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Educating for Tomorrow: The Crucial Alliance between Universities and Government Policies in Empowering Communities against Climate Change

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Abstract: This research aims to examine the role of universities in supporting government policies to empower communities in facing climate change. The research method used is quantitative with a survey design. The research sample consisted of 141 respondents from two faculties at XYZ University. Data was collected through a questionnaire distributed via Google Form which was shared via WhatsApp. The data analysis technique uses structural equation modeling (SEM) using the Warp-PLS application. The research results show several important findings, namely: (1) Perception has a significant influence on the participation of the academic community in facing climate change,(2) Perception does not have a significant influence on higher education involvement in dealing with climate change, (3) Government policies have an important role in handling climate change but do not have a direct influence on academic community participation,(4) Government policies have a significant influence on university involvement in dealing with climate change, (5) Technological literacy has a significant influence on the participation of the academic community in facing climate change, (6) Technological literacy has a significant influence on university involvement in dealing with climate change, (7) University involvement has a significant direct influence on the role of the academic community in dealing with climate change. This research highlights the importance of perceptions, government policies, and technological literacy in supporting higher education institutions' efforts to address climate change and encourage the participation of the academic community in the climate change agenda. In addition, this research shows that university involvement has a central role in influencing the role of the academic community in facing the challenges of climate change

Keywords: Perception, Government Policies, University Involvement, Technological Literacy, Community Participation

1. Introduction

Climate change has become an urgent global challenge, affecting various aspects of human life, including the economy, the environment, and social welfare. In facing climate change, universities have a crucial role in supporting government policies for community empowerment. Universities, as centers of knowledge and innovation, have great potential to become a driving force in efforts to mitigate and adapt to increasingly worrying climate change.

Climate change is no longer an issue that can be ignored. With rising global temperatures, unstable weather, and serious threats to natural resources, universities and governments need to work together to address these issues[1]. This article will dig deeper into how universities can be effective agents of change in supporting government

policies to empower communities in facing climate change.

With a deep understanding of climate change, access to the latest research, and the ability to educate and engage communities, universities have great potential to shape a more sustainable future[2]. This article will explain this concept further, highlighting various university efforts in connecting scientific knowledge with real action on the ground, so that together we can face this increasingly urgent global challenge.

Through understanding, cooperation, and continuous innovation, universities and the government can jointly make community empowerment the key to efforts to overcome climate change[3]. This article will describe the journey towards a greener and more sustainable future, where the role of universities is not only a support but also a key driver in changing the world towards a more balanced and sustainable environment.

Several relevant factors or variables are the focus of the research:

Role of Universities: Assess the extent to which the universities in this research are truly involved in supporting government policies related to climate change[4]. This can be measured by various indicators, such as the number of climate-related research projects they carry out, participation in sustainable initiatives, or the number of educational programs covering climate issues.

Community Empowerment: Determine the level of community empowerment in facing climate change. This can involve factors such as increasing community capacity to manage climate risks, participation in climate projects, and awareness of climate issues[5].

Government Policy: Analyze various government policies that support community empowerment in facing climate change. This includes policies related to the environment, renewable energy, and incentives for sustainable action[6].

Knowledge about Climate Change: Measures the extent to which society knows climate change. This can be measured with questionnaires that measure people's understanding of climate impacts and mitigation efforts[7].

Participation in Climate Initiatives: Measures the level of community participation in climate initiatives, such as tree planting programs, waste reduction, or use of renewable energy[8].

Climate Change Impact: Determines the extent to which climate change has impacted society, such as natural disasters, increased temperatures, or extreme weather fluctuations.

University Engagement in Education: Measures the extent to which universities are involved in educating the public about climate change, both through academic programs and extracurricular activities[9].

Resources: Analyze the resources available to support government policies and community empowerment in facing climate change, such as budgets, research facilities, and infrastructure[10].

Third-Party Engagement: Assess the role of various third parties, such as environmental NGOs, in supporting government and university efforts to address climate change[11].

This article will explain the strategic role of universities in helping society face the challenges of climate change. Apart from that, this article will also review various initiatives and collaborations between universities and the government that have helped increase understanding, knowledge, and community involvement in efforts to reduce the impacts of climate change.

The aim of this research is: (1) the influence that perceptions have on the participation of the academic community in facing climate change, (2) the influence of perceptions on the involvement of universities in facing climate change, (3) the influence of government policy on the participation of the academic community, (4) the influence of policy government on the involvement of universities in facing climate change, (5) the influence of technological literacy on the participation of the academic community in facing climate change, (6) the influence of technological literacy on the involvement of universities in facing climate change, (7) the influence of the involvement of universities on the role of the academic community in facing climate change

2. Method

Approach and Research Design

The research approach used is the qualitative approach, which is research that intends to understand the phenomenon of what is experienced by the research subject holistically, using descriptions in words and language, in a special natural context, and by utilizing various scientific methods [12]. Research and Development Research, hereafter abbreviated as R&D, is a research method used to produce certain products and test the effectiveness of these products. Products mentioned here are not merely in objects or hardware, but also in the form of software[13].

Designing a Google Forms Questionnaire

First, we design a questionnaire that includes relevant questions for the variables that want to research, such as the role of universities, community empowerment, government policies, climate change knowledge, participation in climate initiatives, etc. Make sure the questions are well-designed and have a high level of reliability.

Sample Selection

Sampling uses random techniques with 141 respondents from the two faculty in university XYZ.

Data Collection

Distribute the Google Forms questionnaire to respondents via WhatsApp. Give respondents enough time to fill out the questionnaire properly.

Data Processing

After collecting data from respondents, we need to carry out initial data processing, such as data cleaning and converting data from Google Forms to a format that can be used by the Warp-PLS application.

Data Analysis

Use the Warp-PLS application to perform SEM analysis. This analysis will describe a conceptual model that reflects the relationships between the variables that are studied. Next, we will use the data that have collected to test this model. Warp-PLS will help to calculate path coefficients and measure the extent to which the model fits the data[12].

Interpretation of Results

After the analysis is complete, continue with the interpretation of the results. Pay attention to the path coefficients to see the extent to which the variables in the model are related to each other. Identify direct and indirect effects between variables.

3. Results

The data description for each variable is presented as follows:

Table 1. Data Description

	N	Minimum	Maximum	Mean	Std. Deviation
Perception (P)	141	1.6	5.0	3.75	.662
Government Policy (GP)	141	1	5.0	3.08	.721
University Engagement (ENG)	141	2.0	5.0	3.43	.851
Technology Literacy (TL)	141	2	5.0	4.06	.711
Empowerment (EMP)	141	2.3	5.0	3.96	.560
Valid N (listwise)	141				

Source: Analyzed Data (2023)

Table 1 shows that the average Perception (P) value is 3.75; the average government policy is 3.08; the University Engagement (ENG) of 3.43; the average Technology Literacy (TL) of 4.06; and the average Empowerment of 3.96. From the average value of each variable, information is obtained that all are included in the good/high category because the average value is more than 3.

Measurement Model Analysis

The outer model of the measurement analysis assesses the construct variables, their validity, and reliability. To determine the consistency of results within a test, internal consistency analysis is employed. This analysis uses a composite reliability value, with a variable considered reliable if the value exceeds 0.700 [13][14].

Table 2. Internal Consistency Analysis

	Cronbach's Alpha	Composite reliability	Average Variance Extracted
Perception (P)	0.689	0.83	0.623
Government Policy (GP)	0.721	0.733	0.578
University Engagement (ENG)	0.543	0.753	0.604
Technology Literacy (TL)	1	1	1
Empowerment (EMP)	0.367	0.76	0.612

Source: Analyzed Data (2023)

According to the internal consistency analysis data provided in the table, the results indicate that the perception variable is reliable with a composite reliability value of 0.83 > 0.700. Similarly, the government policy variable (0.733 > 0.700) and the university engagement variable (0.753 > 0.700) are also found to be reliable. Therefore, the data suggests that these variables demonstrate reliability.

Table 3. Convergent Validity

	P	GP	ENG	TL	EMP
P1	**0.634**	0.242	-0.015	-0.109	-0.235
P2	**0.858**	-0.103	-0.024	0.048	0.068
P3	**0.856**	-0.076	0.035	0.033	0.106
GP1	0.199	**0.761**	-0.169	0.181	-0.017

GP2	-0.199	**0.761**	0.169	-0.181	0.017
ENG1	-0.134	0.111	**0.777**	-0.116	-0.107
ENG2	0.134	-0.111	**0.777**	0.116	0.107
TL1	0	0	0	**1**	0
EMP1	-0.084	0.157	0.162	-0.071	**0.783**
EMP2	0.084	-0.157	-0.162	0.071	**0.783**

Source: Analyzed Data (2023)

The table above reveals that the outer loading values for all indicators are higher than 0.6, so all indicators are valid from the model. After the second stage of the analysis, the loading values obtained for all indicators already have an outer loading value above 0.7 so a structural analysis model can be carried out.

Structural Model Analysis (Inner Model)

The inner model analysis, also known as structural model analysis, is conducted to test the research hypothesis. In this analysis, the coefficient of determination (R Square) is examined to test the hypothesis.

The collinearity test assesses the strength of the correlation between latent or construct variables. If a strong correlation is found, it indicates methodological issues in the model, which can affect the estimated statistical significance. This issue is referred to as collinearity. To analyze collinearity, the Variance Inflation Factor (VIF) value is considered [15]. If the VIF value exceeds 5.00, it indicates the presence of a collinearity problem, whereas a VIF value below 5.00 suggests no collinearity problem[16].

Table 4. Collinearity

P	GP	ENG	TL	EMP
1.322	1.127	1.348	1.381	1.422

Source: Analyzed Data (2023)

From the above data, it can be described that all indicators have a VIF of less than 5. Thus, from the data above, the structural model, in this case, does not contain collinearity problems

Testing the Significance of the Structural Model Path Coefficient

The test comprises two stages: examining the hypothesis of direct effect and examining the hypothesis of indirect effect. The image below contains the path coefficients for hypothesis testing.

The purpose of conducting significance testing on the path coefficients of the structural model is to assess the significance of the relationships within the structural model. The objective is to test the significance of all relationships or hypotheses.

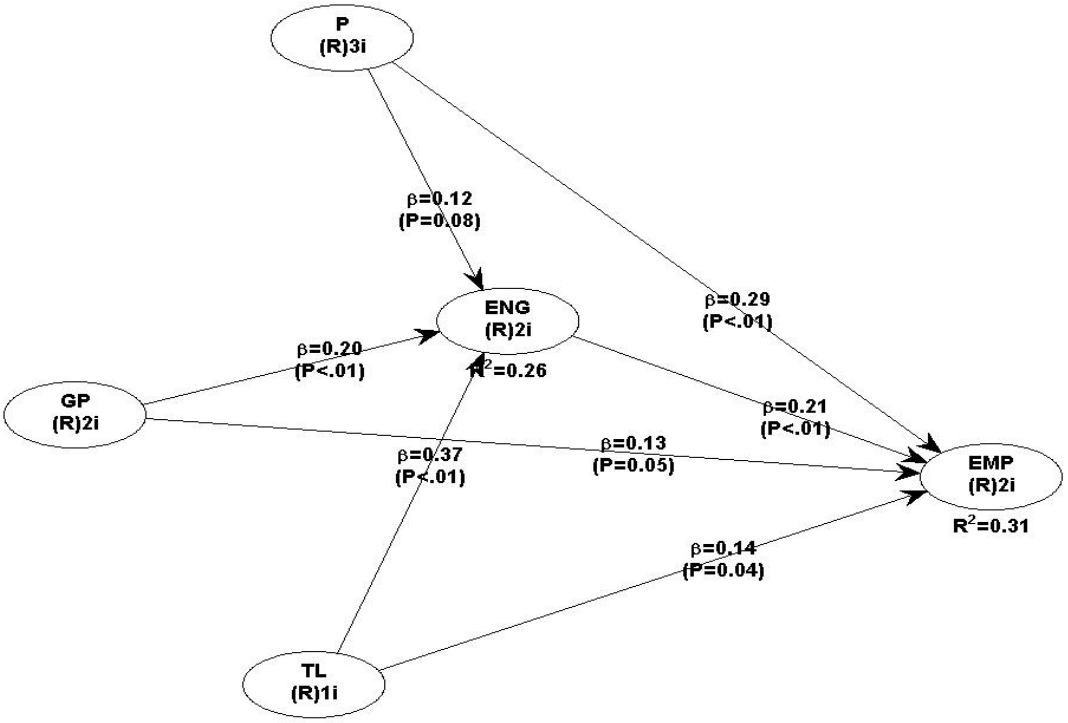

Figure 1. Hypothesis test

Source: Analyzed Data (2023)

Direct Effect Testing

The objective of testing the direct effect hypothesis is to demonstrate the impact of a variable on other variables directly [17]. A positive path coefficient value indicates that an increase in one variable corresponds to an increase in the other variable. Conversely, a negative path coefficient value suggests that an increase in one variable leads to a decrease in the value of the other variable.

If the probability value (p-value) is less than the significance level (Alpha) of 0.05, the null hypothesis (Ho) is rejected, indicating a significant influence of the variable on other variables. On the other hand, if the probability value (P-Value) is greater than Alpha (0.05), the null hypothesis (Ho) is not rejected, implying that the effect of the variable on other variables is not significant. (Suciptawati, 2016).

Table 5. Path Coefficient

Relationship between Variable	Original sample (O)	P-values
Perception (P) -> Empowerment (EMP)	0.291	< 0.001
Perception (P) -> Engagement (ENG)	0.115	0.081
Government Policy (GP) -> Empowerment (EMP)	0.132	0.054
Government Policy (GP) -> Engagement (ENG)	0.197	0.008
Technology Literacy (TL)-> Empowerment (EMP)	0.144	0.04
Technology Literacy (TL)-> Engagement (ENG)	0.372	< 0.001
Engagement (EMG) -> Empowerment (EMP)	0.205	0.006

Source: Analyzed Data (2023)

Discussion

The influence of perceptions about climate change on community participation in facing climate change

The research results show that perceptions about climate change have a significant effect on community participation in facing climate change. The research results show that people's perceptions of climate change play a key role in shaping individual attitudes and actions. There are several reasons why perceptions about climate change are very important in motivating public participation, namely:

When individuals have a strong perception of the seriousness of climate change and its impacts on the environment, economy, and human well-being, they tend to be more aware of the threats they face[19]. This could include understanding floods, droughts, extreme weather, rising temperatures, and ecosystem changes. Awareness of these threats can motivate individuals to take action to protect themselves and their communities. Strong climate change perceptions can generate intrinsic motivation to act. When someone feels that climate change is a serious and relevant issue, they tend to be more motivated to take personal action[20]. This could include reducing your carbon footprint, participating in environmental projects, or supporting environmentally friendly policies.

Perceptions about climate change also influence support for government action to address climate change. When people believe that climate change is a serious problem, they are more likely to support policies aimed at reducing greenhouse gas emissions, supporting renewable energy, or protecting the environment. This can influence the policy process and the government's role in dealing with climate change[21].

Perceptions of climate change can influence consumer behavior. Individuals who are aware of climate change will likely make more sustainable choices in their daily lives, such as purchasing environmentally friendly products, reducing waste, or using more sustainable transportation[22]. Strong perceptions about climate change can encourage participation in environmental initiatives. Individuals who believe that their actions can make a difference in addressing climate change are more likely to be involved in community projects, environmental campaigns, or non-governmental organizations focused on environmental protection.

The influence of perceptions of climate change on university engagement in climate change

The results of this study show that perceptions about climate change do not affect university involvement. There are several reasons why students' perceptions of climate change may not always impact university engagement in addressing it. The following are several factors that can influence the relationship between student perceptions and university actions regarding climate change:

Universities often have many priorities and limited resources. They may focus more on internal issues such as funding, academics, and administration than on external issues such as climate change. This may hinder their ability to take significant action to address climate change, regardless of student perceptions[23].

Not all students may have a deep understanding of climate change or the importance of the actions needed to address the issue. Therefore, even if there are students who care, they may not have enough knowledge to move to the university. Concrete actions of universities in addressing climate change may be related to certain policies, regulations, or external factors that are not entirely dependent on student perceptions[24]. For example, a university's involvement in investing in renewable energy or reducing its carbon footprint may be influenced by government policy, financial resources, or pressure from other stakeholders.

Universities are often faced with multiple priority issues that compete for their attention and resources. Climate change is just one of many global and local issues they must consider in their decision-making. Decision-making within universities can involve various parties who have different perspectives and must go through a complex decision-making process[25]. This can make it difficult for students or student groups to directly influence university actions to address climate change.

Nonetheless, it is important for students who care about climate change to continue to play an active role in campaigning for awareness and action at their universities. They can try to mobilize support from fellow students, support existing initiatives at the university, and seek to communicate effectively with university authorities to increase awareness and action regarding climate change[26]. The more support and pressure created by students,

the more likely it is that universities will engage in efforts to address climate change.

The Influence of Government Policy on Community Participation in Facing Climate Change

The results of this research show that government policies related to climate change do not affect community participation in facing climate change. There are several reasons why government policies may not always have a significant influence on public participation in addressing climate change:

Communities may not fully understand climate change, its impacts, or how their actions can contribute to addressing it. Government policies may not be effective enough in conveying relevant information to the public, so awareness and understanding of this issue remains low. Even if there are policies that encourage sustainable actions or reduce carbon emissions, there may not be strong enough incentives or there may be barriers that prevent people from following these policies[27]. For example, the cost of renewable energy may still be high compared to fossil energy sources, or the infrastructure for sustainable transportation may be inadequate.

Not all members of society have equal access to green technologies or the resources needed to reduce their impact on climate change. These inequalities can hinder the participation of disadvantaged communities. There are groups of people who may have views or interests that are contrary to government policies regarding climate change. This can generate resistance to the policy and can even motivate action to hinder or oppose its implementation[28].

The success of government policies in dealing with climate change often depends on the strong commitment of political leaders and government authorities[29]. If these leaders do not prioritize climate change or instead resist action, existing policies may not be implemented effectively. Government policies related to climate change can be very complex and difficult for the general public to understand. This can reduce people's ability to comply with policies or even understand them. Changing societal behavior on a large scale to reduce the impacts of climate change often takes time. Government policies may not yet achieve significant results because behavioral changes take time to develop[30].

In overcoming this challenge, the government needs to pay attention to effective communication approaches, provide appropriate incentives, increase the accessibility of green technology, and listen to the needs and input of the community. Awareness, education, and active community involvement are also important in creating sustainable change in the face of climate change.

The Influence of Government Policy on University Involvement in Facing Climate Change

The results of this research show that government policy has a significant influence on university involvement in dealing with climate change. Government policies usually have an impact on many aspects of society, including universities, in dealing with climate change. However, there are several reasons why government policy may not always have a significant influence on university engagement in climate change efforts:

Universities have a limited number of priorities and resources, and they may focus on areas such as education, research, and internal administration. Government policies related to climate change may compete with these priorities, and universities may have difficulty allocating additional resources to climate change initiatives. Universities often have autonomy in their internal decisions, including decisions about how they will address climate change[30]. While government policies may provide guidance and incentives, universities may have the freedom to determine their strategies and actions.

Government policies may address multiple issues at once, while universities may have varying focuses, depending on their missions and goals. This can result in a mismatch between government policy and university agendas[31]. If government policies do not provide strong enough incentives or external pressure for universities to take action on climate change, then universities may be less motivated to make significant changes.

Universities are large entities with complex decision-making processes. Implementing change within a university environment can take a long time, even if government policy supports immediate action. Not all universities have sufficient knowledge and resources to effectively address climate change. They may require additional assistance, either in the form of training or funding, which is not always provided by government policy[32].

Universities may encounter internal resistance or opposition to changing their practices regarding climate change,

especially if interests are opposing such changes within the institution. Nonetheless, it is important to note that government policies can still have a significant influence on universities in dealing with climate change through a variety of means, including incentives, regulations, financial support, and awareness promotion. Strong and consistent government policies can be a catalyst for universities to take more serious action in addressing climate change.

The influence of technological literacy on community participation in facing climate change

The results of this research show that technological literacy has a significant effect on community participation in facing climate change. Technological literacy influences community participation in facing climate change because technology plays a key role in gathering information, disseminating knowledge, mobilizing action, and enabling collaboration for climate change mitigation and adaptation efforts. Here are some reasons why technological literacy is very important in this context:

Technology enables quick and easy access to information about climate change, including scientific data, the latest developments, and practical information about how to reduce the impacts of climate change. With technological literacy, people can search for and access these information sources via the Internet, mobile applications, and social media platforms[33].

Technological literacy allows individuals to share knowledge about climate change more effectively through digital media, blogs, videos, and social networks. They can become "information connectors" who spread important messages about climate change to a wider audience[34]. Through technological literacy, people can participate in environmental campaigns and online activism. They can join online petitions, support environmental organizations, and contribute to internet-based campaigns aimed at tackling climate change. Technologies such as environmental sensors, weather monitoring applications, and data-driven platforms enable people to actively monitor the condition of their environment. Technological literacy allows them to use these tools well and participate in the collection of environmental data which is important for a deeper understanding of climate change[35].

Technological literacy facilitates collaboration and networking. People can join online communities that share an interest in climate change, share ideas, and collaborate on projects that support sustainable goals. Technological literacy allows access to online educational programs on climate change. This helps improve the understanding and skills needed to contribute to confronting climate change. There are many apps and digital tools designed to help individuals measure their carbon footprint, monitor energy use, and identify sustainable actions they can take. Technological literacy enables people to use these tools well.

The influence of technological literacy on university involvement in dealing with climate change

The results of this research show that technological literacy has a significant effect on university involvement in dealing with climate change. Technological literacy has a significant influence on university involvement in dealing with climate change because technology has a key role in understanding, monitoring, mitigating, and adapting to climate change. Here are some reasons why technological literacy is so important:

Technology allows universities to collect important data on climate change through sensors, satellite mapping, and modeling models. High technological literacy enables researchers at universities to develop, operate, and analyze equipment and systems used in climate research. Information and communication technology plays a big role in conveying information about climate change to the wider public[36]. Universities with good technological literacy can leverage social media, websites, and other online platforms to raise awareness about climate change and the actions that can be taken.

Technology is often an integral part of solutions to address climate change. This includes the development of renewable energy technologies, sustainable transportation systems, and other technologies that help reduce carbon emissions. Universities that have strong technological literacy can contribute to the research and development of this technology. Technology can be used to optimize the use of resources at universities, including energy, water, and waste. Advanced automation and monitoring systems can help universities reduce their carbon footprint and save resources[37].

Universities can provide training and higher education in climate change-related technologies, thereby preparing students for professional roles related to climate change and green technology. High technological literacy enables universities to collaborate with various stakeholders, including government, industry, and non-governmental organizations, to develop joint solutions to climate change.

Universities can also play a role in designing and implementing policies and regulations related to climate change with the help of technology for monitoring and reporting. By having good technological literacy, universities can be more effective in integrating technology into their strategies and initiatives in dealing with climate change. This will enable them to play a leadership role in research, education, and action that supports sustainability and addressing climate change.

The influence of university involvement on community participation in facing climate change

University involvement influences community participation in facing climate change because universities have great potential to influence the awareness, knowledge, and actions of individuals and communities in overcoming the challenges of climate change. Some of the reasons why university involvement has a significant impact are:

Universities are knowledge and research centers that provide scientific knowledge about climate change, its impacts, and the solutions that can be adopted. University scientific research and publications help in understanding deeper climate issues and verifying the scientific facts underlying climate change. This helps in educating people about the importance of climate change[38].

Universities have a major role in educating and training future generations. By including climate change issues in curricula and educational programs, universities can create awareness and understanding of this issue among students. It prepares individuals to take better action in the face of climate change as they enter the workforce and society[39]. The university frequently holds outreach programs, seminars, and public events aimed at increasing public awareness about climate change. It includes an explanation of the scientific concepts underlying climate change, its impacts on the environment and society, as well as actions that can be taken by individuals and groups.

Universities are often centers for research and development of green technologies and innovative solutions to tackle climate change. These innovations can help reduce greenhouse gas emissions, increase energy efficiency, and promote sustainable practices in various sectors. These solutions can inspire sustainable action in society[40]. The university frequently collaborates with governments, NGOs, and the private sector on research projects and environmental initiatives. This collaboration enables the development of scientific evidence-based policies and the implementation of projects that support climate change goals. Universities can act as key partners in these initiatives. Universities produce well-trained and educated graduates who can contribute to research and employment in the field of climate change. They can also become advocates and leaders in society who motivate and mobilize others to participate in efforts to address climate change.

5. Conclusion

The conclusions of the research on "The Role of Universities in Supporting Government Policies for Community Empowerment in Facing Climate Change" are:(1) Perception has a significant influence on the participation of the academic community in dealing with climate change, (2) Perception does not have a significant influence on the involvement of universities in facing climate change, (3) Government policy has an important role in dealing with climate change but does not have a direct influence on community participation academic, (4) Government policy has a significant influence on university involvement in facing climate change, (5) Technological literacy has a significant influence on the participation of the academic community in facing climate change, (6) Technological literacy has a significant influence on university involvement in facing climate change, (7) University involvement has a significant direct influence on the role of the academic community in facing climate change.

The academic-professional implications of the results of this research are:

1) Based on research findings, universities can consider expanding and deepening their educational programs related to climate change. This includes a stronger curriculum, a more active research program, and ongoing skills training.

2) There is an opportunity to strengthen collaboration between universities and the government in supporting climate change policies. This may include the development of joint research projects, educational programs, and knowledge exchange.
3) This research can encourage universities to develop the best models to support government policies related to climate change. This could be a useful example for other institutions wishing to contribute effectively to addressing climate change.
4) This research provides findings that can be used as references in scientific publications, conferences, and seminars on the environment and climate change. This can broaden professional and academic understanding of the role of universities in addressing climate change.
5) Students and professionals in various fields can consider their involvement in climate change-related efforts. This research shows that the role of universities can create significant opportunities for them to contribute to these efforts.

Credit S tatements

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Declarations of interest

The author declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article

Acknowledgment

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all aspects of this work

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