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RESEARCH OF TECHNOPRENEURSHIP UNDERSTANDING AMONG UNIVERSITY STUDENTS: A CASE STUDY IN BALI PROVINCE

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ABSTRACT

This research aims to examine factors that affect technopreneurship understanding among university students in Bali. As many as 145 students were asked to fill a questionnaire. Four variables were used: education (v1), family (v2), technopreneurship understanding (v3), and gender (v4). The results obtained from Fisher's Exact Test and Cramer's V test show that understanding of technopreneurship is directly influenced by academic major, gender, and the desire to adopt the latest technology. Another indirectly influential factor is the father's occupation. These relationships can be used as a guidance to develop more technopreneurs, especially in Bali.

KEY WORDS

Technopreneurship, entrepreneurship, education impact, Bali.

Technopreneurship or technology entrepreneurship is defined as the utilization of technological innovation to support entrepreneurial activities [50]. Technopreneurship is a development of the concept of entrepreneurship, in which entrepreneurship is combined with the rising advancement of technology to achieve more positive results [53]. According to Beckman et al. [47], technology, entrepreneurship, and innovation have a close relationship. The significance of technology understanding in economic development can sustain long-term economic growth, resulting in more lucrative outcomes [14], [94].

In the technopreneurship literature, education is regarded as an influential factor of technopreneurship and its role in economic development [93], [83], [59], [36]. As stated in studies by Cui et al., [21] and Robinson et al., [77], education has wielded positive effects on prospective entrepreneurs and students, and the use of technology has seen significant growth in the field of entrepreneurship education [87]. Findings from a study by Kirkwood et al., [40] shown that students receive many benefits from entrepreneurship education programs, such as increased confidence, entrepreneurial knowledge and skills, practical problem solving, and insights into the feasibility of novel venture ideas.

As a developing country, Indonesia faces various challenges in effectively adopting the international transfer of technologies [99]. A study by Sugestiyadi [61] shown that there is still a small number of entrepreneurs in Indonesia, around 0.18% of the total population. It can anticipate this situation, technopreneurship education is proposed. Sugestiyadi has been defined technopreneurship education as a business learning process that utilizes technology for a more lucrative outcome. This is supported by Aldianto et al. [3], in which it was found that the integration of entrepreneurship education to students' learning process encourages business creation. In facing this era of digitalization, entrepreneurs must adopt the use of technology as befits the needs of consumers, as stated in research by Suharyati & Ediwarman [67]. In their research, however, it was found that technology understanding is still below 70% in the region of Bogor, Indonesia. Thus the authors concluded that entrepreneurship education must be conducted intensively. In Bandung, Abdurohim et al. [71] found that knowledge on technology use in businesses reaches 90%. The authors further provided technology guidance and assistance, which resulted positively in product



quality and quantity. Similarly, young people in Aceh are using technology to support growing businesses [79].

A variety of factors come into play in ensuring the development of technopreneurship understanding among students so as to achieve economic growth. As stated in a study by Kirby [39], present day entrepreneurship education needs considerable change in its content and learning process. Significant aspects of entrepreneurship development through students' education are family background and the occupation of the family head [12], [27], [25], in the sense that both these aspects play a role in students' course of education. That, in turn, influences students' inclination to entrepreneurship. Results from a study by Ma [49] show a disparity between students from families of lower and higher socioeconomic background in choosing their college major. Students from lower socioeconomic status (SES) tend to opt for technical, life/health science, and business majors rather than humanities and social science/education majors. Consequently, students' choice of college major can impact the development of digital entrepreneurship and technopreneurship [59].

Another factor of influence is gender, Shinnar et al., [85] founded that in the process of entrepreneurship education, there is a discrepancy between male and female students' entrepreneurial intention. The results show that male students develop higher entrepreneurial self-efficacy compared to female students. This outcome is contrary to that of a previous study by Sowmya et al. [90], which shown that female students are more inclined to start a business. Furthermore, in a study by Bhardwaj [11] it is found that female entrepreneurs face more struggles in businesses with their lack of time to improve the skills required to improve their ventures.

The previously elucidated studies have investigated the relationship between entrepreneurship, technology, and education. However, research on technopreneurship development in Bali is still noticeably lacking, considering most of the previous studies were conducted in other countries or in Indonesia but not in Bali exclusively. This study aims to investigate the influential factors on technopreneurship understanding among university students in Bali. The contribution of this study is to propose a technopreneurship education model that is relevant for students in Bali.

LITERATURE REVIEW

In 2007, Matlay et al. [55] conducted research in the UK regarding the development and implementation of entrepreneurial education with a data span of 10 years (1995-2004). This research shows that entrepreneurship education courses evolving in the UK are impacted by several factors namely conceptual, contextual, design, and delivery. Moreover, the author stated that the teaching process of entrepreneurship education in postgraduate level utilizes ICT (Information and Communications Technology) as a platform that supports the teaching process. In line with this research, Wright et al. [16] studied how technopreneurship is influenced by the role of human capital. The conclusions that can be drawn by the authors is that there is an immense benefit that can be taken if universities can combine science and technology programs with business management programs. The authors suggested that a program in elementary level school in which children and adults alike are shown the career opportunities in merging science and technology with business management.

Research by Marvel & Lumpkin [54] investigated that the impact of education, experience, and knowledge of technology entrepreneurship on innovation radicalness. Innovation radicalness linked with technological knowledge and preceding formal education has a positive influence. However, if linked with knowledge on market service, it will result in negative effects.

According to a study by Pei [69], factors that can cause failure in starting a business or ongoing businesses in IT ventures is the level of industrialization. IT entrepreneurs need to renew their knowledge of marketing and technology. It is critical for IT entrepreneurs to be knowledgeable in business and the correct technology adoption. This also applies to non-IT entrepreneurs.



Research by Murah & Abdullah [58] investigates how an entrepreneurial course can contribute to the transformation of teaching practices. Within this course, concepts and theories in the field of technopreneurship are introduced to students. The authors concluded that the most efficient learning process is through interviews and web-based projects. In becoming an entrepreneur, the focus needs to be on the process of the entrepreneurial course and not the end result of tests and written assignments.

In Indonesia, it is stated in a study by Harsono [32] that technopreneurship education (concept, theory, creativity, and innovation) plays an important role in shaping the mindset and career intention of students to become entrepreneurs in terms of attitude, skills, awareness, culture, and motivation. Technopreneurship education can significantly increase students' interest in the field. The author also stated that technopreneurship education can produce individuals who are independent, productive, and technologically skillful. Being a technopreneur is one way to tackle unemployment cases every year. A similar research was conducted by Sugestiyadi on year of 2013. Sugestiyadi stated that technopreneurship education has the purpose of shaping new entrepreneurs while involving technology as a support for the teaching process. The technopreneurship education given can be in the form of theories or skills.

Parents' occupation can have a considerable influence in their children's career, as stated in a study by Lerchundi et al. [66]. Using 851 students majoring in engineering and architecture from the Technical University of Madrid, Spain, focusing on technology entrepreneurship, this study results showed that students with parents who are entrepreneurs tend to want to become entrepreneurs as well. Whereas students with government employee parents are less inclined to become entrepreneurs. The result from this study is supported by previous research by Carr et al. [15], Chlosta et al. [19], Mungai et al. [57], and Laspita et al. [43]. Children who have the desire to become entrepreneurs will learn indirectly from their families, such as parents or grandparents.

Nambisan [60] studied that how the entrepreneurial process is affected by digital technology. The process and results of entrepreneurship such as product processes, industrial services, entrepreneurial opportunities, and entrepreneurial results can be influenced by digital technology. In this case, any developing technology, emerging novel theories and technologies support the entrepreneurial process. It is important that entrepreneurs as well as academics study and adoption with technologies very well.

Evaluation of technology-based business processes in an educational perspective was carried out by Marti'ah [53] in a study. Marti'ah mentioned that technopreneurship is a development of the concept of entrepreneurship. To print students into successful entrepreneurs, there needs to be integration between entrepreneurship and technology in the environment of educational institutions. Educational institutions have the challenge of providing students with an understanding of the importance of technology adoption in the entrepreneurial world. The process of entrepreneurship education must be carried out comprehensively by educational institutions and educational institutions must produce generations that are economically independent.

Shih & Huang [84] conducted with a research in a Taiwanese research university regarding entrepreneurship education, especially technology-based entrepreneurship. Several conclusions that can be summarized namely the importance of considering the content of education, the need to improve students' and faculty capabilities, how understanding technology commercialization is an important factor of interdisciplinary interaction, as well as the much-needed perspective expansion. Economic growth and innovation are influenced by technology. This will also affect to education programs and entrepreneurial interests. Research by Rippa et al. [76] found that technological unpreparedness and lack of student experience can lead to suboptimal entrepreneurial interest.

The focus of the study by Mataa et al. [50] is the strengthening of technopreneurship in higher education institutions. The aim is to propose models and concepts that can strengthen the implementation of technopreneurship in Oman. Respondents used 40 students with computational specialization to identify the needs of tertiary institutions. The results show



90% of students not knowing about technopreneurship and its benefits for students' future careers. As many as 75.5% of the total respondents agreed that there is a need for a course on technopreneurship in higher education institutions to help educate and guide students to become successful technopreneurs.

Research by Bandera et al. [6] investigated that the effects of technological support in entrepreneurship education on students' attitude and intention in facing risks. The researcher made a comparison of students with three entrepreneurship courses of their own choice. This comparison aims to see the level of difference, how to integrate information and communication technology, and how to interact with entrepreneurs in business incubators. The results show that students' entrepreneurial intention as well as the interaction with incubator entrepreneurs has sensitive perceptions. While the attitude in taking risk increases significantly.

Economic growth in the industrial era 4.0 has increased. A study by Hamdan [29] explained that data collection is automatically carried out in all fields in this industrial revolution era. Breakthroughs such as artificial intelligence, nanotechnology, IoT, biotechnology, and quantum-based technology are beginning to develop. The impact of this development is that the services provided provide a more affordable price.

Lim et al. [46] stated that IoT is a new technology that plays a part in the entrepreneurial environment in knowledge transfer. This research gives the information that the main source of knowledge in the startup ecosystem is the investors. For prospective entrepreneurs and entrepreneurs, it is considered important to have knowledge about technology.

A study by Qian et al. [74] examined technopreneurship in England and California, USA. Entrepreneurship is widely acknowledged as a driver of economic growth. The authors identified factors related to technology in the startup world at the district level of the two regions and obtained heterogeneous results. Regions that have a high-tech startup business will yield high results. In areas where technology intensity is still lacking, the government will experience more difficulty in fostering technological entrepreneurship in the area.

Results shown in research by Haryanti et al. [33] explained that several factors needed by a university in an effort to strengthen technology entrepreneurship, namely technology transfer, competition, and university policy. These factors have a significant impact on the university's technology entrepreneurship education. Increasing creativity and developing entrepreneurial skills can encourage students to become better when there is competition in the field.

Abdurohim et al. [71] conducted a study regarding the knowledge and process of using technology in Bandung. The author stated that the evaluation of the process was carried out to a number of business group partners. By carrying out approaches such as design, manufacture, testing, training, technology guidance, and business mediation, the author obtained results in the form of increased quality and quantity of products produced by business group partners. Similar research was also carried out by Sari & Siregar [79] in Aceh. Many young people who are engaged in entrepreneurship combine it with the use of technology. This proves that young people have a close relationship with technology which is one of the factors supporting the progress of the national economy.

Increased business competition in the era of globalization requires entrepreneurs to adapt to the use of technology in business and consumer needs. Research conducted Suharyati & Ediwarman [67] suggested that entrepreneurs improve technological knowledge and usage skills. This re-search was conducted in Bogor. Fintech education was carried out in the form of lectures and financial application download.

It is stated in a study by Barnett et al. [7] that the use of the internet has a positive impact on entrepreneurship. The use of the internet can help promotion through existing social media. Investing in infrastructure or using technology in entrepreneurship can help with the promotion or marketing of businesses.

An analysis of students' technopreneurship intention impact on entrepreneurship education was conducted by Nurhayati et al. [68]. Data analysis used regression techniques with 102 students. The results show that the intention of students is quite high in the field of



technopreneurship with a presentation of 55.7%. Entrepreneurship learning is considered very effective. With the results obtained, the authors suggested educational institutions to enhance learning in the field of entrepreneurship, especially technopreneurship. Similarly, a study by Asih et al. [22] stated that entrepreneurial education in the era of the industrial revolution 4.0 influences the behavior of students to become more innovative in the field of technopreneurship.

Research on the impact of the Internet of Everything (IoT) was conducted by Langley [42]. This research discusses the way organizations run their businesses in the presence of IoT. The author stated that business models and creation can improve with the use of IoT. Prospective entrepreneurs or entrepreneurs will get new challenges to bring change, create opportunities, and new challenges in business development. Entrepreneurs and prospective entrepreneurs must continue to develop new knowledge in the business model that is run.

In 2020, Youssef et al. [9] conducted research on the digitalization of economy and entrepreneurship intention. Findings from this study show that personal attitude and behavioral content are the main determinants of entrepreneurial intention. The authors argue that more attention should be paid in encouraging graduates to implement their own novel business ideas. Higher education institutions benefit much from digital technology in terms of developing innovative tools that can strengthen the academic entrepreneurial process. Digital technology also has a considerable significance in changing the academic entrepreneurship process. Startups can benefit from digital technologies that allow lower cost coordination and communication.

Hypotheses:

- H1a: Academic major affects the level of understanding of technopreneurship of the students;
- H1b: Academic major affects the level of willingness of the students to adopt a new technology for their future business.

Wang & Wong [97] examined entrepreneurial intentions based on gender. This study revealed that over time students' entrepreneurial intentions decreased [95]. As many as 19% in female students and 28% in male students based on the developed model. Gender differences need to be considered in growing and developing the entrepreneurial potential of students.

In 2009, research by Pruet et al., [73] would be conducted that surveys at universities in the US, Spain and China on how entrepreneurial intentions are seen from cultural, social and technological aspects. The results show that entrepreneurial intentions are not significantly affected by gender. This means there is no definite difference between the intention of women and men in starting a business. In the same year, Zhang & Arvey [102] conducted a study on the role of gender in career decision making, especially in entrepreneurship. The results obtained show similarity to that of Pruet et al., [73]. Unfortunately it is not stated clearly in this study the type or area of business that will be built.

A survey carried out by Millman et al., [56] regarding factors that can improve students' behavior and perceptions of entrepreneurial technology intentions shows the results that some students prefer to become technopreneur. This survey was conducted at three universities in China. The influencing factors are student status, gender and family income.

Ertuna & Gurel [26] conducted a survey in five Turkish universities by taking a sample of 767 students enrolled in business and engineering majors. The survey conducted focused on the role of education in student characteristics and entrepreneurial interests by selecting gender, family background, and student majors as control variables in the study. The authors found that students' intentions to become entrepreneurs were influenced by their higher education and personalities. By having a higher level of education, students are more inclined to start a business. However, this study did not show differences between male and female students specifically regarding the technopreneurship.

Research by Maresch et al. [52] yielded results showing that entrepreneurial intention is positively influenced by entrepreneurship education with factors of age, gender, and motivation as control variables. Entrepreneurship education must be modified and adjusted to address problems in business students (economics and business administration), science



and engineering (engineering and natural sciences). However, these results were contrary to that of Boissin et al., [13] and Agboola [1] which stated that entrepreneurial intention is not significantly influenced by work experience, family background, and gender. There is a lack of further discussion on major choice and entrepreneurial intention with age and gender as control variables.

In Malaysia, a person's career choice is affected significantly by gender, specifically men [96], [44], age, employment status, and nationality. These factors have a positive effect on the intention to start a business after finishing formal education and entering the stage of seeking employment [70], [78] previously conducted similar research and stated that gender is one of the important factors in entrepreneurship. This is shown in how male students tend to have higher entrepreneurial intention than female students. In contrast, Sowmya et al., [90] in their study stated that female students are more inclined to start a business than male students. The entrepreneurship field is considered to have contributed much to the creation of job opportunities. Further contrasting results are found in studies by Oosterbeek et al. [65], Franco et al. [28], Varamäki et al. [95], Aldianto et al., [3] which all stated that gender has no effect on the implementation of entrepreneurship in education.

The increase in entrepreneurial self-efficacy statistically only occurs in male students. This was discovered by Shinnar et al., [85] in their research. Whereas statistically for the gender subgroup, entrepreneurial intentions did not change. Seeing the results of the study, implicit entrepreneurship education has not yet reached female students. With the results shown, entrepreneurial intentions must be integrated with gender.

Elliott et al. [24] developed entrepreneurship education programs and entrepreneurship guidance in the University of Canada's engineering and computer science majors. This education and guidance program is aimed at female students in an effort to provide teaching, learning experience, and support for the gender of a small group of students. From this study, the obtained results show that sensitivity to gender can increase the perception of entrepreneurial self-efficacy.

From the literature that has been discussed, get a hypothesis:

- H1e: Father's occupation affects the choice of the academic major of the students.
- Research on technopreneurship understanding among university students:
- H1c: Gender affects the level of understanding of technopreneurship of the students;
 - H1d: Gender affects the choice of academic major.

Children's academic choice is often influenced by their parents. D. Mare [51] evaluated Continuation of children's education from the socio-economic aspect of the parents and family structure. The data source used was primary data from the Occupational Changes in a Generation (OCG) survey in 1973. The evaluation resulted that the family had a strong influence in the transition to higher education. This result is supported by previous research by Sewell et al. [82]. Sewell et al., used data taken from middle schools, private schools, and parish schools in Wisconsin, using a questionnaire survey method conducted in 1957. It was founded that the strongest impact on children's higher education choices was influenced by parents. Parental economic status provides more advantages in the development of education to a higher level.

In 2001, Leppel et al. [45] examined students' decisions as seen from parents' work and parents' socioeconomic status. Using survey data conducted in 1990 on Beginning Postsecondary Students (BPS) by the National Center for Statistics Education (NCES) U.S. Department of Education shown that the tendency of male students with high socioeconomic backgrounds prefers business majors. The conditions indicated in this study contrast with the results for female students. Trusty et al. [92] conducted a similar study, in which the results show that the higher the socioeconomic status of the family, the higher the desire of male students to choose business majors when compared to female students.

Research by Yingyi Ma [49] in 2009 shown that parental involvement and socioeconomic background have a significant impact on children's education. Parents' occupation affects to their socioeconomic status. However, this research does not clearly stated with the type of work of parents that can influence to many more children's academic education.



Simpson [86] proposed a question regarding how children's academic choice is influenced by their parents. This study aimed to see what factors can influence a child in choosing tertiary education to obtain a bachelor's degree and focus on the background of the mother's work that plays a major role. By using as many as 2359 students from High School and Beyond respondents, this study found that mothers have a tendency in suggesting their children to take non-engineering majors. While fathers tend to advise taking a major in engineering. Wolfer et al. [101] have conducted a similar research and stated that the work of a mother gives a significant influence on children's education.

There are some deficiencies found in the literature above, namely the lack of exposure to what work is influential and whether fathers can have more influence on children's education.

This study used purposive sampling technique [34], [20], [17], [63], [64]. Researcher collected the data from 145 students enrolled in universities in Bali. The main criteria for the student to be selected as a respondent is the willingness to start a business after finishing their education. This criteria based on Jun Cui et al. [21] on how every action taken by students in starting a business is influenced by said students' entrepreneurial intention.

Respondent data is not in line with the criteria desired from them will not be included in the analysis process.

Respondents have the range of ≤ 20 years old to > 25 years old. On the age criterion, as much as 30.1% were of the age of ≤ 20 years old, 65% of the students were age 21-25 years old, and 4.9% of the students were > 25 years old. In the criterion of academic major, 42% of the respondents were engineering students, 38.5% are from economy and business majors, and 19.6% are from other majors. Other majors consist of several majors namely tourism, linguistics, agriculture, teacher training, pharmacy, Mathematics and Natural Sciences, and law.

From the literature review that has been conducted, several hypotheses were obtained. From these hypotheses, we acquired variables that are used in every step of the analysis. The variables are:

Education (v1):

In the education variable, there are two sub-variables such as:

- Business internship availability in the questionnaire, we inquired into opportunities for entrepreneurial practice. According to Jack et al. [37], Harmeling [30], Dickson et al. [88], entrepreneurial practices are considered important in building a business. Through this opportunity, students can become more skilled in providing solutions or ideas related to problems that are happening [18] and help build their own business [5];
- Academic major. Respondents filled out the academic major they are currently taking in the questionnaire. There are 3 academic major categories, namely Economics & Business, Engineering, and Others. This division was done due to the obtained results showing as much as 50% more respondents coming from the department of economics & business. Maresch et al. [52] stated that the majority of businesses were started by engineering, economics, and business students.

Family (v2):

The family variable is based on how much influence the family has on entrepreneurship, especially when viewed from the father's occupation. Respondents were asked to fill in the type of father's work, which was divided into 6 categories: government employees, farmers, entrepreneurs, artists, private employees, and others.

Technopreneurship Understanding (v3):

Technopreneurship understanding variable is divided into 3 sub-variables, which are:

(a) Level of understanding. Understanding of technopreneurship in students was evaluated by the questions provided in the questionnaire. We use Likert scale (1 to 10) to measured that how are confident a respondent to understanding about technopreneurship;



(b) The desire to adopt technology. After knowing the technology that is available in the market today, we investigate whether respondents have the desire to use or apply the four types of technology above. We use Likert scale to measure this sub-variable.

Gender (v4):

The gender factor is also the focus of the following studies [102], [56], [26]. Schiller dan Crewson [80] found an interesting result that there is a significant difference between male and female entrepreneurs. Thus, in this study, we investigate whether gender has an impact on respondents' confidence in technopreneurship.

From the answers given by respondents, the Likert scale is used to measure the relationship of respondents to strongly disagree to strongly agree on a numerical scale [31], [23], [100], [62]. This study used Fisher's exact test to measure whether the relationship between variables is significant. Alpha value used is equal to 0.05. Fisher's exact test was used considering it is known to be effective in measuring small or nominal samples [48], [38], [4].

Cramer's V Test was conducted to measure the strength of the relationship between the variables [10], [8], [2].

Proposed relationship model of factors that have an impact on students' understanding of technopreneurship and importance of adopting a new technology in their future business.

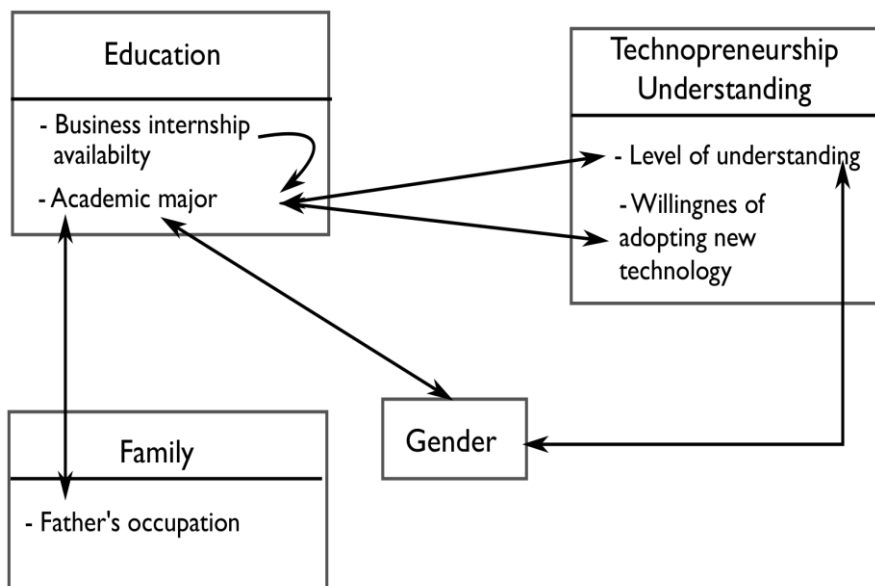


Figure 1 – Proposed model for technopreneurship understanding among students in Bali

In this case, the Likert Scale is grouped into three namely (0-3), (4-7), and (8-10). The groupings are made based on the rules of Sturges [81] and taken from student respondent data. The results from Cramer's V test obtained were translated based on the level of strength [89].

The Likert Scale is grouped into three namely (0-3), (4-7), and (8-10). The groupings are made based on the rules of Sturges [81]. The first group (0-3) for students who do not know or do not understand about technopreneurship. The second group (4-7) for students who might know and understand a little about technopreneurship. And the last group (8-10) for students who know and understand about technopreneurship. It can be seen that most students fall into the 4-7 group, indicating that they likely know about technopreneurship but not very confident.

The level of technopreneurship understanding of engineering students is higher than EB students and other major students. This means the H0a hypothesis: Academic major does not the level of understanding of technopreneurship of the students is rejected. Academic majors have an influence on the level of understanding of students in understanding technopreneurship.



Cramer's V Test = 0.3. The relationship between academic major and level of understanding of technopreneurship is very strong.

The respondents will adopt technology for their future business. Students realize that their future business can be supported by the use of technology.

The desire of students in all three majors categories to adopt technology in their future business is very high, as many as 76% of EB students, 88.3% of engineering students, and 73% of other majors. This means the $H0b$ hypothesis: Academic major affects the level of willingness of the students to adopt a new technology for their future business is accepted.

Cramer's V = 0,229. The relationship between academic major and willingness to adopt new technology is strong.

Understanding of technopreneurship is lowest in female students while male students have a high understanding of technopreneurship. Bhardwaj [11] states in his research that women entrepreneurs need to improve entrepreneurial skills and understanding. Elliott et al. [24] suggested in their study that entrepreneurship education and technopreneurship guidance need to be improved. This means that the $H0c$ hypothesis: Gender does not affect the level of understanding of technopreneurship of students is rejected. Gender has an influence on understanding entrepreneurship.

Cramer's V -test = 0.2. There is a strong relationship between gender and technopreneurship understanding.

The following show variables that do not have a direct relationship to variables that belong to the technopreneurship understanding category. These variables have a relationship with other variables that have a strong relationship with the technopreneurship understanding category.

Although gender has a strong relationship to the level of technopreneurship, gender also has a relationship with academic major. Thus, gender is included into both direct and indirect relationships. Female students tend to choose EB majors while male students tend to choose engineering majors. This means that the $H0d$ hypothesis: Gender does not affect the choice of academic major is rejected. There is a significant difference in the number of female and male students in the three majors. These results reveal that academic majors are influenced by gender.

Cramer's V test = 0.4. Gender and academic major have a strong relationship.

We founded that the father's role gives more impact to the students' academic choice compared to the mother's role. This can be because most people in Bali use the patriarchy system [98], [91], [75] [41].

The relationship between fathers' work and participants' academic major. This means that the $H0e$ hypothesis: Father's occupation does not affect the choice of the academic major of the students is rejected. Father's work was influential in the selection of academic majors.

Cramer's V test = 0.3. There is a strong relationship between the father's occupation variable and the selection of children's academic majors. Fathers with private sector jobs tend to direct their children to choose EB majors. While fathers who work as entrepreneurs direct their children to choose engineering majors.

Understanding of technopreneurship in engineering students is higher than that of students majoring in EB and other majors. One of the universities in Bali, Udayana University (<https://www.unud.ac.id/>) provide technopreneurship courses. This influences the understanding of technopreneurship in students. Other than providing only courses, having a technopreneurship/entrepreneur practice or internship. According to Pittaway et al. [72], students can have more skills to become entrepreneurs if they follow the practice of entrepreneurship. Although most students majoring in engineering study technopreneurship, they do not necessarily receive enough entrepreneurial practice. Thus, the author suggests that universities provide enough internship opportunities, especially for engineering students.

According to Pei [69], students from engineering majors should be more knowledgeable about emerging technologies because their curriculum is designed to make them familiar with new types of technology. However we found that most students with educational backgrounds in engineering will prioritize the use of technology in their future



business plans. This brings to surface two different opinions, namely (1) Students majoring in engineering have not been given enough knowledge about the technology that is currently developing, and (2) Students with non-engineering majors have a high curiosity by finding information about developing technologies.

Gender is considered as one of the control variables that influence students in entrepreneurial intentions and characteristics [52], [26]. Based on the results, technopreneurship understanding is lowest in female students while male students have high technopreneurship understanding. Bhardwaj [11] stated that entrepreneurial skills and understanding of women entrepreneurs need to be improved. This result is also supported by research from Vial [96], Noorkartina et al. [70], dan Lasso et al. [44] which stated that men tend to be entrepreneurs. This means that gender is a factor that influences the understanding of technopreneurship because it involves their career in the field of entrepreneurship.

In contrast, studies by Pruett et al. [73], Hytti et al. [35], Oosterbeek et al. [65], Franco et al. [28] dan Aldianto et al. [3] stated that gender does not affect entrepreneurship education. Male and female students do not have definite differences in their intentions in their future business. These results conflict with the results relating to the selection of majors for students. Female students tend to choose EB majors while male students tend to choose engineering majors. This statement shown that the understanding of technopreneurship in students majoring in engineering is higher compared to students majoring in EB and other majors. Entrepreneurship education is considerably capable of overcoming problems experienced by science & engineering students and EB students. Entrepreneurship education needs to be adjusted to a predetermined target. Gender differences need to be taken into consideration to design interventions in efforts to increase entrepreneurship [95].

Father's occupation can significantly and strongly influence the choice of academic majors for students. The academic major taken can significantly affect students' understanding of technopreneurship. Thus, father's occupation has an influence on students' understanding of technopreneurship.

However, the obtained results have weaknesses that cannot be generalized to all students at universities in Bali because they use purposive sampling techniques. Nevertheless, these results can be used as an additional reference as an initial description of the condition of technopreneurship development in Bali.

CONCLUSION

This research was conducted to investigate factors that influence the understanding of technopreneurship among university students in Bali. There are four variables measured in this research: education (v1), which consists of two sub-variables, which are business internship availability and academic Major. The second variable is family (v2). The third variable is technopreneurship understanding (v3), consisting of two sub-variables of Level of understanding and the desire to adopt technology. The fourth variable is gender (v4). The hypotheses acquired in this research consist of 3 hypotheses that are directly related and 2 hypotheses that relate indirectly between the variables that have been mentioned. The results of the Fisher Exact Test and Cramer's V Test analysis on direct relationship show that firstly, the academic majors variable influences the level of understanding technopreneurship strongly. Secondly, the major academic variables have a strong influence on students' ability to adopt technology. The third factor that has a strong influence on understanding of technopreneurship is gender. In the indirect relationship hypotheses, it is found that gender strongly influences the decision of academic major and the father's occupation is very influential in the selection of children's academic majors. The results obtained indicate that the proposed variables have a strong relationship with each of the other variables.

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