

DOES GENDER AFFECT TO THE UNDERSTANDING OF TECHNO-PRENEURSHIPS AMONG UNIVERSITY STUDENTS? A CASE STUDY IN BALI

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ABSTRACT

This research studies the impact of gender on university students' technopreneurship understanding in Bali. About 145 respondents were asked to fill in the questionnaire. The variables used in this research are gender (v1), confidence level in understanding technopreneurship (v2), academic background (v3), future type of business (v4), and intention level of students to open a business (v5). Fisher's exact test and Cramer's V test are used to analyze the link between variables above. The results show that gender (v1) has strong and significant impact on the other variables (v2, v3, v4, v5). These results can give a new perspective for technopreneurship trainers, teachers, or lecturers in teaching female and male students.

Keywords: technopreneurship, entrepreneurship, education impact, Bali

1. INTRODUCTION

Extensive research in the entrepreneurship literature has shown evidence that entrepreneurship is among the main drivers of economic growth. Mataa *et al.* [30], and Murah Abdullah [34] have stated both in their studies that entrepreneurship plays a key role in the development of the economy. In the many advancements of the 21st century, entrepreneurship follows suit by adapting into the growing technological improvements, as is explained by Abbas [1], technology holds a significant power in transforming the world, and thus entrepreneurship along with technology will see and give a great advancement globally. Technology entrepreneurship or technopreneurship is the coined term that is defined as the utilization of technological innovation in order to support entrepreneurial activities [30].

Through entrepreneurship education programs, students obtain many benefits, namely increased confidence, entrepreneurial knowledge and skills, practical problem solving, and insights into the feasibility of novel venture ideas [27]. According to Ullah and Taylor [51], technology-based small firms are important and well-recognized in its role as an engine of economic development. Similarly, the attention paid to its literature is growing. In the burgeoning of technological entrepreneurship, education is an important aspect in terms of how it increases a person's knowledge and aptitude [32]. Urban and Barreira [52] describe students as important actors in the sense that they are able to receive the education needed to take the initiative in contributing more to the economy, which is done by recognizing and anticipating high-technology opportunities. Consequently, it is appropriate to address the many factors that come into play in the discussion of students' role in technopreneurship.

Three previous studies have shown the link between education and entrepreneurship [27], [6], [44]. In a study by Elliott *et al.* [17], entrepreneurship education is one of the methods that can increase self-efficacy and entrepreneurial intentions. Results from a study by Shinnar *et al.* [47] shows that there are differences between the entrepreneurial intention of male and female students upon receiving entrepreneurship education. In Indonesia, most research on female entrepreneurs focus on their activities in household enterprises and the informal sector [7], and much is yet to be known regarding how gender in and of itself affects entrepreneurship. Moreover, research on the effects of gender on entrepreneurship is still limited [39], and even more so in technopreneurship literature.

Though the following studies have stated that gender has no effect on entrepreneurial education [24], [38], [19], other studies have investigated further into the differences between male and female students in entrepreneurship education. Bhardwaj [11] stated that female entrepreneurs lack of skills because they do not have time to improve their entrepreneurial skills, and that they struggle to train themselves and follow technological advancements. Results from a study by Shinnar *et al.* [47] show that an increase in entrepreneurial self-efficacy is seen only in male students, which implies that entrepreneurship education does not reach female students. In contrast, Sowmya *et al.* [50] founded that female students have higher intention to start a business.

This study aims to investigate how the gender of students influences their understanding of technopreneurship, especially in the province of Bali, Indonesia. The contribution of this study is in providing more information of the relationship between gender and technopreneurship understanding among university students in Bali.

The rest of the paper is organized as follows. Section 2 discusses previous works related to the present study. Section 3 explains our methodology. Section 4 and 5 present the findings and analysis, respectively. Our conclusions are presented in Section 6.

2. LITERATURE REVIEW

Pruett *et al.* [43] conducted research regarding entrepreneurial intention prediction by combining factors of culture, social, and psychological. Surveys were done in universities in the USA, Spain, and China. The authors found that gender had no significant effect on entrepreneurial intention. Meaning that there are no definitive differences between male and female students in terms of their intention to start a business. Zhang and Arvey [56] have a similar statement in their research regarding how the role of a

person's gender can participate in decision making related to career choices in the field of entrepreneurship. However, the mentioned research does not explain further about the business choices and the area of the business that will be built.

Survey results from a study by Millman *et al.* [33] regarding factors that motivates students' perception and behavior related to internet entrepreneurship intentions are demographic factors such as students' status, gender, and family income. This study was done in three universities in China and the results yielded from the survey show that some students in China prefer internet entrepreneurs to others. This research has not yet discussed how these factors can influence students' understanding of internet entrepreneurship.

Ertuna and Gurel [18] chose gender, family background, and students' major, as control variables for research on the role of education in entrepreneurial intentions and student characteristics. From the survey done in five universities in Turkey, 767 samples from new and old students of business and engineering majors were obtained. Findings from this study show that students' intention to become an entrepreneur is influenced by personality traits and higher education. Students with a higher level of education are more inclined to be motivated to become an entrepreneur. Unfortunately, this study does not show any specific differences between male and female students and whether gender has an effect on the choice of major discussed in this research.

et al. [31] stated in their research that entrepreneurship education should be modified and adjusted to a specific target, as well as being able to overcome problems in business students (business administration and economics), science and engineering (engineering and natural sciences) on the side of subjective norms. The control variables used are age and gender. Entrepreneurial intention is positively influenced by entrepreneurship education when controlled by variables of age, gender, and motivation. This differs with Boissin *et al.* [12] and Agboola [2] who stated that there are no demographic variables (work experience, family background, and gender) that significantly influence entrepreneurial intentions. The choice of majors and how students' intentions towards entrepreneurship when viewed based on the control variables used, for example age and gender, are not yet discussed in detail.

The significant factor that influences choosing entrepreneurship as one's career choice in Malaysia is gender, especially men [53], [28], age, employment status and Malay nationality. These factors have a positive effect on influencing someone to become an entrepreneur after they finish their education and enter the labor market Noorkartina *et al.* [41]. This research is supported by another previous research by Sandhu *et al.* [45] which stated that gender is one of the important factors in influencing entrepreneurship, shown in how entrepreneurial tendency is more prevalent in male students than female students.

However, this study does not mention how those factors affect students' choice of future. A contradictory statement is present in a study by Aldianto *et al.* [4]. Research was conducted to reflect the inputs, processes, outputs in the entrepreneurship education program at the University in Bandung to create value for students. The questionnaire was filled out by 222 respondents and produced results shown that how entrepreneurship education programs needed to be integrated by providing learning to students to encourage business creation. This study stated that gender has no effect on the implementation of entrepreneurship education programs at universities.

Bhardwaj [11] conducted research on the relationship between variables of education, training, and performance of female entrepreneurs. Correlation method is used to find the relationship between these variables. In this study, the researchers found that the lack of skills development training in female entrepreneurs was because they did not have time to improve entrepreneurial skills. Difficulty to train oneself and to follow the development of technology is one of the obstacles also for women entrepreneurs. And also the lack of social support for women entrepreneurs. In the same year, Shinnar *et al.* [47] stated in their research that statistically increased Entrepreneurial self efficacy occurred only in male students.

Whereas Entrepreneurship Intention did not change statistically for the gender subgroup. Implicitly, entrepreneurship education does not reach female students. The results obtained indicate that learning Entrepreneurial self-efficacy and Entrepreneurship Intention must be integrated with gender. The development of entrepreneurship intentions based on gender was also investigated by Wang Wong [54] ; Varamäki *et al.* [40].

This study revealed that students' entrepreneurial intentions decreased over time. Of the models developed, as much as 19% of the differences between female students and 28% of male students showed gender differences in intention development. Gender differences need to be considered in designing interventions to grow and develop entrepreneurial potential. In quite contrast to previous research conducted by Hytti *et al.* [24]. The research aimed to see the impact of one's motivation to learn entrepreneurship from students to generate business ideas by considering student behavior. The age and gender of the respondents were used as control variables. Respondents used were 117 students majoring in business. The basic model used in this study shows that gender and age have nothing to do with entrepreneurial learning outcomes. Similar results were obtained by Oosterbeek *et al.* [38] and Franco *et al.* [19]. Both studies use gender as a variable in their research and there are other variables as well. But from the results obtained, gender does not affect entrepreneurship education.

THE IMPACT OF GENDER IN UNDERSTANDING TECHNOPRENEURSHIP

Zhao *et al.* [57] presented 12 theoretical perspectives on entrepreneurial success as seen from the age factor, namely gender stereotype, life stages, family obligation, financial capital, emotion, social capital, discrimination, human capital, risk propensity, time's value, personal health and rigidity. By using exploratory meta-analysis, the study shows that age has a linear relationship to entrepreneurial success. The positive effect is shown more in female samples. This research gives knowledge regarding age factor

and its complex relationship with entrepreneurial success. However, there are too many perspectives discussed in this study and the explanation of each perspective is considered not detailed enough.

A study conducted by Elliott *et al.* [17] developed entrepreneurship education and mentoring programs in University of Canada's engineering and computer science majors specifically aimed at female students. This study was in an effort to provide teaching, experiential learning, and support for gender sensitivity to a small group of students. This study discusses students' experiences in entrepreneurial intentions and entrepreneurial self-efficacy. The results obtained from this study are that sensitivity to gender can increase awareness of gender diversity and problems, increase the perception of entrepreneurial self-efficacy, and there is a change in perspective on life in general and ways of solving problems. In line with that study, Sowmya *et al.* [50] stated that female students have a bigger intention to start a new business. Entrepreneurship is considered to have contributed to the creation of employment. This study shows that the new generation has a positive mindset regarding alternative ways in creating any new job opportunities. In 2013, Powell and Eddleston [42] stated in their research that women entrepreneurs receive positive support such as funding from their family while men entrepreneurs do not.

Hultén and Tumunbayarova [23] conducted research which aims to see how Swedish Universities develop interventions to improve students' entrepreneurial mindset. The authors did the analysis by checking the value before the test and the value after the test using paired samples tests. Multivariate analysis of covariance (MANCOVA) was carried out to examine the dependent post test variable which was the effect of the proposed intervention. The results shown by MANCOVA show the results of student pretest, gender, and that their participation have an impact on the dependent variable. A significant increase occurred in engineering students with the highest number of men in measuring Entrepreneurial Creativity.

From the journal reviews above, the following hypotheses are obtained:

H1a: Gender does not affect the confidence level of the university student in understanding technopreneurship

H1b: Gender does not affect the choice of academic background

H1c: Gender does not affect the choice of the future type of business

H1d: Gender does not affect the intensity level of student to open a business in the future

3. METHODOLOGY

3.1. Data collection and descriptive of the samples

Data collection was carried out at universities in the province of Bali. As many as 145 students were asked to fill in the existing questionnaire. Respondents from this study have criteria that are students who are starting a business or want to start a business after graduating. JunCui *et al.* stated in his research that students' actions in starting a business are influenced by entrepreneurial intentions. Purposive sampling technique is used to ensure all data obtained from respondents is in accordance with predetermined criteria [22] [15] [13] [36] [37].

3.2. Data Analysis

From the hypotheses obtained from the conducted literature review, we acquire 5 variables that will be used in the analysis of this study. These variables are:

1. Gender (v1)
The gender factor has been investigated in many research. In a study by Schiller and Crewson (1997), it was founded that there is a significant difference between male and female entrepreneurs' success. Entrepreneurship is considered to have a high risk because it is linked to doing business itself.
2. Confidence level in understanding techno (v2)
The questions given in the questionnaire for the respondents evaluate their understanding of technopreneurship. The measurement of this understanding is by utilizing the Likert Scale (scale 0 - scale 10). Likert scale is a psychometric scale used for surveys and questionnaires that contain opinions, perceptions, and thoughts. The advantage of using a Likert Scale is the answer given by the respondent in the form of a linear assessment, for example having a numerical value used to measure the behavior of the respondent or a measurement of value from strongly disagree to strongly agree [21] [16] [55] [35].
3. Academic background (v3)
Students are asked to fill in information about the majors currently taken. Academic Background is grouped into three categories namely Engineering, Economics Business (EB), and Others. How more than 50% of respondents come from the Engineering Department and the EB is the reason for this categorization. In addition, some businesses are started by students majoring in engineering or students majoring in EB [31]
4. Future type of business (v4)
In v5, the respondent will fill in information about the type of business plan that will be made in the future. Several business options have been outlined in the questionnaire namely trade, agriculture, IT, and tourism. There are also other options if the respondent wants to fill in the type of business they want to develop in the future.

5. Intensity level of student to open a business (v5)

In some literatures, entrepreneurial practicum is considered an important factor in building a business [25] [48] [20]. Students who receive entrepreneurial practice tend to become more skilled at getting ideas from outside problems [14] and can improve their skills in building their own business [8].

This study uses the Fisher's Exact Test with an Alpha value (α) equal to 0.05 to measure the level of significant relationship between variables. Fisher's Exact Test is an effective technique in analyzing data or samples that have a small number of respondents in nominal or ordinal form [29] [5] [26]. After that, the measurement of the strength of the relationship between variables is done using the Cramer V-Test [10]. This test is carried out for data that have a nominal scale with categories for each row and column of more than 2. The output of this test shows the strength of the related variable [3] [9]. And the results of the Cramer's V-Test support a strength level [49].

4. RESULTS AND ANALYSIS

4.1. Gender vs Technopreneurship Understanding

To understand the relationship between gender and the level of understanding of technopreneurship, the Likert Scale used will be divided into three groups: students with groups 0 - 3, 4 - 7, and 8 - 10. These groupings are made using the Sturges rule [46], where the value of these groups is taken from the data of student respondents. These results are supported by research by Bhardwaj [11] which states that women entrepreneurs need to improve their skills and understanding in the field of entrepreneurship. Elliott *et al.* [17] in their research gave advice to develop entrepreneurship education and mentoring about technopreneurship. Fisher's and Cramer's V tests analysis yields the following values:

- p-value= 0.02. Hypothesis H0a which states that Gender does not affect the level of confidence of the university students in understanding technopreneurship is rejected. This means that Gender has an influence on understanding technopreneurship / entrepreneurship.
- Cramer's V-tests = 0.2. Result from Cramer's V-Test shows a strong relationship between gender and technopreneurship understanding.

4.2. GENDER VS ACADEMIC MAJOR

Academic Major is divided into three groups such as Engineering, Economics and Business, and Others. Respondents with female gender tend to choose Economics majors while respondents with male gender tend to choose Engineering majors. Based on the Fisher's and Cramer's V test, the following results are achieved:

- p-value = 5.0×10^{-4} . This means that H0b which states that Gender does not affect the choice of academic background is rejected. This means that Gender has an influence on the selection of academic majors.
- Cramer's V test = 0.4 from the result of the Cramer's V Test, there is a very strong relationship between gender and academic major.

4.3. GENDER VS FUTURE BUSINESS TYPE

Several factors have an influence on the field of entrepreneurship [25] [20] [48]. Whereas, male students tend to open businesses in commerce and IT. This result is in line with the results of the Fisher's and Cramer's V test for the selection of academic majors which shows that female respondents tend to choose EB majors while male respondents tend to choose engineering majors:

- p-value= 5.4×10^{-5} . The H0c hypothesis which stated that Gender does not affect the choice of the future type of business is rejected. Gender influences the choice of students' future business types.
- Cramer's Vtest = 0.5. From the result of the Cramer's V-Test, there is a very strong relationship between gender and future business type choice.

4.4. GENDER VS INTENTION TO OPEN A BUSINESS

Several studies have revealed that gender has no effect on student intentions in starting a business [43] [56]. To analyze the relationship between gender and an intention to open a business, the following results are generated from Fisher's and Cramer's V tests:

- p-value = 0.5×10^{-3} . The H0d hypothesis which stated that gender does not affect the intensity level of students to open a business in the future is rejected. This means opening a future business will be influenced by student intensity.
- Cramer's V test = 0.3. The result of the Cramer's V Test shows that there is a strong relationship between gender and students intention in starting a business.

5. DISCUSSION

The results of the research above shown that gender significantly affects technopreneurship understanding, academic major choice, future type of business, and intention to start business in the future. These variables are gender (v1), confidence level in understanding techno (v2), academic background (v3), future type of business (v4), and intention level of student to open a business (v5). The research results obtained cannot be generalized because it uses a purposive sampling technique to collect data. Nevertheless, the results obtained from this study can provide an initial overview of the effect of gender on the development of technopreneurship in Bali.

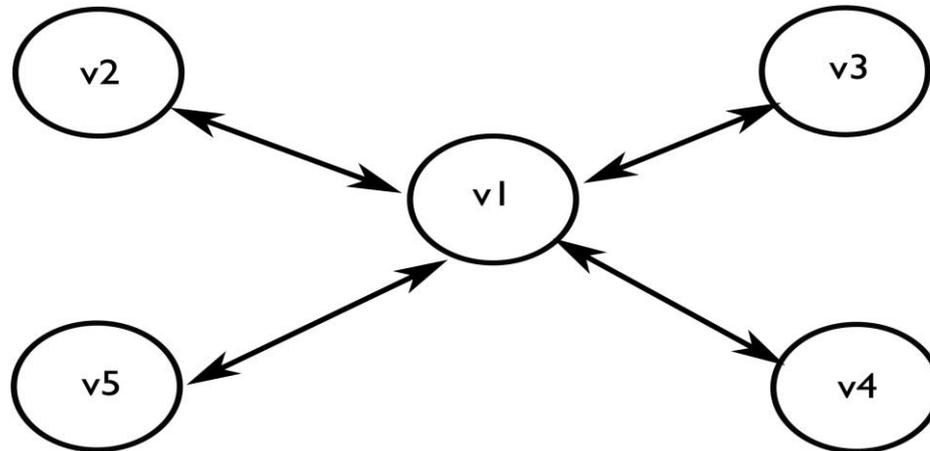


Figure 1. Research Model

The mentioned studies stated that men are more inclined to become entrepreneurs. Bhardwaj [11] stated that women entrepreneurs need to improve their skills and understanding on entrepreneurship. In studies by Maresch *et al.* [31] and Ertuna and Gurel [18], gender is one of the control variables which influences students' entrepreneurial intentions and characteristics in learning entrepreneurship. Entrepreneurship education needs to be modified and adjusted to a designated target. In addition to that, on the side of subjective norm, entrepreneurship education is capable of overcoming problems experienced by business students (business administration and economy), as well as science and engineering (engineering and natural science). The difference of gender needs to be considered in designing intervention in order to improve and develop entrepreneurial potency [40].

Several studies, however, are in contrast with the previously mentioned studies. A research by Pruett *et al.* [43], which was in universities across the USA, Spain, and China, found that fender has no significant effect on entrepreneurial intention. This means that there is no definite difference between male and female students regarding their intention to start a business. This result can be due to the fact that the study combined cultural, social, and psychological factors occurring within the area. In the same year, Boissin *et al.* [12] stated that there are no demographic variable (gender, job experience, family background) that can significantly affect entrepreneurial intention. This is similar to studies by Hytti *et al.* [24], Oosterbeek *et al.* [38], Franco *et al.* [19] and Aldianto *et al.* [4]. The conducted research produced results showing that gender does not affect the implementation of entrepreneurship education in universities. However, there is no detailed discussion regarding that.

6. CONCLUSION

This research aims to investigate the effect of gender on technopreneurship understanding among university students in Bali. The variables used are gender (v1), confidence level in understanding techno (v2), academic background (v3), future type of business (v4), and intention level of students to open a business (v5). The Fisher's test shows that v1 has a significant impact on v2, v3, v4, and v5. This research also shows that there is a strong relationship between gender (v1) and each of the other variables (v2, v3, v4, v5), which can be seen from the results of the Cramer's V tests.

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