WWW.PEGEGOG.NET

Determining Green Entrepreneurial Innovation of Higher Education Students: SEM Analysis Approach

Anna Marganingsih[1*], Emilia Dewiwati Pelipa[2], Eliana Yunitha Seran[3], Yayan Adrianova Eka Tuah[4], Nur Kholifah5, Hani Subakti[6]

[1,2] Department of Economic Education, STKIP Persada Khatulistiwa, Kalimantan Barat, Indonesia
[3]Department of Primary Teacher Education, STKIP Persada Khatulistiwa, Kalimantan Barat, Indonesia
[4]Department of Computer Education, STKIP Persada Khatulistiwa, Kalimantan Barat, Indonesia
5Departement of Clothing and Food Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[6]Department of Primary Teacher Education, Widya Gama Mahakam Samarinda University, Kalimantan Timur, Indonesia

Abstract

This research measures the role of psycho-cybernetics training (PT), green entrepreneurship training (GET), and green entrepreneurship motivation (GEM) in determining GEI. Going even deeper, GEM was also tested for its mediating role on the influence of PT and GET in determining GEI. This study adopts an ex-post facto design that focuses on the condition of students after green entrepreneurship training and psycho-cybernetics reinforcement. A total of 294 university students in Indonesia were involved to fill out the questionnaire voluntarily. A Likert-scale questionnaire instrument whose items have been validated is used to collect data. Structural Equation Modeling (SEM) analysis is used to test the hypothesis of direct influence between variables and mediating roles through path analysis and bootstrap methods. The results of the direct effect test stated that PT and GET play a significant role in determining GEM, and PT, GET and GEM also play a significant role in determining GEI. The mediating role of GEM has also been tested to be significant in the influence of PT and GET in determining GEI. These results provide a big signal that in creating various green innovations in entrepreneurship, two aspects (technical skills and psychological conditions) are needed which are well synergized.

Keywords: Green entrepreneurial innovation, green entrepreneurial motivation, pyscho-cybernetics training, green entrepreneurial training, higher education student.

Introduction

STEM Since the declaration of the seventeen sustainable development goals (SDGs) by the United Nations in 2015, the issues of environmental stability, climate change, energy saving and human welfare have become four major issues that continue to be considered (Prieto-Jiménez et al., 2021; Shulla et al., 2020). In the last decade, higher education (HE) has become increasingly aware of its crucial role in helping achieve this goal. An important orientation that forms the basis of development in HE is the creation of green economic development (GE) and sustainable society (SS) (Heleta & Bagus, 2021). Following up on this interest, educational institutions that synergize with the world of work industry are starting to think about creating various green jobs (Kopnina, 2020). Where, the orientation apart from achieving the goals of GE and SS is to overcome the gap regarding the limited number of jobs that are not proportional to the large number of the workforce, especially in developing countries like Indonesia (Kurniawan et al., 2021; Sutiman et al., 2022). Based on these aspects, it has been seen that producing graduates who are ready for entrepreneurship is the key to achieving this goal (Wiramihardja et al., 2022). Furthermore, what needs to be considered is that the entrepreneurs produced must be oriented towards green entrepreneurs creating green jobs which are currently very important in helping to green jobs that lead to GE and SS (Bali Swain & Yang-Wallentin, 2020).

In generating green jobs, green entrepreneurs certainly have to have continuous innovation (Sawang, 2020; Yun et al., 2019). Continuous innovation is a response to circumstances that demand new changes in the form of processes and practices (Pansera & Sarkar, 2016). In the context of the SDGs, sustainable innovation refers to new processes and practices as an effort to overcome environmental and energy gaps to help create human welfare in a sustainable manner (Naderi et al., 2022).

This innovation has four main forms in its implementation, including creating solutions to solving green problems at work, rethinking emphasis on work, developing a green work culture, and collaborating appropriate technology in the right work. These four forms of innovation must be able to be carried out by entrepreneurs in thinking about and creating green entrepreneurial innovations (GEI) (Muangmee et al., 2021; Pavlova, 2009; Yun et al., 2019). However, generating GEI is certainly not easy to do. This is proven, the jobs that have grown to date have not had a positive impact on the environment and are energy efficient (Geng & He, 2021; L. Lin et al., 2010). Once identified, the most important problem is that there is no motivation from within the entrepreneurs to make their jobs green. They are still motivated to take easy risks and pay big dividends. This happens because they lack the knowledge and practical skills to pursue green innovation in entrepreneurship (Lüdeke-Freund, 2020). Strengthening green entrepreneurship motivation (GEM) is the main step that must be taken by higher education as an effort to develop GEI in students (Muangmee et al., 2021). GEM is an encouragement from within the individual to tend or focus on an activity to create green jobs as a form of concern for fellow living things (Hameed et al., 2021). GEM will appear departing from the awareness within the individual who has thought about human well-being in the future through greening at work (Yun et al., 2019). Motivation like this is very important to be strengthened in students who will be oriented towards creating green jobs after they graduate. But back again that strengthening GEM in students requires various treatments that can smoothly grow (Wagiran et al., 2022; Wang et al., 2021).

In an effort to stimulate the growth of GEM from within students, various special trainings are needed that are able to treat and provide knowledge and skills for practicing green entrepreneurship (Fawaid et al., 2022). Psycho-cybernetics (PT) training is one of the proper trainings to do. Psycho-cybernetics is the science of human development which is related to a knowledge system that causes individuals to be able to make accurate and predictable changes according to their thoughts, feelings and beliefs (Maltz, 1986). PT emphasizes aspects of self-esteem, self-efficacy, and rational thinking about circumstances and opportunities that allow it to be achieved through its abilities, so that this will lead to individual welfare (Szymanski & Szymanski, 1995). Training that emphasizes these aspects is very much in line with helping students construct their thoughts and feelings that are able to reflect their environmental conditions in order to achieve their welfare (Mrchev, 1997). In addition, these conditions must also be balanced by the existence of green entrepreneurship training (GET) which plays a role in equipping green skills in the entrepreneurship process (Che Nawi et al., 2022; Sawang, 2020). Both are important, because developing entrepreneurs requires a balanced psychological and practical approach.

Based on the problems above and the importance of research to be carried out, this study aims to reveal the extent of the role of PT, GET and GEM in developing GEI in students. Apart from that, the importance of motivation in entrepreneurship, this study also measures the extent of GEM's involvement in mediating PT and GET in influencing the growth of GEI. Figure 1 shows the visualization of the conceptual framework in this study.
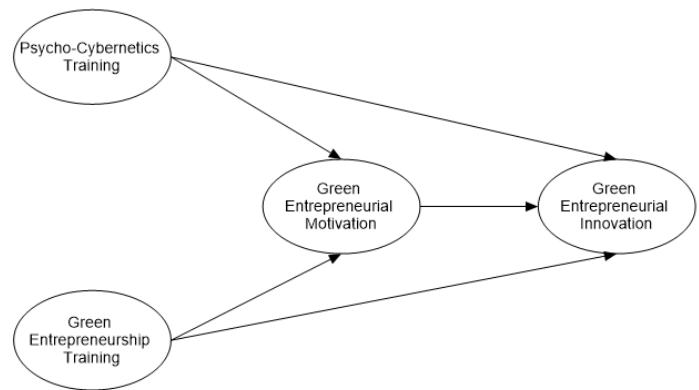
Figure 1: Conceptual framework.

Literature Review and Hypotheses

Psycho-cybernetics Training and Green Entrepreneurial Training on GEM

Even though it is still minimally discussed, if PT is interpreted in depth, the essence will be known which makes it very important to study. PT is the science of human development related to a knowledge system that causes individuals to be able to make accurate and predictable changes according to their thoughts, feelings and beliefs (Maltz, 1986). PT emphasizes aspects of self-esteem, self-efficacy, and rational thinking about circumstances and opportunities that allow it to be achieved through its abilities, so that this will lead to individual welfare (Szymanski & Szymanski, 1995). Based on previous relevant research, that these three aspects are an important foundation, considering that motivation in individuals to tend to be entrepreneurship can grow strongly (Neneh, 2020; Seikkula-Leino & Salomaa, 2021). Furthermore, one of the orientations of PT which leads to respecting fellow human beings and their environment is very relevant to support the formation of motivation for green entrepreneurship (Del Vecchio et al., 2021; Kassim et al., 2020). Thus, PT training refers to strengthening its indicators which include: self-esteem, self-efficacy, self-acceptance, rational thinking, feelings of well-being, respect for fellow human beings, and respect for the environment. Then, increasing GEM through GET is intended to practice green entrepreneurship practice skills directly (Sawang, 2020). This practice includes five important aspects that are trained on students, namely green awareness, green literacy, green capability, green creativity, and green criticality (Alwakid et al., 2021; Del Vecchio et al., 2021). According to previous research, these five aspects must be mastered thoroughly to ideally form GEM and be able to lead to the emergence of renewable and sustainable innovations (Hameed et al., 2021; Wang et al., 2022). H1: PT has a significant role in determining the growth of GEM; H2: GET has a significant role in determining the growth of GEM.

Psycho-cybernetics training, green entrepreneurial training and motivation on GEI

The theory of innovation in entrepreneurship emphasizes that entrepreneurial innovation arises as a result of mature cognitive and psychomotor stimulation and has a concept to implement

(Ratten, 2022). However, mature concepts will be applicable if there is a strong foundation in the form of individual encouragement to do so (Ratten, 2022; Sawang, 2020). These matters implicitly confirm that physical, mental and psychological conditions must be integrated with each other in generating mature concepts and their implementation, so this is what is called innovation (Y. H. Lin & Chen, 2018). These three conditions are very relevant in the context of spurring the growth of GEI. GEI in an individual will grow if he has the knowledge and skills to think about and apply green concepts in opening a job (Frare & Beuren, 2022; Guo et al., 2020). On the other hand, knowledge and skills will be implemented well if followed by psychological conditions in the form of motivation that departs from good conditions regarding self-esteem, self-efficacy, self-acceptance, rational thinking, feelings of well-being, respect for fellow human beings, and respect for the environment (Postigo et al., 2021; Szymanski & Szymanski, 1995; Wang et al., 2021). This gives a strong signal that GET which includes cognitive and psychomotor domains can determine the growth of GEI. Then psycho-cybernetics and motivation which act as psychological conditions can underlie the growth of GEI. As revealed by previous research that must be smooth for the growth of GEI in individuals must integrate skills strengthening which is balanced with psychological reinforcement (Muangmee et al., 2021; Na-Allah & Ahmad, 2022; O'Brien & Hamburg, 2019). H3: PT has a significant role in determining the growth of GEI; H4: GET has a significant role in determining the growth of GEI; H5: GEM has a significant role in determining the growth of GEI.

Mediating Role of Green Entrepreneurial Motivation

GEM is seen as the main foundation in determining GEI to emerge and be implemented (Ratten, 2022). GEI will appear if within the individual there is motivation that includes the desire to succeed through entrepreneurship, the urge to preserve nature and save energy, the desire to achieve sustainable prosperity, the consequences of rewarding success, and the desire to provide job opportunities to others (Sawang, 2020; Wang et al., 2021). These indicators become the main constructs as a motivation to carry out green innovations in creating jobs through GEI. GEM itself needs other aspects that can stimulate it to grow. Motivation usually grows when the individual has a good psychological state and has sufficient skills in a field (Hameed et al., 2021). In this context, PT and GET are the two most important to combine in growing GEM. PT places more emphasis on psychological conditions that are full of confidence, courage followed by the desire to do things in the interests of the environment (Maltz, 1986; Szymanski & Szymanski, 1995; Wang et al., 2022). While GET will stimulate the growth of GEM through strengthening green knowledge and skills (Dana et al., 2021; Hameed et al., 2021). This assertion is reinforced by previous research which also agrees that to stimulate one's motivation to innovate requires strengthening psychological conditions and strengthening physical skills and understanding of a job (Chang et al., 2022; Dana et al., 2021; Hassan et al., 2021). H6: GEM plays a significant role in mediating the influence of PT in determining GEI; GEM plays a significant role in mediating the influence of GET in determining GEI.

METHOD

Research Design

Based on the data collected from the conditions or events that have occurred, we decided to adopt the ex-post facto research method designed by Cohen et al. (2011) (Cohen et al., 2011). This is also a cross-sectional study where data is collected through a questionnaire that has been planned and designed using a statement scheme according to the parameters of each measured variable. In accordance with the procedures in the conceptual framework that were previously strengthened through theoretical studies, both direct and mediating effects were measured based on the actual data that occurred. We ensure that the research direction is in line with Indonesia's human resource development policies through entrepreneurship education and a focus on the SDGs from the United Nations.

Research Participants

We decided that the participants involved in this study were selected based on the criteria of having experience in taking entrepreneurship courses. The next criterion is that the students involved have also attended intensive training related to PT and GET organized by related tertiary education institutions and have a minimum score in the very satisfactory category as evidenced by a certificate. Before conducting the research, we conducted an online survey first to ensure the willingness of students, so that this would affect the level of rationality of the data produced. The results of simple random sampling probabilistic calculations were obtained by a number of participants (N = 294 students) of higher education in Indonesia. Of all the participants, fifty-two percent were women and the remaining forty-eight were men. All students involved are students majoring in economics education in higher education. Their ages varied between 20-22 years and obtained an average of 21 years (SD = 3.68). Meanwhile, in terms of parental background, the majority of participants (67%) reported that their parents worked with other people or agencies and the rest reported that their parents were self-employed.

Measures

Green entrepreneurial innovation scale

The GEI scale is adopted from Frare & Beuren (2022); Muangmee et al. (2021) for the purposes of formulating and developing this research instrument (Frare & Beuren, 2022; Muangmee et al., 2021). The scale was adopted with the consideration of a high level of reliability and validity to measure the quality of green innovation in various participant characteristics. This scale consists of four indicators that are used to evaluate green innovations that arise in participants in entrepreneurship. We also re-ensure the level of validity and reliability through re-testing with confirmatory factor analysis (CFA), in order to obtain: creating green problem-solving solutions at work (LF=0.789; α=0.902); green behavior at work (refuse, reduce, reuse, repair, and recycle) (LF=0.868; α=0932); developing a green work culture (LF=0.779; α=0.891), and collaborating appropriate technology in appropriate work (LF=0.848; α=0.914). This instrument adopts

a 5-point Likert Scale type starting from a score of 1 (strongly disagree) to 5 (completely agree).

Psycho-cybernetics training

Measurement of PT is carried out by referring to the strength of the indicators as parameters possessed by students after receiving intensive training. In measuring PTs that tend to be entrepreneurial, we follow the previous parameters from Maltz (1986) which are then re-tested to ensure the appropriate level of validity and reliability (Maltz, 1986). Of the eight PT indicators, at least seven of them received confirmation of a high level of validity and reliability, so they were used to measure, which included: self-esteem (LF=0820; α=0.920); self-efficacy (LF=0.831; α=0.908); self-acceptance (LF=0.830; α=0.911); rational thinking (LF=0.802; α=0.898); feelings of well-being (LF=0.842; α=0.903); respect fellow human beings (LF=0.754; α=0.863); and respect the environment (LF=0.787; α=0.882). As before, this also adopts a 5-point Likert Scale with the same conditions

Green entrepreneurial training

The GET measurement is carried out by referring to the strength of the indicators as parameters possessed by students after receiving intensive green entrepreneurship training. In measuring the GET, we follow the previous parameters from Sawang (2020); Gardetti & Muthu (2018) then tested again to ensure the appropriate level of validity and reliability (Gardetti & Muthu, 2018; Sawang, 2020). There are 5 main indicators and have received confirmation of a high level of validity and reliability, which include: green awareness (LF=0.752; α=0.858); green literacy (LF=0.731; α=0.846); green capability (LF=0.811; α=0.930), green creativity (LF=0.834; α=0.944); and green criticality (LF=0.725; α=0.899). As before, this also adopts a 5-point Likert Scale with the same conditions

Green entrepreneurial motivation

GEM is measured using a green motivation profile scale adopted from Wang et al. (2021) for the purposes of formulating and developing this research instrument (Wang et al., 2021). The scale was adopted with consideration of the high level of reliability and validity to measure the profile of green motivation in various participant characteristics. This scale consists of five indicators that are used to measure the GEM that appears to the participants. We also obtain validity and reliability level certainty through back testing, so that it is obtained: creating green problem solving solutions at work includes the desire to succeed through entrepreneurship

(LF=0.911; α=0.949); encouragement to preserve nature and save energy (LF=0.931; α=0.962); the desire to achieve sustainable prosperity (LF=0.912; α=0.958); there are reward consequences for success (LF=0.817; α=0.912); and the desire to provide work opportunities to others (LF=0.833; α=0.916). This instrument adopts a 5-point Likert Scale type starting from a score of 1 (strongly disagree) to 5 (completely agree).

Statistical Analysis

Structural Equation Modeling (SEM) analysis is used to test the hypothesis of direct influence between variables and mediating roles through path analysis and bootstrap methods. Path analysis is used to measure the direct effect of exogenous variables on endogenous variables. While the boostrap method is used to measure the role of GEM in mediating the role of PT and GET in determining the growth of GEI. Bootstrap was adopted considering its accuracy, considering it to be the most reasonable method and capable of obtaining confidence limits for certain indirect effects in most conditions (Preacher & Hayes, 2008). Data analysis in this study used SmartPLS 3.0 supporting software. The research hypothesis is formulated based on relevant theoretical support related to the line of influence of exogenous variables on endogenous variables directly or by using mediation, as stated in the previous literature review.

FINDINGS

Model fit evaluation

Previously we tested the fit model three times until finally the model was determined according to what is presented in Figure 2. This test model provides an evaluation of the suitability level of the standard structural model which is able to explain the coefficient of the relationship between variables and the role of mediation. Evaluation of the fit index in the last test is presented (as the basic model) as in Table 1. With the analysis carried out, all the fit indices in the entire basic model are well evaluated according to the cutoff criteria. The expected small chi-square value was confirmed as appropriate. The high probability value (p-value ≥0.50) provides clarification of the suitability between the model being tested and the data, so that the predictive ability of the model being tested on the observed value is very good. GFI, AGFI, TLI and NFI were all realized according to above the threshold value (≥0.90). SRMR value < 0.05 and RMSEA < 0.08, this also means a high suitability and structural model analysis can be carried out (Westland, 2019).

Table 1: Model fit test result

| Goodness of fit aspect	Criteria	Result	Evaluation
Chi-square	Small	19.771	Fit
Probability	≥0.50	0.341	Fit
Goodness of fit index (GFI)	≥0.90	0.917	Fit
Adjusted goodness of fit index (AGFI)	≥0.90	0.913	Fit
Tucker lewis index (TLI)	≥0.90	0.921	Fit
Normal fit index (NFI)	≥0.90	0.910	Fit
Standardized root mean squared residual (SRMR)	<0.05	0.033	Fit
Root mean square error of approximation (RMSEA)	<0.08	0.064	Fit
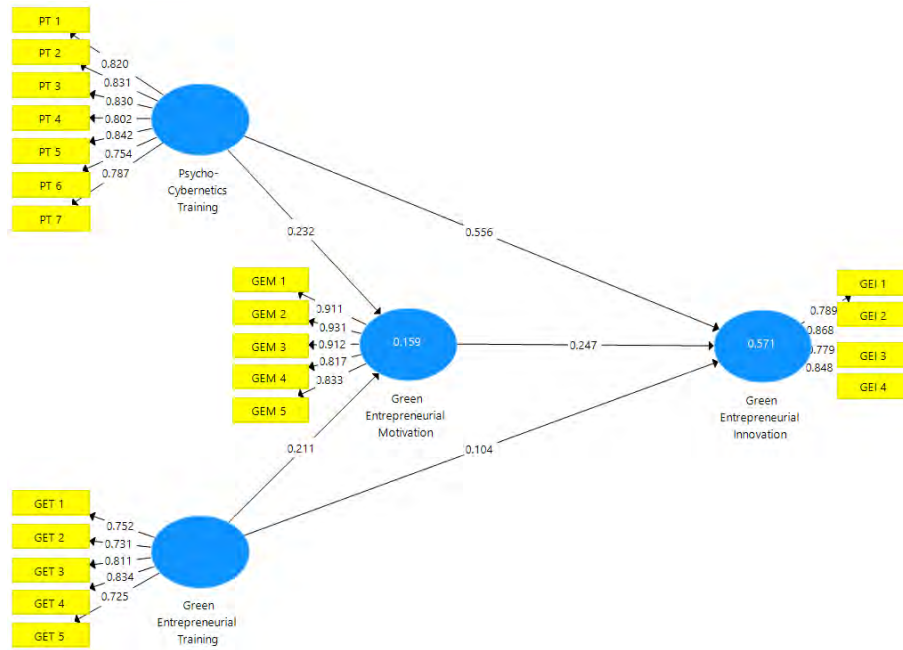
Figure 2: Structural model in this research

Direct effect test results

Presenting the results of the direct effect test through path analysis refers to the estimated path coefficient in the original sample and the p value with a significance level of 5% (p≤0.050) as shown in Table 2. The estimated path coefficient in PT to GEM was obtained at 0.232, and the p value of 0.000***, so that H1 is supported. The second consideration is different from the previous one in that the path coefficient value in GET to GEM is 0.211, and the p value is 0.000***, so

that H2 is also supported. Furthermore, the highest estimated path coefficient value was obtained at 0.556 and a p value of 0.000*** in the path PT to GEI supported H3. Likewise, H4 is supported by considering the acquisition of an estimated path coefficient value of 104 and a p value of 0.001** on the GET path to GEI. Furthermore, the path coefficient on GEM to GEI is 0.247 and the p value is 0.000***, so that H5 is supported. Thus, the results prove that all hypotheses that are incorporated in the direct effect are accepted.

Table 2: Direct effect test result

Path	Path estimate	p	Decision
Psycho-cybernetics training → green entrepreneurial motivation	0.232	***	Supported
Green entrepreneurial training → green entrepreneurial motivation	0.211	***	Supported
Psycho-cybernetics training → green entrepreneurial innovation	0.556	***	Supported
Green entrepreneurial training → green entrepreneurial innovation	0.104	0.001**	Supported
Green entrepreneurial motivation → green entrepreneurial innovation	0.247	***	Supported

The mediating role of the green entrepreneurial motivation

The mediation role test considers the results of bootstrapping with a 97.55% confidence interval using one thousand iterations. The mediating role tested is the mediating role of GEM as a consequence of the growth of GEI in students. Analysis using the bootstrap method obtained significant

results from the role of GEM in mediating the effect of PT and GET on GEI. Considering the support for the hypothesis, see Table 3 presenting the mediating role of GEM. The estimated coefficient of indirect influence from PT on GEI is 0.057 with a p value of 0.000***, so that H6 is supported. Likewise, the coefficient of indirect influence from GET on GEI is 0.052 with a p value of 0.000***, so that H7 is also supported.

Table 3: Mediating role of entrepreneurial personality

Path	Direct Effect		Indirect Effect		Total Effect	
	Estimate	Sig	Estimate	Sig	Estimate	Sig
PT → GEM	0.232	***	-	-	0.232	***
PT → GEI	0.556	***	0.057	***	0.613	***
GET → GEM	0.211	***	-	-	0.211	***
GET → GEI	0.104	0.001**	0.052	***	0.156	***
GEM → GEI	0.247	***	-	-	247	***

DISCUSSION

Psycho-cybernetics Training and Green Entrepreneurial Training on GEM

Stimulating strong motivation as capital in innovating in green entrepreneurship is proven to require two important strengthening aspects, namely strengthening through psycho-cybernetics training (PT) and green entrepreneurship training (GET). Both are proven to have a direct strong influence on the growth of green entrepreneurship motivation (GEM) through this research. These results indicate that to spur the emergence of a strong urge to green jobs, PT is needed for students which includes strengthening aspects of self-esteem, self-efficacy, self-acceptance, rational thinking, feelings of well-being, respect for fellow human beings, and respect for the environment (Salinas Mercado & González-González, 2018). This condition is seen as a psychological realm of students that provides direction of self-confidence to achieve goals in accordance with the scope of the seven aspects (Maltz, 1986). Study from Salinas Mercado & González-González (2018); Szymanski & Szymanski (1995) stated that in order to be able to do a job successfully, it is very important that individuals have a stable and supportive psychological condition for a job (Salinas Mercado & González-González, 2018; Szymanski & Szymanski, 1995). Here the important role of self-esteem, and self-efficacy, which is followed by rational thinking is needed (Wang et al., 2021). Furthermore, previous research has also clarified that in the context of green jobs, it really requires a level of concern and respect for fellow humans and the environment. This strongly suggests the need for psycho-cybernetics reinforcement training for students as an effort to increase their motivation for green entrepreneurship (Hameed et al., 2021).

Furthermore, strengthening in terms of technical skills through GET has also proven to make a significant contribution in stimulating GEM. Strengthening through GET includes five aspects namely green awareness, green literacy, green capability, green creativity, and green criticality (Pavlova, 2009). These five aspects are seen by various studies as five aspects that determine the direction of new jobs that have the potential to be created by maintaining a green context (Alwakid et al., 2021; Frare & Beuren, 2022). These five aspects are skills that are intact and mutually sustainable from the first to the fifth aspects (Wang et al., 2022). Green awareness is needed first as a foundation to convince oneself of the importance of greening in work in response to the issue of declining environmental quality (Astuti et al., 2022; Sutiman et al., 2022). This awareness then also forms green literacy from within students (Falloon, 2020). Green literacy is a fundamental aspect that provides a comprehensive understanding of strategies for greening jobs. Then, strong green literacy in students becomes a guideline for implementing greening new jobs, so that here it also gives birth to green capabilities (Chang et al., 2022). After that, training in cultivating green creativity plays a role in generating new creative ideas to create new green jobs (Cai et al., 2022; Jiang et al., 2020). Lastly, strengthening students' critical thinking to plan, implement and evaluate green jobs is necessary to create sustainable new green jobs (Pavlova, 2009).

Psycho-cybernetics training, green entrepreneurial training and green entrepreneurial motivation on GEI

In accordance with previous prevailing theory, innovation in building new jobs emerges as a response to the results of mature cognitive and psychomotor stimulation and has a concept to implement (Ratten, 2022). In addition, strengthening the psychological side that can increase self-confidence to achieve certain goals must be a counterweight (Mutohhari et al., 2023; Triyono et al., 2023). This study provides strong confirmation that strengthening cognitive and psychomotor stimulation through green entrepreneurship training (GET) balanced with psychological reinforcement from psycho-cybernetic training (PT) and green entrepreneurship motivation (GEM) is a significant driver for green entrepreneurship innovation (GEI). Through GET, students acquire aspects of knowledge and skills needed to create new innovations in creating green jobs (Cabral & Lochan Dhar, 2019; Chang et al., 2022). It has been confirmed previously that creating green jobs requires strengthening green awareness and capabilities that can generate green job ideas (Fawaid et al., 2022; Guo et al., 2020). In addition, other studies also provide evidence that green literacy is an important foundation that must be strengthened to equip students with a comprehensive understanding of green jobs (Cabral & Lochan Dhar, 2019). In addition, strengthening creativity and critical thinking determines the birth of innovation (Pavlova, 2009).

Then, psychological reinforcement through PT and GEM reinforcement becomes the basis for students to build strong determination and orientation in trying to think of new ideas related to green jobs (Guo et al., 2020). Previous research emphasized that psychological aspects such as self-esteem, self-efficacy, and self-acceptance provide important provisions to give self-confidence in developing their green skills, so that their orientation will lead to the creation of new green jobs (Na-Allah & Ahmad, 2022). In addition, support from rational thinking, feelings of well-being, respect for fellow human beings, and respect for the environment in psycho-cybernetics provide students with flexibility and direction in formulating ideas related to green jobs (Frare & Beuren, 2022; Maltz, 1986). Likewise, GEM strengthening which is defined as giving encouragement to students that specifically leads to encouragement in greening jobs (Del Vecchio et al., 2021). This is very important in building determination and enthusiasm in students to generate new green work ideas that can be implemented (Hameed et al., 2021).

Mediating Role of Green Entrepreneurial Motivation

These results also reinforce that encouragement from within individuals to tend to innovate green in entrepreneurship is strongly influenced by the formation of skills from within students. In addition, psychological conditions that include self-esteem and self-efficacy, followed by rational thinking play a significant role in providing opportunities for innovation to emerge from within the individual (Yafi et al., 2021). On the other hand, the attitude of caring for fellow humans and the environment which is part of the psycho-cybernetics aspect

becomes a special basis in forming motivational specifications that lead to the creation of green jobs for prospective entrepreneurs (Guo et al., 2020; Maltz, 1986). Previous studies provide clear confirmation that the motivation that is the basis for the emergence of innovation in individuals is constructed from aspects such as technical skills and psychological reinforcement that lead to self-confidence, self-esteem through rational thought processes (Del Vecchio et al., 2021; Hameed et al., 2021). Other studies also provide specific confirmation that emerging green motivation plays a role in mediating individual psychological skills and conditions that tend to lead to the creation of green innovations (Yafi et al., 2021).

Conclusion

Creating new, green jobs is very interesting to study in more depth. Although many thinks that innovation and motivation in creating green entrepreneurs are influenced by practical skill factors. However, this study reaffirms that aspects of practical skills must be balanced with psychological conditions related to self-efficacy, self-esteem, and a sense of empathy for fellow humans and the environment. These two aspects are the foundation of mutual synergy in stimulating the growth of motivation in students. Self-efficacy and self-esteem will give a sense of confidence that he is capable of doing entrepreneurship. Furthermore, a sense of empathy for the environment and humans will make motivation in entrepreneurship have green specifications. This is what ultimately leads to the birth of green innovations in creating jobs.

Suggestion

Based on the findings in this study, we suggest that higher education has a leading role in training students' innovative power as an effort to green jobs through entrepreneurship. We also emphasize that further empirical research is urgently needed as an effort to develop green job innovations that have the opportunity to emerge from entrepreneurs through a more intensive training approach.

Limitation

This research is limited to the variables that have been mentioned in the contents of this article. This certainly has limitations that are not comprehensive and it is possible that there is a significant influence from other variables not examined in this study as an effort to increase green entrepreneurship innovation in higher education students.

Conflict Of Interest

The authors declare no potential conflicts of interest regarding this article's research, authorship, and/or publication.

Author Contributions

A. Marganingsih – Study framework development, instrument development, manuscript writing, and data analysis; E. D. Pelipa – visualization/presentation of data in text, manuscript writing, and manuscript submitting; E. Y. Seran – typing, correction, and editing; Y. A. E. Tuah – data collecting, correction, and editing; N. Kholifah – data collecting, correction, and editing. All authors have read and agreed to the published version.

Acknowledgment

References

Alwakid, W., Aparicio, S., & Urbano, D. (2021). The influence of green entrepreneurship on sustainable development in Saudi Arabia: The role of formal institutions. International Journal of Environmental Research and Public Health, 18(10), 1–16. https://doi.org/10.3390/ijerph18105433

Astuti, M., Arifin, Z., Nurtanto, M., Mutohhari, F., & Warju, W. (2022). The maturity levels of the digital technology competence in vocational education. International Journal of Evaluation and Research in Education, 11(2), 596–603. https://doi.org/10.11591/ijere.v11i2.22258

Bali Swain, R., & Yang-Wallentin, F. (2020). Achieving sustainable development goals: predicaments and strategies. International Journal of Sustainable Development and World Ecology, 27(2), 1–12. https://doi.org/10.1080/13504509.2019.1692316

Cabral, C., & Lochan Dhar, R. (2019). Green competencies: Construct development and measurement validation. Journal of Cleaner Production, 235(1), 887–900. https://doi.org/10.1016/j.jclepro.2019.07.014

Cai, X., Hussain, S., & Zhang, Y. (2022). Factors That Can Promote the Green Entrepreneurial Intention of College Students: A Fuzzy Set Qualitative Comparative Analysis. Frontiers in Psychology, 12(1), 1–13. https://doi.org/10.3389/fpsyg.2021.776886

Chang, C. H., Shih, M. Y., & Peng, H. J. (2022). Enhancing entrepreneurial opportunity recognition: Relationships among green innovative capability, green relational capability, and co-innovation behavior. Business Strategy and the Environment, 31(4), 1358–1368. https://doi.org/10.1002/bse.2959

Che Nawi, N. R., Arshad, M. M., Krauss, S. E., & Ismail, I. A. (2022). Challenges faced by youth social entrepreneurs in Malaysia: career transition to become a social entrepreneur. European Journal of Training and Development, 46(3–4), 317–336. https://doi.org/10.1108/EJTD-02-2020-0021

Cohen, L., Lawrence, M., & Keith, M. (2011). Research Methods in Education. Routledge:Taylor & Francis Group.

Dana, L. P., Tajpour, M., Salamzadeh, A., Hosseini, E., & Zolfaghari, M. (2021). The impact of entrepreneurial education on technology-based enterprises development: The mediating role of motivation. Administrative Sciences, 11(4), 1–15. https://doi.org/10.3390/admsci11040105

Del Vecchio, P., Secundo, G., Mele, G., & Passiante, G. (2021). Sustainable entrepreneurship education for circular economy: emerging perspectives in Europe. International Journal of Entrepreneurial Behaviour and Research, 27(8), 2096–2124.

https://doi.org/10.1108/IJEBR-03-2021-0210

Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. Educational Technology Research and Development, 68(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Fawaid, M., Triyono, M. B., Sofyan, H., Nurtanto, M., Mutohhari, F., Jatmoko, D., Majid, N. W. A., & Rabiman, R. (2022). Entrepreneurial intentions of vocational education students in indonesia: PLS-SEM approach. Journal of Technical Education and Training, 14(2), 91–105. https://doi.org/10.30880/jtet.2022.14.02.009

Frare, A. B., & Beuren, I. M. (2022). The role of green process innovation translating green entrepreneurial orientation and proactive sustainability strategy into environmental performance. Journal of Small Business and Enterprise Development, 29(5), 789–806. https://doi.org/10.1108/JSBED-10-2021-0402

Gardetti, M. A., & Muthu, S. S. (2018). Sustainable Luxury, Entrepreneurship, and Innovation. Springer Nature Singapore Pte Ltd.

Geng, M. M., & He, L. Y. (2021). Environmental regulation, environmental awareness and environmental governance satisfaction. Sustainability (Switzerland), 13(7), 1–17. https://doi.org/10.3390/su13073960

Guo, Y., Wang, L. F., & Chen, Y. (2020). Green entrepreneurial orientation and green innovation: The mediating effect of supply chain learning. SAGE Open, 10(1), 1–12. https://doi.org/10.1177/2158244019898798

Hameed, I., Zaman, U., Waris, I., & Shafique, O. (2021). A serial-mediation model to link entrepreneurship education and green entrepreneurial behavior: Application of resource-based view and flow theory. International Journal of Environmental Research and Public Health, 18(2), 1–19. https://doi.org/10.3390/ijerph18020550

Hassan, A., Anwar, I., Saleem, I., Islam, K. M. B., & Hussain, S. A. (2021). Individual entrepreneurial orientation, entrepreneurship education and entrepreneurial intention: The mediating role of entrepreneurial motivations. Industry and Higher Education, 35(4), 403–418. https://doi.org/10.1177/09504222211007051

Heleta, S., & Bagus, T. (2021). Sustainable development goals and higher education: leaving many behind. Higher Education, 81(1), 1–15. https://doi.org/10.1007/s10734-020-00573-8

Jiang, H., Wang, S., Wang, L., & Li, G. (2020). Golden apples or green apples? The effect of entrepreneurial creativity on green entrepreneurship: A dual pathway model. Sustainability (Switzerland), 12(15), 1–12. https://doi.org/10.3390/SU12156285

Kassim, E. S., Tajmi, T. A. M., Hairuddin, H., Malik, A. M. A., & Tobi, S. U. M. (2020). Mapping social enterprise to sustainable development goals. International Journal of Environment and Sustainable Development, 19(2), 209–237. https://doi.org/10.1504/IJESD.2020.106674

Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. Journal of Environmental Education, 51(4), 1–13. https://doi.org/10.1080/00958964.2019.1710444

Kurniawan, R., Jaedun, A., Mutohhari, F., & Kusuma, W. M. (2021). The absorption of vocational education graduates in

the automotive sector in the industrial world. Journal of Education Technology, 5(3), 482–490. https://doi.org/10.23887/jet.v5i3.35365

Lin, L., Zhou, D., & Ma, C. (2010). Green food industry in China: Development, problems and policies. Renewable Agriculture and Food Systems, 25(1), 69–80. https://doi.org/10.1017/S174217050999024X

Lin, Y. H., & Chen, H. C. (2018). Critical factors for enhancing green service innovation: Linking green relationship quality and green entrepreneurial orientation. Journal of Hospitality and Tourism Technology, 9(2), 188–203. https://doi.org/10.1108/JHTT-02-2017-0014

Lüdeke-Freund, F. (2020). Sustainable entrepreneurship, innovation, and business models: Integrative framework and propositions for future research. Business Strategy and the Environment, 29(2), 665–681. https://doi.org/10.1002/bse.2396

Maltz, M. (1986). Psycho-Cybernetics. Pocket Books.

Mrchev, S. J. (1997). Bionics: Psychocybernetics of human memory part III: Modelling of the human short-term memory. Kybernetes, 26(2–3), 184–197. https://doi.org/10.1108/EUM0000000004322

Muangmee, C., Dacko-Pikiewicz, Z., Meekaewkunchorn, N., Kassakorn, N., & Khalid, B. (2021). Green entrepreneurial orientation and green innovation in small and medium-sized enterprises (Smes). Social Sciences, 10(4), 1–15. https://doi.org/10.3390/socsci10040136

Mutohhari, F., Triyono, M. B., Sudira, P., Nurtanto, M., & Kholifah, N. (2023). The role of entrepreneurial personality mediation and technological competencies moderation in determining entrepreneurial intentions in vocational education. Journal of Technical Education and Training, 15(1), 128–141. https://doi.org/10.30880/jtet.2023.15.01.012

Na-Allah, S. R., & Ahmad, N. H. (2022). Entrepreneurial orientation and venture creation in nigerian context: Assessing mediating and moderating roles of self-efficacy and entrepreneurial support among graduates. Sustainability (Switzerland), 14(9), 1–14. https://doi.org/10.3390/su14094904

Naderi, N., Monavvarifard, F., & Salehi, L. (2022). Fostering sustainability-oriented knowledge-sharing in academic environment: A key strategic process to achieving SDGs through development of students' sustainable entrepreneurship competences. International Journal of Management Education, 20(1), 1–12. https://doi.org/10.1016/j.ijme.2022.100603

Neneh, B. N. (2020). Entrepreneurial passion and entrepreneurial intention: the role of social support and entrepreneurial self-efficacy. Studies in Higher Education, 8(1), 1–18. https://doi.org/10.1080/03075079.2020.1770716

O'Brien, E., & Hamburg, I. (2019). A critical review of learning approaches for entrepreneurship education in a contemporary society. European Journal of Education, 54(4), 525–537. https://doi.org/10.1111/ejed.12369

Pansera, M., & Sarkar, S. (2016). Crafting sustainable development solutions: Frugal innovations of grassroots entrepreneurs. Sustainability (Switzerland), 8(1), 1–25. https://doi.org/10.3390/su8010051

Pavlova, M. (2009). Technology and Vocational Education for

Sustainable Development. Springer Science Business Media B.V.

Postigo, Á., Cuesta, M., & García-Cueto, E. (2021). Entrepreneurial personality, conscientiousness, self-control, and grit: The psychological side of self-employment. Anales de Psicologia, 37(2), 61–370. https://doi.org/10.6018/analesps.453711

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40(3), 879–891. https://doi.org/10.3758/BRM.40.3.879

Prieto-Jiménez, E., López-Catalán, L., López-Catalán, B., & Domínguez-Fernández, G. (2021). Sustainable development goals and education: A bibliometric mapping analysis. Sustainability (Switzerland), 13(4), 1–20. https://doi.org/10.3390/su13042126

Ratten, V. (2022). Entrepreneurial Innovation: Strategy and Competition Aspects. Springer Nature Singapore Pte Ltd.

Salinas Mercado, E., & González-González, A. (2018). The Selfer, Personality in a Virtual Paradigm. Language and Psychoanalysis, 7(2), 1–12. https://doi.org/10.7565/landp.v7i2.1587

Sawang, S. (2020). Entrepreneurship Education: A Lifelong Learning Approach (1st ed.). Springer.

Seikkula-Leino, J., & Salomaa, M. (2021). Bridging the research gap—a framework for assessing entrepreneurial competencies based on self-esteem and self-efficacy. Education Sciences, 11(10), 1–14. https://doi.org/10.3390/educsci11100572

Shulla, K., Filho, W. L., Lardjane, S., Sommer, J. H., & Borgemeister, C. (2020). Sustainable development education in the context of the 2030 Agenda for sustainable development. International Journal of Sustainable Development and World Ecology, 27(5), 458–468. https://doi.org/10.1080/13504509.2020.1721378

Sutiman, S., Sofyan, H., Soenarto, S., Mutohhari, F., & Nurtanto, M. (2022). Students' career decision-making during online learning: The mediating roles of self-efficacy in vocational education. European Journal of Educational Research, 11(3), 1669–1682. https://doi.org/10.12973/eu-jer.11.3.1669

Szymanski, J. M., & Szymanski, A. (1995). Research note: Logical foundations of modern cybernetics. World Futures, 44(2–3), 177–180. https://doi.org/10.1080/02604027.1995.9972541

Triyono, M. B., Mutohhari, F., Kholifah, N., Nurtanto, M., Subakti, H., & Prasetya, K. H. (2023). Examining the mediating-moderating Role of entrepreneurial orientation and digital competence on entrepreneurial intention in vocational education. Journal of Technical Education and Training, 15(1), 116–127. https://doi.org/10.30880/jtet.2023.15.01.011

Wagiran, W., Suharjana, S., Nurtanto, M., & Mutohhari, F. (2022). Determining the E-Learning Readiness of Higher Education Students: A Study During the COVID-19 Pandemic. Heliyon, 1–11. https://doi.org/10.1016/j.heliyon.2022.e11160

Wang, W., Cao, Q., Zhuo, C., Mou, Y., Pu, Z., & Zhou, Y. (2021). COVID-19 to green entrepreneurial intention: role of green entrepreneurial self-efficacy, optimism, ecological values, social sesponsibility, and green entrepreneurial motivation. Frontiers in Psychology, 12(1), 1–12. https://doi.org/10.3389/fpsyg.2021.732904

Wang, W., Cao, Q., Zhuo, C., Mou, Y., Pu, Z., & Zhou, Y. (2022). Corrigendum: COVID-19 to green entrepreneurial intention: role of green entrepreneurial self-efficacy, optimism, ecological values, social responsibility, and green entrepreneurial motivation. In Frontiers in Psychology (Vol. 13, pp. 1–14). https://doi.org/10.3389/fpsyg.2022.808812

Westland, J. C. (2019). Structural Equation Models: From Paths to Networks (Second). Springer.

Wiramihardja, K., N'dary, V., Al Mamun, A., Munikrishnan, U. T., Yang, Q., Salamah, A. A., & Hayat, N. (2022). Sustainable economic development through entrepreneurship: A study on attitude, opportunity recognition, and entrepreneurial intention among university students in Malaysia. Frontiers in Psychology, 13(1), 1–14. https://doi.org/10.3389/fpsyg.2022.866753

Yafi, E., Tehseen, S., & Haider, S. A. (2021). Impact of green training on environmental performance through mediating role of competencies and motivation. Sustainability (Switzerland), 13(10), 1–15. https://doi.org/10.3390/su13105624

Yun, J. J., Lee, M. H., Park, K. B., & Zhao, X. (2019). Open innovation and serial entrepreneurs. Sustainability (Switzerland), 11(18), 1–16. https://doi.org/10.3390/su11185055