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Improving Energy Literacy to Facilitate Energy Transition and Nurture Environmental Culture in Vietnam

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Abstract: Concern about energy depletion has risen because of industrialization and consumerism, pushing a transition from fossil fuels to renewable energy sources. To this end, every group within society, especially the youth, should be made responsible for confronting and/or mitigating environmental problems. This study advances the understanding of young adults' intentions to learn about energy conservation and its influencing factors, as well as contributes to the literature on environmental management and environmental culture and development. We used a systematic random sample technique to conduct a large-scale online survey with 1454 students from 48 different Vietnamese universities and employed Bayesian regression model to analyze the data. The initial research indicates that young adults are highly concerned about the environment, but more work has to be done to turn perceptions into actions. The majority of respondents—nearly 83%—want to increase their energy-saving knowledge, and around 50% are interested in enrolling in an energy course. Their decision regarding participation in an energy course is largely influenced by their perception and income. Women were more inclined to take energy-saving courses, and people who lived in rural areas had a stronger desire to increase their knowledge. Our research has various policy implications for promoting energy transformation and/or nurturing environmental cultures associated with environmental education improvement in Vietnam and beyond.

Keywords: energy transformation; energy policy; sustainability; bayesian approach; renewable energy

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1. Introduction

As the looming climate catastrophe endangers our civilization [1], the 2020s must become the "decade of action" [2] to save humankind from irreversible consequences. Vietnam has joined the global effort by committing to the net-zero targets by 2050 that were introduced at the 2021 United Nations Climate Change Conference (COP26). Engaging youth in the energy transition is vital to fulfilling the Glasgow promise. Our planet has passed the 1.2 °C level and is perilously close to the 1.5 °C threshold [3]. Meanwhile, international efforts still fall short in response to this "code red" [4]. Evidence shows that if the 2 °C limit is passed, many feedback circles in the climate system will be activated, potentially pushing the temperature 4–5 °C further to reach the "Hothouse Earth" state [5]. In that scenario, humanity will have little control over retaining a livable planet. So far, the Limits to Growth's World3 model, which was established in the 1970s by the Club of Rome [6] and recently updated by Herrington (2021) [7], is still on track with its original prediction of social collapse by 2040 due to ecological constraints. To avoid

such an unthinkable future, all nations must deploy all their resources to act vigorously and urgently.

Energy is at the heart of every climate agenda because it accounts for 73.2% of greenhouse gas emissions worldwide when combining electricity, heat, and transportation [8]. To defend the 1.5 °C frontier, the International Energy Agency has defined a pathway in which the world economy will expand by 40% but consume 7% less energy than today by 2030. This scenario requires a massive push in energy efficiency, with an annual improvement of 4%, tripling the average rate of the 2000–2020 period. Furthermore, fossil-fuel methane emissions must fall by 75%, while clean energy should witness a fourfold increase this decade [9]. These ambitious targets will make the 2020s the decade of a massive energy revolution. Fortunately, the necessary technologies for transformation are already known, and policies to accelerate their deployment have been tested. Moreover, because financial development has been shown to positively and significantly impact the development of renewable technologies, it is advised that allocating financial resources to the renewable energy sector would facilitate environmental sustainability [10]. In addition, behaviour changes, such as reducing consumption and switching to green modes of transportation, can contribute 4–5% of emissions reductions in the net-zero pathway [9].

Young generations have a unique role in the net-zero transition. They are more likely to face the dire corollaries of global warming in their lifetime [3]. Thus, they can vividly feel the psychological burden of the climate crisis, both from witnessing climate-induced disasters and understanding that worse is yet to come [11]. Their direct concern about climate issues has become the primary source of motivation behind the global youth climate movement [12]. They are the decisive force in raising public awareness, spreading green lifestyles, empowering vulnerable groups, and demanding climate action from governments worldwide. Furthermore, with a better ability for technology adoption [13], the youth can play a game-changing role in energy conversion.

Following COP26, Vietnam has significantly stretched its climate commitment [14]. The country has been praised globally because of its impressive expansion of solar energy [15]. The upcoming Power Development Plan VIII is expected to continue emphasizing green power and energy security. However, energy efficiency remains obsolete as the country requires an average 10% increase in power consumption to induce a 6–7% economic growth rate annually [16]. As the country retains its golden population structure until the end of the 2030s [17], the youth are the central force in Vietnam's energy conversion pathway.

This study investigated the perceptions and demand for energy conversion among young Vietnamese people. Deploying the contingent valuation method [18] and the Bayesian regression model in an online survey of students from 48 universities, we analysed the awareness and willingness of young adults to undertake training in energy saving and transition practices. The findings of this work will provide critical input for policymakers and educational entities. Well-defined training strategies are needed to engage Vietnamese youth in the country's decarbonization efforts.

2. Literature Review

In the face of energy poverty, energy literacy plays an integral role in energy conservation by modifying human behaviour towards a more pro-environmental lifestyle [19–21]. According to DeWaters & Powers (2011) [22], energy literacy encompasses three different dimensions: cognitive, affective, and behavioural. An energy-literate individual not only has basic energy-related knowledge but is also aware of the impacts of human energy-related activities on the ecosystem. Most importantly, such a person feels the urge to adopt energy-saving behaviours and seeks to conserve energy. In addition to contributing to environmental protection through their own actions, these individuals could act as educational agents for their families and friends, which helps increase participation in saving energy [21,23,24].

One of the most effective means of achieving sustainability in general and UN Sustainable Development Goal 7 (ensuring access to affordable, reliable, sustainable, and modern energy for all) is to develop energy literacy among the young generation [22,25,26]. Many studies have observed that responsible energy consumption among young people is exhibited when they are energy literate [22,27]. This could be explained by the fact that the change in attitudes and behaviours derives from the acceptance of new knowledge and personal values [20,28]. In the years to come, this generation will grow into the primary energy producers and consumers in adulthood, and their actions will significantly influence how energy is used on a large scale. Since modifying behaviour requires a great deal of time, it is advised that young children and adolescents should be exposed to energy-related knowledge to ensure future energy conservation and efficiency [22].

Globally, energy education has targeted students of all levels. Many countries have incorporated energy issues and sustainability requirements into K-12 curricula in order to provide students with the knowledge needed to understand the connection between energy usage and environmental challenges, with the ultimate goal of increasing energy efficiency [29]. The Wisconsin K-12 Energy Education Curriculum (KEEP) is one example, with the purpose of assisting communities in making educated energy choices for a sustainable future by providing a holistic, comprehensive energy education program for students of all grades [30]. Energy education programs aimed at increasing students' energy literacy have also been widely promoted in tertiary education, though it appears to be more commonplace among universities with energy-related majors in developed nations [26,31,32]. In Vietnam, since 2006, the Ministry of Education and Training has introduced a nationwide project to integrate the domain of basic energy-related knowledge into school curricula [33]. Vietnam prioritizes the development of energy-literate citizens, as indicated by the national goal of having 60% of schools engage in promotion and teaching activities related to their economical and efficient energy use from 2019 to 2030. However, the effectiveness of the policy still requires further research, and the program's continuation in universities and colleges remains under debate.

Several studies have examined the cognitive (knowledge), affective (attitudes, values), and behavioural aspects of energy literacy and explored their relationships. In the studies conducted by Chen et al. (2015) and Akitsu et al. (2017), a positive influence of environmental knowledge on behaviour was confirmed [34,35]. Those who are aware of environmental deterioration, climate change in particular, the role of energy conservation in preserving the environment, and the economic benefits of responsible energy usage would be more interested in adopting these behaviours [22,26,27,35,36]. Moreover, people whose core values revolve around sustainability and environmental protection have a greater propensity to pursue environmentally friendly behaviours [37–39]. This could be explained by Homer and Kahle's (1998) value-attitude-behaviour model [40]. For instance, the desire and action to purchase environmentally friendly products and to join environmental campaigns and organizations are strongly connected with ecological values [41–47]. Consequently, these values and experiences could motivate them to actively seek information on environmental protection and energy saving, including training courses, in order to equip themselves with more efficient techniques of energy consumption.

Environmental and energy-saving behaviours are also influenced by demographic factors. It has been shown that women generally pay greater attention to environmental issues and are more likely than men to adjust their behaviour when considering energy conservation [35,48–50]. Age can also exert an influence on behaviour to a certain extent. Young people are believed to have higher environmental awareness [51–53]. However, the likelihood of participation in "green" activities, such as waste sorting, increases with age [54,55]. Some studies have indicated that low-income individuals are more concerned about saving energy to reduce their energy bills [56]. Although wealthier individuals generally have the financial means to invest in energy-efficient products, they seem to consume more energy through their daily activities, such as forgetting to turn off heaters when leaving a room [56,57]. Nevertheless, when people are satisfied with their financial

situation and standard of living, they will work towards a long-term goal of sustainable development for posterity, hence allocating their time and resources to energy saving. Additionally, Dias et al. (2004) identified dwelling areas as a rational energy use barrier [20]. This was supported in studies conducted by Akitsu et al. (2017) and Trotta (2018), which claim that urbanites were more energy-educated and responded in a more positive way to new energy-saving technologies than those in rural areas [35,57]. Among other demographic factors, religion could also indicate a greater willingness to switch to pro-environmental behaviour and to enrol in energy-related courses since its role is of pivotal significance in forming attitudes [58–60].

Although there are many studies on energy literacy and the determinants of energy-saving behaviour, very few have focused on the demands and willingness of students to increase their energy literacy, especially in developing countries. More specifically, the drivers and barriers for students to acquire energy-related knowledge and energy-saving methods are open to question. In addition, previous literature does not make any concrete recommendations on how energy education should be introduced and developed or what strategies to implement to attract the younger generation. If sustainable development is to be achieved, these issues need to be researched thoroughly.

3. Materials and Methods

3.1. Study Area

The research was carried out at 48 universities across 11 provinces in Vietnam. We collected a total of 1454 responses, most of which came from central cities such as Hanoi, Ho Chi Minh City, and Danang, which could be explained by the fact that most universities in Vietnam are located in these areas. We selected Vietnam as a study area for several reasons. First, its population approximates 99 million people and is ranked 15th globally in population size [61]. A large population poses a two-fold energy challenge for the government: ensuring access to affordable, reliable, and modern energy services while simultaneously participating in a global transition to clean, low-carbon energy systems. Second, the energy literacy of Vietnamese residents seems low [62]. Most people are not fully aware of the role that saving energy plays in sustainable development and are thus less willing to adopt energy-saving practices. Third, it is projected that Vietnam will be among the fastest-growing economies by 2030 [63], yet according to [64,65], the country still mainly depends on fuel-fired power for energy supply and tends to achieve economic growth at the expense of the environment. Because energy security and renewable energy promotion appear to be proportional to economic development [66,67], there is a critical need for research-based findings to inform policy decision making regarding faster and more sustainable development [65]. Thus, we examine Vietnamese students' concerns over energy saving and their willingness to join free energy-related training as well as an energy course integrated into university curricula to determine how to address the aforementioned issues.

3.2. Data Collection

The sample size, data frame, and representativeness were carefully controlled to ensure the validity and reliability of the study's dataset [68]. According to most research, our sample size of 1454 observations is appropriate [69–71]. Additionally, we guaranteed our data's high representativeness by balancing many observations distributed across Vietnam. Students from 48 Northern, Central, and Southern Vietnam universities were encouraged to participate in the survey. Specifically, when collecting data, we employed the web-based survey method for the following reasons: First, stay-at-home and quarantine measures are widely implemented in Vietnam due to the COVID-19 pandemic, making face-to-face contact during interviews inconvenient. Second, this method has been growing in popularity in recent years because it is an easy and convenient means of data collection [72]. Third, this method is inexpensive because it can take advantage of the availability of the Internet and the popularity of smartphones in Vietnam, which saves resources for the

collection process. Finally, this method allows the information to be transferred directly into Excel files, reducing the time needed for data entry and checking and cleaning. However, the web-based method has some potential limitations due to response bias and possible misunderstandings [72]. To address this issue, we use focus group and pilot survey techniques to ensure the quality of the questionnaire in terms of understandability. The group contains eight lecturers and five students from the Vietkap group of the Faculty of Political Economy, Vietnam National University, Hanoi.

Our questionnaire is divided into six sections. The first section examines the cognitive aspect of the respondents' views on energy issues. The second aims to discover their awareness of climate change and the role of energy saving, coupled with their suggestions for how to consume energy more efficiently and solve energy problems. Next, the section probes the respondent's experience concerning energy usage and saving energy, followed by their interest in being actively involved in the practice of saving energy. The fifth section investigates their demand and willingness to enhance their energy knowledge by participating in free and optional training sessions or university courses on energy. Finally, the last section shows the demographic variables of each respondent.

3.3. Sample Description

In addition to questions about socioeconomic factors, such as age, gender, monthly income, and location, we also include various questions to understand their awareness of climate change and the demand for training and university courses on energy saving. These questions include: "What is your level of concern over climate change and environmental protection/energy saving?"; "How often do you find out information about climate change and energy transition?"; "What is your opinion on the following statements: Energy use causes climate change. Climate change is related to youth responsibility."; "How often do you practice to save resources (such as electricity, water, . . .) in daily life?"; and so on. Most of them are measured by a 1–5 Likert scale, with 1 representing the lowest level of response, such as "No concern," "Never," and "Totally disagree," while 5 represents the opposite. Following the question "Do you want to enhance your knowledge about energy saving?"—a binary question — we ask about the respondent's interest in participating in a course on energy saving offered at different prices and by different organizations. We then further investigate their reasons for not wanting to take part in the training and/or the university course by employing an open-ended question.

Overall, most of the young adults who participated in the study were well aware of renewable energy, yet their energy-saving practices and information-seeking were only moderate. The majority of the respondents were female young adults with an average age of 19.59 and a monthly income of 2.38 million Vietnam dong (equivalent to around 99 U.S. dollars as of 16 October 2022). A greater number of them lived in rural areas, yet the difference was negligible. In addition, the younger participants were most concerned about climate change, with the highest score of 4.42/5, while few thought of energy consumption as the culprit of climate change, with the lowest rating of 3.54/5. A score of 4/5 indicates the young individual's high sense of responsibility to protect the environment. In addition, young adults subscribed to the adoption of renewable energy (4.18/5) and attached great importance to energy-saving practices (4.25/5). Despite taking an interest in environmental aspects such as climate change and environmental protection (4.38/5) and energy saving (4.32/5), the students surveyed did not usually search for related information (3.3/5) or consciously economize their electricity and petrol usage (3.72/5). Their willingness to take part in free energy-related training and energy-related paid courses was also relatively low, with a mean of 0.53 and 0.45, respectively.

3.4. Model Construction

We employed the Bayesian mindsponge framework (BMF) to understand the influences on young people's decision to enrol in an energy course [73]. BMF is an increasingly popular method in studies that aim to explain decision-making, especially in the social

science and humanities fields [74–76]. This popularity could be attributed to Bayesian regression's superiority over frequentist regression when it comes to small sample dataset analysis [77,78]. In addition, Bayesian statistics appears to resolve the stargazing, p-hacking, and HARKing concerns, ultimately enhancing the reproducibility and transparency of scientific research [73,79]. This method employs the mindsponge mechanism based on subjective cost-benefit evaluation, which reflects the complexity and dynamics of the human mind, even under complex information processing, due to its constantly updating nature, non-linear causal nexus, and susceptibility to internal and external factors [73]. In addition, to maximize the benefits of BMF analytics, we employed Bayesian inference to perform statistical analysis. These advantages include subjectivity, flexibility in investigating the human mind, suitability for estimating variation across groups, estimation and visualization of credible intervals, and non-reliance on asymptotic approximation [80,81].

Based on the literature review in Section 2, which recognizes the role of education for young adults—the leading agents of future changes—we built the following models to understand their demand for energy conversion knowledge through free training and paid courses. In Model 1, we examine the factors influencing a student's willingness to enrol in a free energy-saving course.

$$\text{FreeTrain} \sim \propto + \text{ClimateConcern} + \text{Age} + \text{Gender} + \text{FinMon} + \text{Locat} \quad (1)$$

Moreover, we employed the same factors to examine their influences on a student's willingness to take energy-related paid courses, as presented in Model 2. This also allows us to assess the impact of charging a fee.

$$\text{UniCourse} \sim \propto + \text{ClimateConcern} + \text{Age} + \text{Gender} + \text{FinMon} + \text{Locat} \quad (2)$$

Seven variables were used to construct the two models in this study, including five predictor variables and two dependent variables: TrainFree and UniCourse. Their descriptions are presented in Table 1.

Table 1. Variable description.

Variable	Meaning	Type of Variable	Value	Mean	Sd
TrainFree	The respondent's willingness to receive free energy-related training	Binary	1 = Yes 0 = No	0.53	0.50
UniCourse	The respondent's willingness to take energy-related paid courses	Binary	1 = Yes 0 = No	0.45	0.50
ClimateConcern	The respondent's concern over climate change	Ordinal	5 = Total agree 4 = Agree 3 = Undecided 2 = Disagree 1 = Totally disagree	4.42	0.71
Age	Age of the respondent	Nominal	Calculated based on the respondent's year of birth	19.59	1.18
Gender	Gender of the respondent	Binary	0 = Female 1 = Male	0.23	0.42
FinMon	The average monthly income of the respondent (unit: million dongs)	Ordinal	1 = < 1 2 = from 1 to 3 3 = from 3 to 5 4 = from 5 to 10 5 = > 10	2.38	1.18
Locat	The respondent's location	Binary	1 = Urban 0 = Rural	0.40	0.49

4. Results

4.1. Model 1: Intention on a Free Short Training Course

Figure 1 presents Model 1's structure, which investigates the intentions of students to participate in short free energy training courses based on their demographics and environmental concerns.

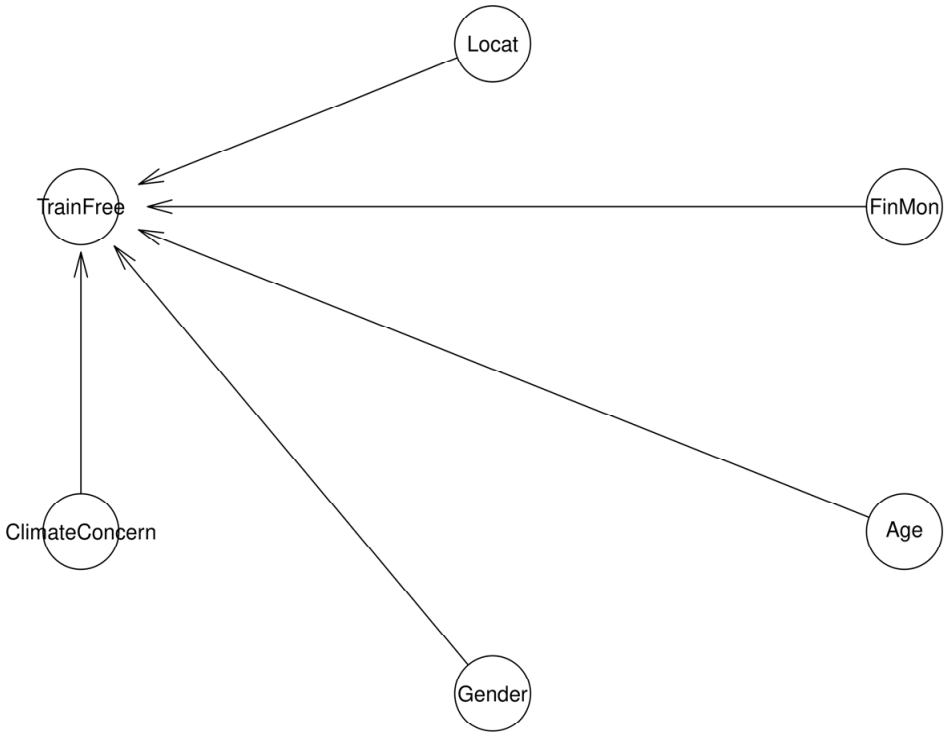

Figure 1. Model 1's structure.

Table 2 presents the estimated results of the Bayesian model of students' decisions regarding participation in the free short training course. This model is well-validated due to a high goodness-of-fit value, which is evaluated by either n_eff being greater than 1000 or Rhat being equal to 1. Overall, environmental concerns, gender, and location variables are highly associated with participation in energy training. Young people with a higher level of concern about the environment are more likely to participate in energy training ($\mu = 0.34$ and $\sigma = 0.08$). Females showed a higher level of intention than males ($\mu = -0.56$ and $\sigma = 0.13$), and urban respondents were found to have a lower probability of course enrolment intention ($\mu = -0.51$ and $\sigma = 0.11$). For greater detail, Figures 2 and 3 show the MCMC chains of the Bayesian model and the distribution of posterior coefficients of Model 1's parameters, respectively.

Table 2. Summary of the estimated coefficients from the hierarchical Energy Training model.

Variables	Percentile Statistics									
	Mean	**se_mean**	**Sd**	**2.5%**	**25%**	**50%**	**75%**	**97.5%**	**n_eff**	**Rhat**
a_TrainFree	−0.58	0.01	0.98	−2.50	−1.24	−0.58	0.09	1.33	6338	1
b_ClimateConcern_TrainFree	0.34	0.00	0.08	0.19	0.29	0.34	0.39	0.49	9544	1
b_Gender_TrainFree	−0.56	0.00	0.13	−0.83	−0.66	−0.56	−0.47	−0.30	10,052	1
b_Age_TrainFree	−0.02	0.00	0.05	−0.12	−0.06	−0.02	0.01	0.07	6564	1
b_FinMon_TrainFree	0.01	0.00	0.05	−0.08	−0.02	0.01	0.04	0.10	9251	1
b_Locat_TrainFree	−0.51	0.00	0.11	−0.74	−0.59	−0.51	−0.44	−0.30	9955	1

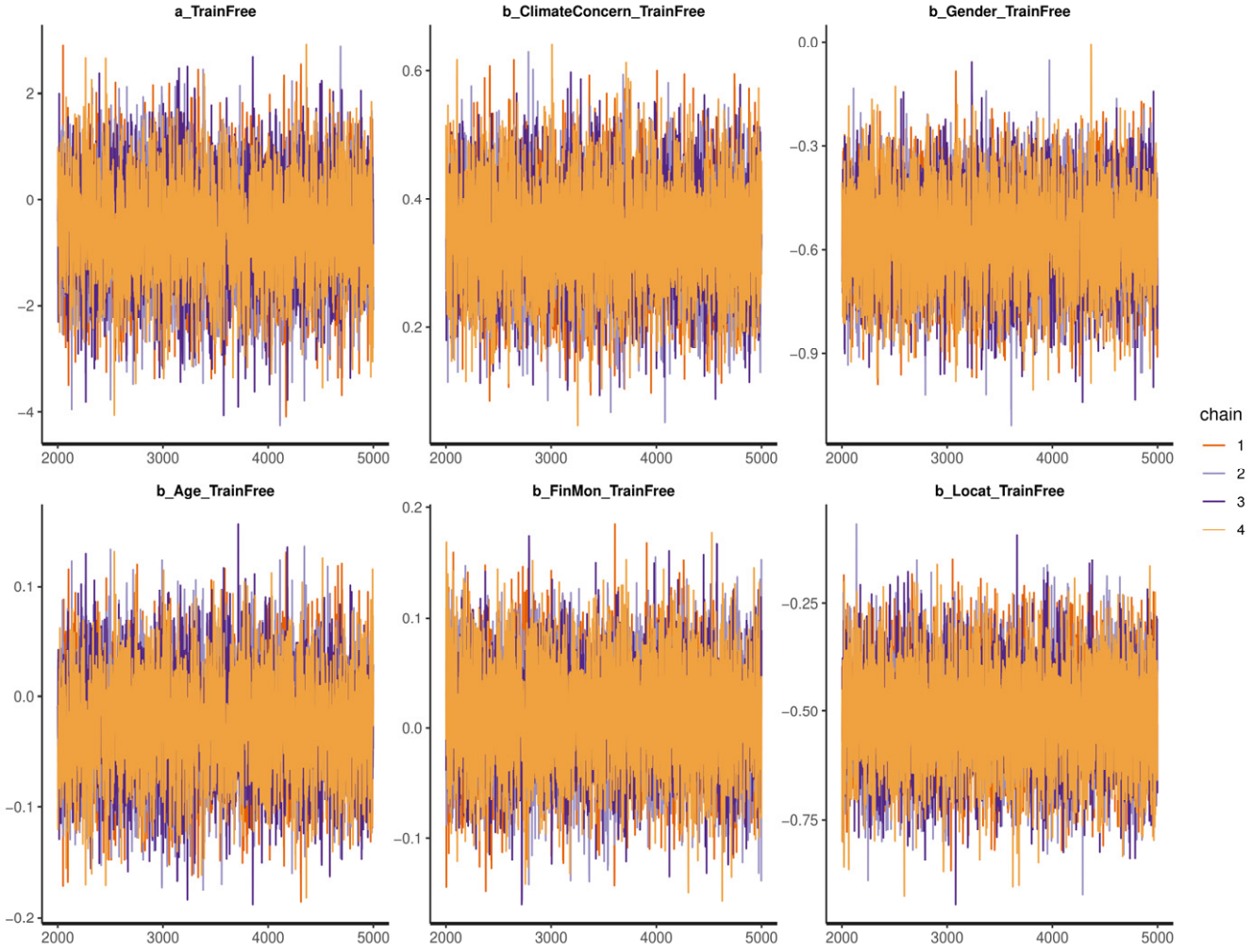

Figure 2. The MCMC chains for the Bayesian model of students' decisions regarding a free short training course.

4.2. Model 2: Intention on Energy Saving Paid Courses at University

Figure 4 presents Model 2's structure, which examines the intentions of students to engage in energy-saving paid courses at a university based on their demographics and environmental concerns.

Table 3 presents the estimated results of the Bayesian model of students' decisions regarding participation in a paid energy course. Similar to Model 1, Model 2's results are well-validated with a high goodness-of-fit. The Markovian property is held, and the Markov chains are good-mixing and stationary, showing good convergence. Overall, climate change-related worry, gender, age, and finances had a statistically significant relationship with a student's decision regarding energy-saving courses at university. Specifically, similar to Model 1, environmental concerns ($\mu = 0.26$ and $\sigma = 0.08$) and gender ($\mu = -0.24$ and $\sigma = 0.13$) had impacts on intentions regarding a paid energy course at university. However, the age moderation effect differs from Model 1's results. Older participants are more likely than young participants to take part in paid energy courses ($\mu = 0.07$ and $\sigma = 0.05$). In terms of financial matters, the higher the monthly income, the higher the intentions. Figures 5 and 6 supplement Table 3 by displaying the MCMC chains for the Bayesian model and the posterior coefficient distribution of Model 1's parameters, respectively.

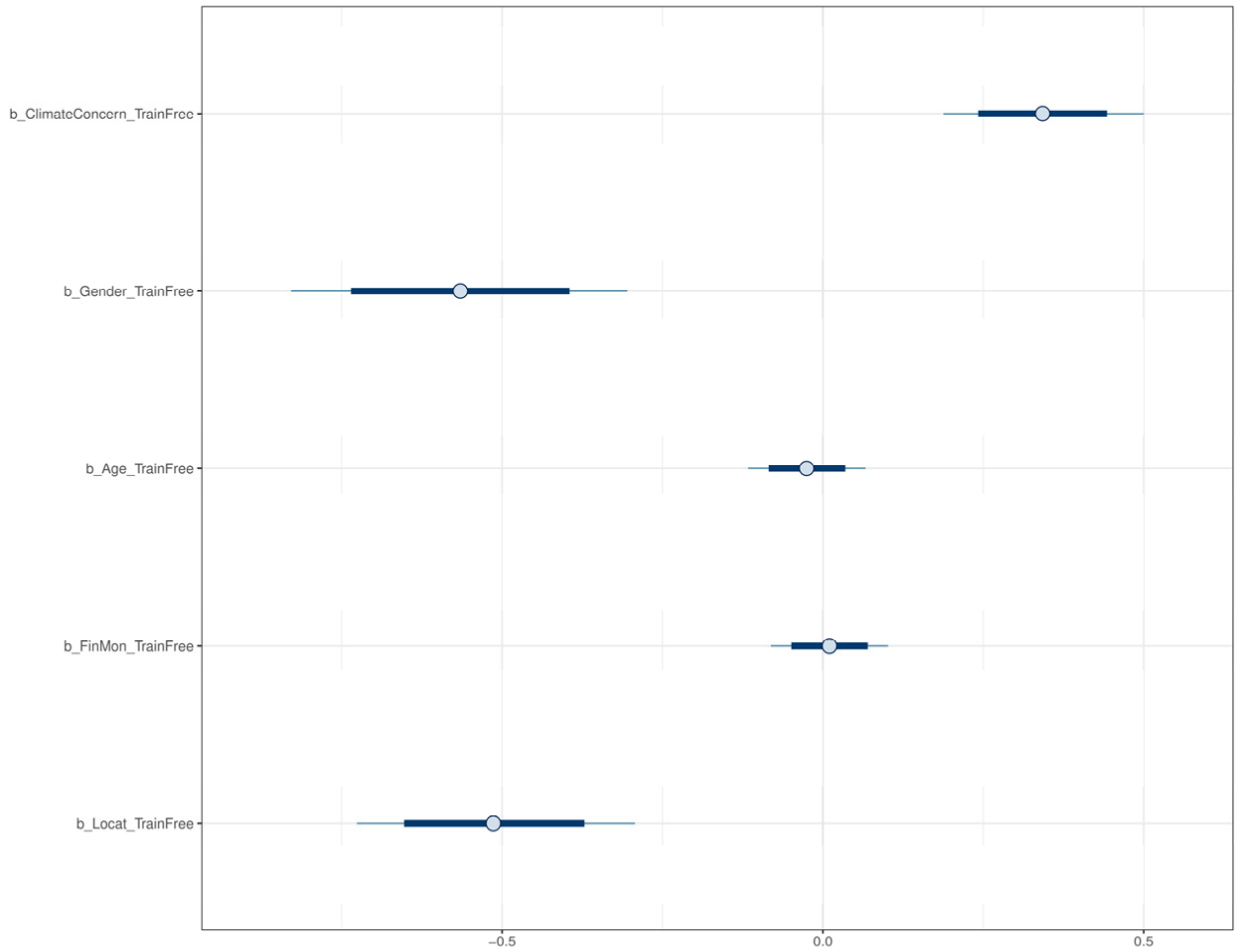

Figure 3. Distribution of coefficients of factors influencing decisions on a free short training course.

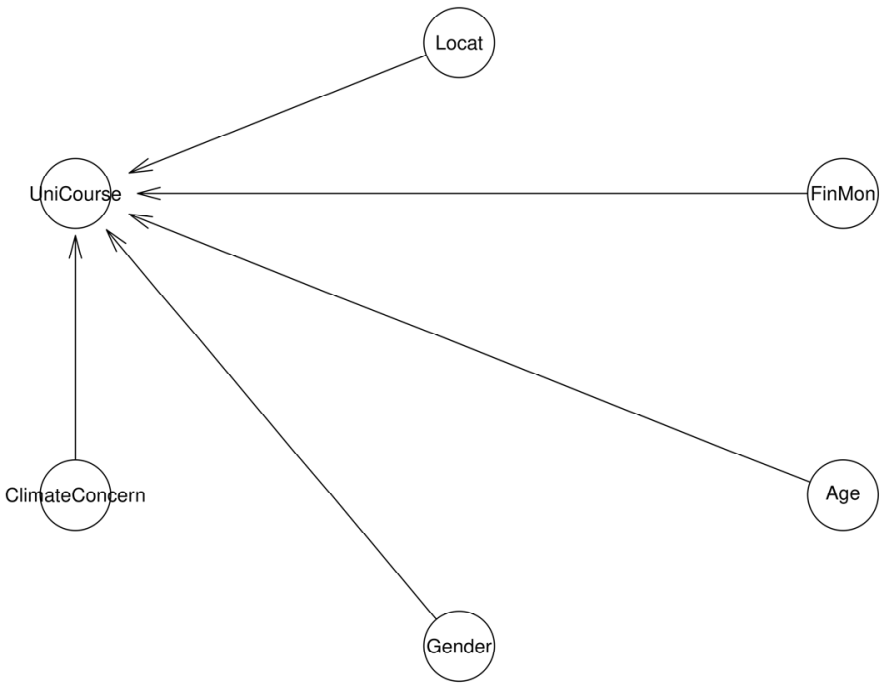

Figure 4. Model 2's structure.

Table 3. Summary of the estimated coefficients from the hierarchical Energy Course model.

Variables	Percentile Statistics									
	Mean	**se_mean**	**Sd**	**2.5%**	**25%**	**50%**	**75%**	**97.5%**	**n_eff**	**Rhat**
a_UniCourse	−2.96	0.01	0.97	−4.90	−3.60	−2.95	−2.30	−1.04	4932	1
b_ClimateConcern_UniCourse	0.26	0.00	0.08	0.10	0.20	0.26	0.31	0.41	8631	1
b_Gender_UniCourse	−0.24	0.00	0.13	−0.49	−0.33	−0.23	−0.15	0.02	9777	1
b_Age_UniCourse	0.07	0.00	0.05	−0.02	0.04	0.07	0.10	0.16	5314	1
b_FinMon_UniCourse	0.11	0.00	0.05	0.02	0.08	0.11	0.14	0.20	10,346	1
b_Locat_UniCourse	−0.44	0.00	0.11	−0.25	−0.11	−0.04	0.04	0.18	10,004	1

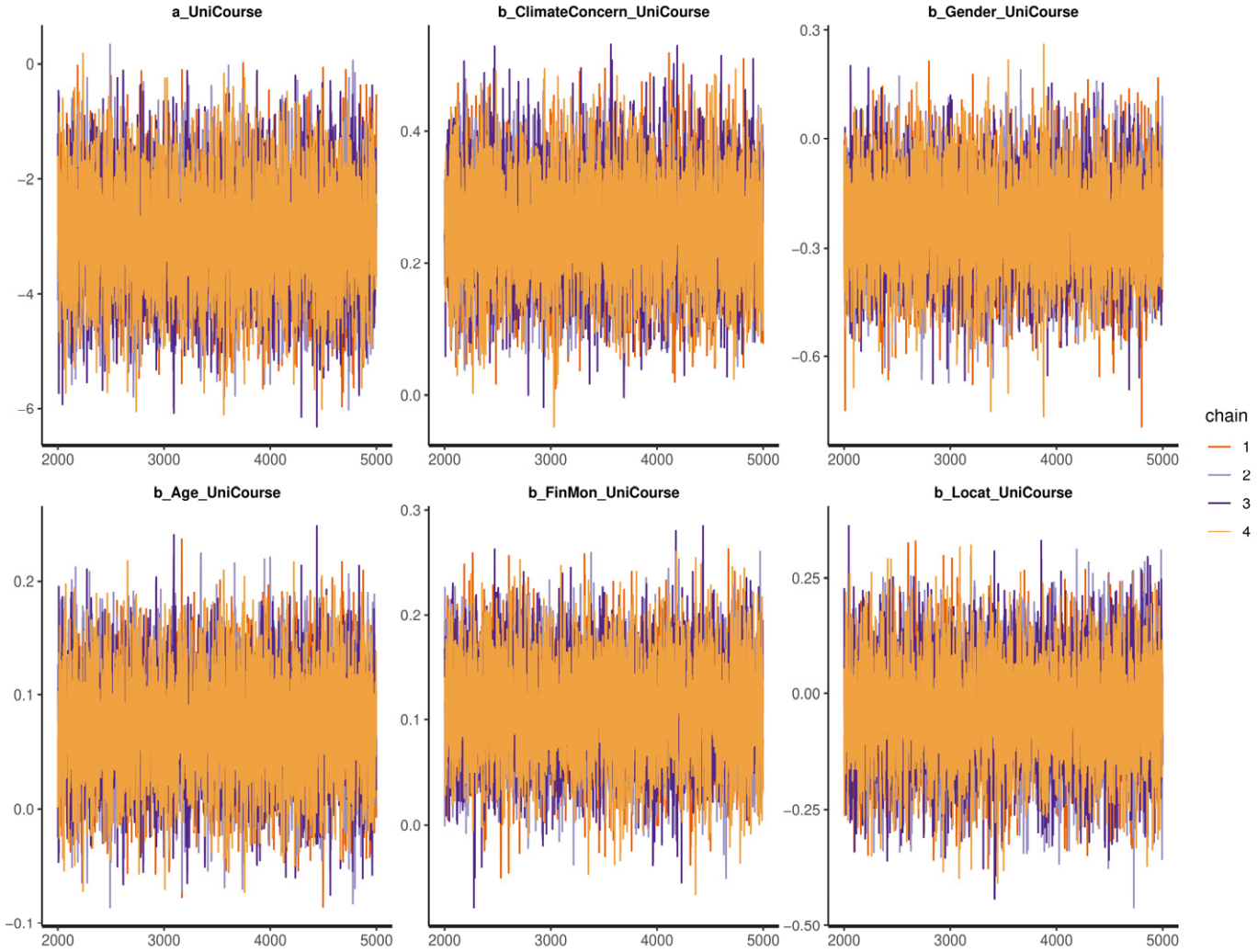

Figure 5. The MCMC chains for the Bayesian model of students' intentions regarding paid energy-saving courses at university.

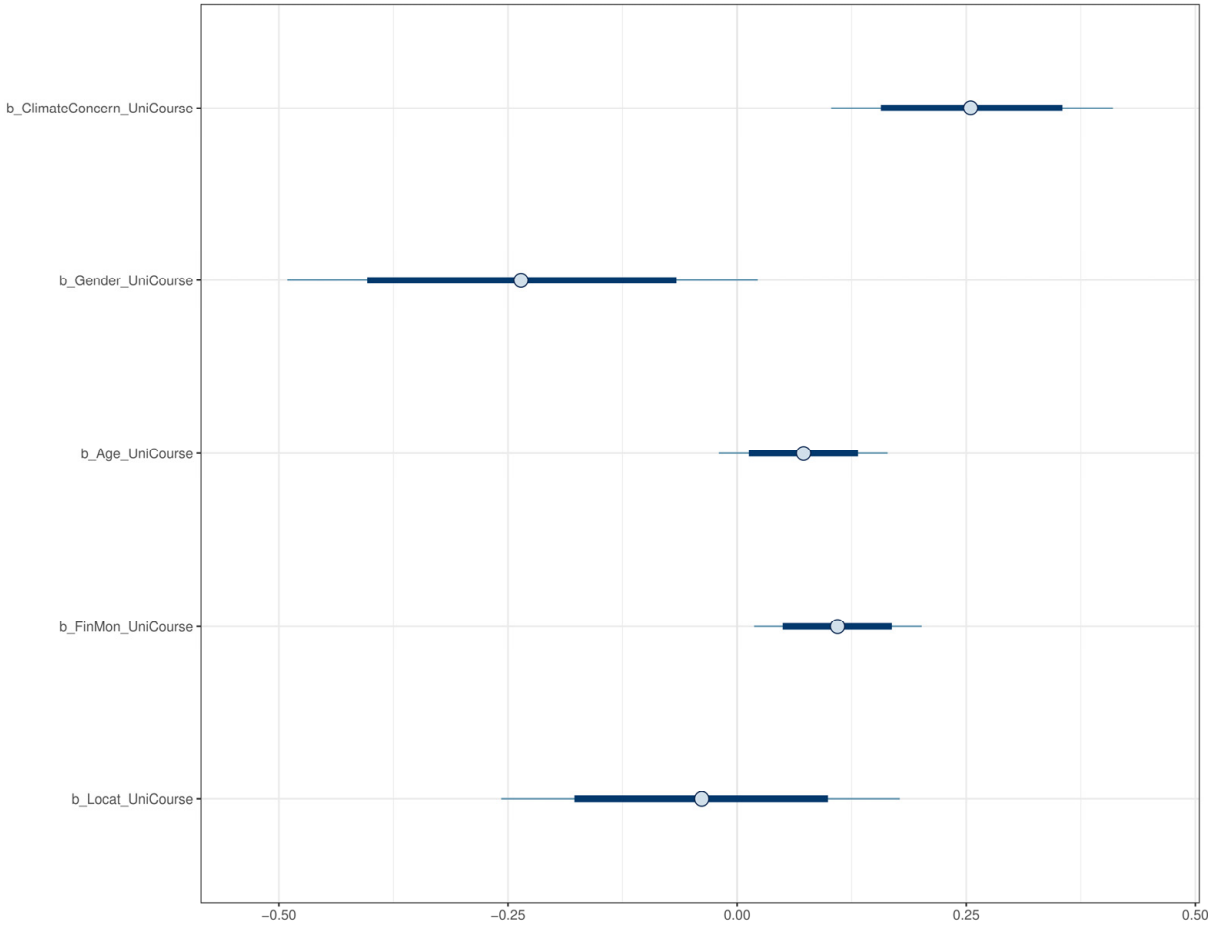

Figure 6. Distribution of coefficients of factors influencing decisions on energy-saving courses at university.

5. Discussion

Improved energy literacy is the key to energy conservation and sustainable development. As mentioned, students are considered vital to the future of a nation, so energy education should be delivered to students in higher education to raise their awareness of environmental protection and energy-saving practices. Energy literacy among students plays an indispensable role in sustainability and developing an environmentally conscious and responsible community that is characterized by positive attitudes towards energy conservation and the ability to make appropriate energy decisions in the future. This study aimed to identify the demands students make for building knowledge about saving energy through courses. It explored the vital determinants of students' decisions as a sound foundation for future effective energy education programs.

Our results show that environmental concerns influence a student's intentions to participate in free short training courses and energy-saving paid courses at a university. It is proven that environmentally conscious individuals are more likely to adopt pro-environmental behaviours and knowledge-seeking practices [82]. In other research, environmental concern is only weakly associated with pro-environmental practices [83,84]. Although a large number of people claim to have growing concerns about the environment, actual pro-environmental behaviours are relatively limited compared to the levels of concern worldwide. One possible explanation could be that people lack fundamental knowledge of how to protect the environment and conserve energy in their daily lives. A study of nursing students indicates that they heavily relied on universities to obtain knowledge on energy sustainability [26]. Two types of courses impart similar fields of knowledge. Yet, their accessibility differs significantly because university courses are stated

clearly in the curricula, whereas students have to put much more effort into knowing the existence of free short training courses. As discussed above, those with high environmental consciousness tend to search for courses outside the university's boundaries.

As expected, demographic characteristics play a significant role in one's acquisition of energy-saving knowledge. We find that gender, location, and monthly income impact a student's decision to enrol in energy-saving courses, yet their effects on the two courses differ. In line with previous studies [48,85], our results show that females have greater concerns than males, they have a higher awareness of environmental impacts, and they consider energy conservation more often [56]. Regarding living locations, rural students are more likely to seek out and take energy-saving courses to adopt pro-environmental practices. For example, 59% of rural students and 46% of urban students registered for free energy training. This surprised us because urban students had a higher perception of renewable energy [86]. One possible explanation is that rural students often have poor financial conditions and/or experience different difficulties in life, which motivates them to save money by participating in courses that teach energy-saving practices. This is consistent with the mindsponge theory's cost-benefit justification-based choice-making mechanism [87,88]. Another possible explanation is that rural students have hardworking habits compared to urban students, so they are more likely to take the course than their counterparts.

Monthly income had no significant impact on one's intentions to participate in free courses, yet if the energy-saving courses are included in university curricula, it becomes a more robust decision factor. This is understandable because the course's fees are counted as tuition fees. The higher the income, the greater the likelihood of enrolling. The difference between free and paid courses highlights cost as an essential factor that both students and educators may consider. Despite significant similarities, in light of mindspongeconomics the determinants of choice for free short training courses and paid university courses differ due to information accessibility and preferences associated with their prioritized core values [28,87,88]. From this view, young individuals who want free short training courses should actively seek related information from various sources outside the university. More importantly, it is crucial for educators to find ways to reduce costs to increase young people's participation in environmental education programs.

This study has contributed much to the literature on environmental culture, environmental management, and sustainable development. This is the first attempt to advance the understanding of the demands made by young people for improving energy literacy, a subset of environmental culture in Vietnam, which is a transitional country where the young make up most of the population. More importantly, this research validates and advances the understanding of young people's potential participation-based energy transition. In practice, building an environmental culture would be beneficial to society, but it would also be challenging because it is costly and takes decades for generation after generation to change their core values (i.e., environmental values). Our study, in part, contributes to facilitating the transition by providing a wealth of critical information and findings to scholars, environmentalists, and policymakers who will develop environmental policies and desirable environmental education programs to assist and encourage people to improve their energy literacy.

Additionally, our study also makes practical contributions to accelerate the transition to energy transformation in Vietnam and developing countries. The results can be useful for authorities and education institutions to determine initial targeted segments of the population when planning environment-based courses. In Vietnam, energy conservation has received insignificant attention, so training programs and their design are scant and can be further improved. According to Chapter II of Youth Law (2020), the youth is obliged to "enhance national traditions of Fatherland building and protection" (Article 12), take the initiative in reform, and "participate in environmental protection and activities for the sake of the community and the society" (Article 13) [89]. In these times of overconsumption of energy, governing bodies should prioritize education reform to integrate energy knowledge

and specific guidance on energy transformation into curricula as a mandatory course to educate the younger generation and influence them to build an eco-surplus culture [90] toward sustainability. Our research findings highlight determinants of the intentions of students to take energy courses. In developing countries, energy depletion has been increasingly severe. Furthermore, political conflicts between superpowers have exacerbated the already bad situation, thereby increasing the likelihood of an energy crisis and energy-related risks.

We fully acknowledge that follow-up studies can fill some gaps in this study. First, future research should delve deeper into environmental culture as it relates to young people's knowledge, experience, and contribution to energy saving. Second, the energy training/course participation model should include more variables, and additional surveys should investigate the reasons for rural enrolment in energy courses. Third, Vietnam's population is nearly 100 million, with youth aged 16 to 30 constituting approximately 22 million people and accounting for around 22.5 percent of the entire population [61,91]. Vietnam's student population is around 2 million each year, accounting for almost 10 percent of the total youth [92]. This suggests that the study's findings may not be entirely representative of Vietnamese youth. Hence, the sample size of the future study should be larger in order to obtain better results. Fourth, the follow-up study should go over the decision-making mechanisms of the environmental programs in greater detail. This is possible due to the complete development of the mindsponge theory [87] and the SM3D knowledge management systems [93]. It should be noted that decision-making mechanisms in many topics are well explained and justified as a result of these theories [74,90,94].

6. Conclusions

The energy transition is the outcome of the interplay between socio-ecological systems and energy transformation systems. A long-term energy transition toward sustainable development requires a high level of energy literacy among citizens, and the speed of the transition depends on how effectively educational programmes are designed and delivered. We made the first attempt to investigate the potential energy transformation of young people, who are the key actors in Vietnam's net-zero transition. We employed a Bayesian regression model to understand the perceptions of young people towards energy-conserving decisions and their influencing factors. Our research reveals that there is a relatively high demand among young people to improve their energy literacy. Climate concerns, gender, age, income, and living environment are major determinants of their intentions to pursue energy conservation training and courses. These findings suggest that it is possible to facilitate an energy transition in Vietnam. However, our study reveals that many aspects must be considered when establishing and/or designing environmental education and environmental policy to encourage and/or involve young people to enhance their energy literacy and environmental literacy, a prerequisite for a nurturing environmental culture. Additionally, future policies should mainly consider reducing costs and disseminating information on energy literacy and/or environmental literacy for further acceleration of the energy transition in Vietnam.

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