *Kualitatif dan R&D* (Bandung: Alfabeta)
[20] Rich J D and Weisberg R W 2004 *Creativity Research Journal* **16** 247–59
[21] Sternberg R J 2004 *Journal of Business Venturing* **19** 189–201
[22] Rosmiati R, Junias D T and Munawar M 2015 *Jurnal Manajemen dan Kewirausahaan* **17** 21–30
[23] Wales W J 2016 *International Small Business Journal* **34** 3–15
[24] Glover J A, Ronning R R and Reynolds C R 2013 *Handbook of creativity* (United States: Springer Science & Business Media)
[25] Sternberg R J 2006 *Creativity research journal* **18** 87–98
[26] Conti R, Coon H and Amabile TM 1996 *Creativity Research Journal* **9** 385–9
[27] Wolpaw J R, Birbaumer N, McFarland D J, Pfurtscheller G and Vaughan T M 2002 *Clinical neurophysiology* **113** 767–91

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