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The Development of a Capability Building Framework for a Bioethanol Power Plant in the Philippines

A Dissertation

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By

***Aldin C. Layaguin**

PHD Student, Philippine Christian University (PCU) – Manila Campus, Philippines

*Lot 9, Block 12, Sampaguita-Sunflower Street, Menlo Village, Phase 3, Zone 10, Talisay City, Negros Occidental Philippines, 6115

aclayaguin@pcu.edu.ph

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Abstract

This research paper examined the Philippines' Capability Building Framework for Bioethanol Power Plants. The researcher hopes to identify the essential tools for assessing the Philippines' Bioethanol Power Plant's financial viability, environmental sustainability, and social consequences for capability building. The weighted mean rating of 4.39 and standard deviation 0.76 indicated that respondents "agree" on bioethanol power plant financial viability instruments in the Philippines. Thus, Philippine bioethanol power plant stakeholders must convey a clear set of rules and regulations to ensure project success. Respondents "strongly agree" on the instruments needed to identify environmental elements that could impact the project's environmental sustainability in land usage, water use, waste management, air quality, biodiversity, and climate change. Standard deviation is 0.68 and composite weighted mean 4.51. Finally, respondents "agree" that the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines includes the following variables: Employment, Community Engagement, Social Inclusion, Human Rights, Health and Safety, Cultural Heritage, Stakeholder Participation, Local Content, Social Infrastructure, Impact on Livelihood, Transparency and Accountability, and 4.42 is the composite weighted mean with 0.801 standard deviation. Philippines legislation and policy should boost biofuel growth and public knowledge, according to this study. Philippines requires a strong agricultural industry to supply sugarcane, cassava, and biofuel transportation and distribution. Bioethanol power plants profit from feedstock, energy, and government subsidies. Selling plant power may increase revenue. Philippine bioethanol power plants can be commercialized through knowledge sharing, investment, and market access through local and international partnerships.

Keywords: Bioethanol, Capacity Building, Environmental Sustainability, Financial Viability, Stakeholder

Introduction

Bioethanol's environmental benefits make it fascinating. It is mostly derived from sugar and starch. You can use most biofuels alone or in a combination with petrol. This is the most prevalent type. Ethanol is made from sugars, starches, lignocellulose, and algal biomass. A Philippine bioethanol power facility commercialization framework is the goal of this project. The framework will help bioethanol become a viable energy source in the country. The project will assess the Philippine bioethanol business, identify its biggest difficulties and possibilities, and create a thorough commercialization framework to help it grow. Computer and field research will be used in the project. Researchers will interview bioethanol producers, investors, policymakers, and specialists. Political leaders, investors, and other stakeholders interested in the Philippines' bioethanol business will benefit from the study. Other countries with similar agricultural resources and energy needs can use this study's commercialization framework to start bioethanol enterprises.

This project will assess the economic, environmental, and social benefits of creating a bioethanol sector in the Philippines and build a commercialization framework for a bioethanol power plant. This analysis will assess the possibilities for job creation, income generation, poverty reduction, greenhouse gas reduction, and sustainable development. The study will also assess the possibilities for a circular bioeconomy to sustain the Philippine bioethanol industry. A circular bioeconomy maximises biomass resource value and utility while minimising pollution and environmental damage. Bagasse, a bioethanol byproduct, will be tested for use in animal fodder, fertiliser, and bioplastics. The study is also expected to contribute to a broader discussion on sustainable energy and climate change mitigation in the Philippines. The study can help the Philippines reduce its dependence on imported fossil fuels, improve energy security, and cut greenhouse gas emissions by boosting bioethanol as a renewable energy source. This helps achieve the nation's sustainable development goals.

This study's findings and commercialization framework can help bioethanol producers and investors create a favourable business environment, develop a sustainable and thriving

bioethanol industry in the Philippines, and reduce greenhouse gas emissions and promote sustainable development worldwide. The study wants to profile Philippines Bioethanol Power Plants, assess their progress, and offer suggestions for improving bioethanol implementation in the region. The researcher will recommend actions to reduce Philippine fossil fuel dependence and become a South East Asian ethanol exporter. Our gasoline prices are rising to Php 90–100 per litre. Our country's Bioethanol Programme will be guided by Biofuel Act of 2006, also known as Republic Act 9367, to minimise greenhouse gas (GHG) emissions. More Bioethanol Power Plants in our country can raise our bioethanol demand and help us meet E10 petrol supply goals. We import bioethanol from other countries and our production costs are still high, but with government support, we can study how to make bioethanol production more cost-effective and support local bioethanol producers. As our government supports Bioethanol Power Plant construction, our economy will profit. Increasing the ethanol petrol blend from E10 to E15 and E20 can save the Philippines millions of dollars. Philippines will actively mitigate climate change and avoid 250,000 CO2e per year, or Php 500M. New Bioethanol Power Plant will employ Filipinos in rural areas.

Materials and Methods

Research Design

The Philippine bioethanol power plant commercialization framework research design typically has several key stages. The first step in developing a research study is to identify research questions. The proposed bioethanol power plant may raise concerns about its technical feasibility, economic viability, environmental impact, and social and political acceptability. The researcher should use the research questions to create a conceptual framework that specifies the key factors and relationships to study. The framework should guide research design and data analysis.

Select a research strategy: The researcher should choose a strategy that fits the study questions and conceptual framework. It may involve qualitative approaches like interviews or focus groups, quantitative methods like surveys or statistical analysis, or both.

Select a sample: The researcher must choose a sample of participants based on the research plan. Government officials, industry specialists, local citizens, and investors may be involved. The researcher must collect sample data using the chosen study approach. This may entail interviews, surveys, or secondary sources like government reports or industry journals. Due to its acquisition, the data was analyzed using statistical or qualitative methods. The Philippine bioethanol power plant commercialization framework study design should be rigorous, methodical, and based on the research questions and conceptual framework. These approaches can help researchers provide high-quality evidence for policymaking and renewable energy industry sustainability in the Philippines.

Setting

The study used mixed-methods to collect and analyzed qualitative and quantitative data. This may involve surveys, interviews, focus groups, and published data. The mixed methods technique can help understand the Philippine bioethanol power plant commercialization framework better. The study's research questions, objectives, scope, and data and resource availability determined the research environment. The site should also take into account the study's potential impact and application to bioethanol stakeholders in the Philippines and abroad.

Representative sample used by researcher. This meant the sample reflected the entire population. Its composition and traits reflect the population's demographic diversity. A representative sample can help generalize findings to the population. A representative sample should be at least 30. These guidelines suggest a sample size of 30 to 100 for a study on the commercialization framework of a bioethanol power plant in the Philippines, based on research questions, objectives, and sampling approach. However, the sample size was established after

considering all relevant aspects and should be justified in light of the study's needs. This research followed survey best practices (Kelly et al., 2003) and the Checklist for Reporting Results of Internet E-Surveys (Eysenbach, 2004). Carter V. Good and Douglas E. Scates' criteria were used to validate and suit the instrument. The jury rated on a scale of 5 (Strongly Agree), 4 (Agree), 3 (Undecided), 2 (Disagree), and 1 (Strongly Disagree).

Test Instrument

The project's research questions, objectives, and scope will decide the survey instrument for a Philippine bioethanol power plant commercialization framework study. Survey instruments may include these elements:

1. Demographic Information: The survey instrument includes respondents' age, gender, education, and occupation. This information helped uncover biases or variances in responses based on these traits.

2. Knowledge and awareness: The questionnaire asks about bioethanol power plants and their commercialization in the Philippines. This can assess respondents' knowledge of the issue and uncover any knowledge gaps or misconceptions.

3. Perceptions and attitudes: The study asks respondents about bioethanol power plants and their commercialization in the Philippines. This helps identify bioethanol power facility commercialization challenges and stakeholder support or opposition.

4. Regulatory and policy frameworks: The poll asks respondents about regulatory and policy frameworks that affect bioethanol power plant commercialization in the Philippines. This helped uncover framework gaps and respondent comprehension and awareness.

5. Economic and financial considerations: The survey asks respondents on the economic and financial implications of commercializing bioethanol power projects in the Philippines. This helped identify revenue streams, funding choices, investment prospects, and their perceived risks and challenges.

6. Environmental and social consequences: The questionnaire asks about bioethanol power plants' potential environmental and social impacts in the Philippines. This helped identify environmental and social risks and opportunities related with bioethanol power facility development and operation, as well as stakeholder concern.

7. Partnerships and collaborations: The survey asks about respondents' views on potential partnerships and collaborations to commercialize bioethanol power facilities in the Philippines. This helped identify potential collaboration and partnership opportunities with government agencies, industry associations, and local communities.

The researcher "collect rich, detailed information from respondents" by allowing respondents to react as they wished (Dillman, Smyth, & Christian, 2009). Multiple-choice and free-response queries have advantages. Combinations of both types are recommended to balance their pros and cons (Polit-O'Hara & Hunga, 2000).

Three engineering doctorates validated the instrument using Lynn (1986) and Polit and Beck (2006)'s Content Validity Index (CVI). According to Polit and Beck (2006) and Zamanzadeh et al. (2014), the CVI for each item's relevancy (item levels (I-CVIs)) is determined by dividing the number of experts who assessed each item as 3 or 4 by the total number of experts. A pilot research simulates primary study data collection. According to Teijlingen and Hundley (2002), there are several objectives for conducting a pilot study: "a) testing adequacy of research instruments, b) assessing the feasibility of a full-scale project, c) assessing whether the research protocol is realistic and workable, d) revealing reveal logistics issues, e) collecting preliminary data, f) ensuring that the sampling frame and technique are effective, g) determining sample size, h) persuade. Prior to the collection of data, a pilot study was conducted to assess the internal consistency of the survey instruments and to ensure their clarity and contextual relevance. Here, a few principles can be applied to determine the size of the pilot study's sample. Cooper and Schindler (2011), for instance, suggested a sample size of 25 to 100 individuals, whereas Hill (1998) suggests that a sample size of 10 to 30 individuals is sufficient for undertaking a pilot test. In this Pilot Test, 10 participants were chosen at random and asked

to complete the questionnaire. The pilot test was completed without incident, so the questionnaire is ready for distribution. Participants who participated were omitted from the subsequent study. Convenience sampling was used for the questionnaire preliminary test. Cronbach's alphas () ranged from 0.911 to 0.955. According to Hair et al. (2010), each construct's Cronbach's should be 0.7.

Data Collection Methods

This is the data collection procedure for the Philippines bioethanol power plant commercialization framework research.

1. Online Survey: Government agencies, industry associations, investors, suppliers, consumers, and local communities can easily distribute and collect online surveys via email, social media, or specialized survey platforms.

2. Face-to-face interviews: Critical informants like government officials, industry leaders, and community representatives can provide more detailed and nuanced information in person or over the phone. Interviews can be structured or semi-structured based on the research questions and objectives.

3. Document Analysis: Document analysis can be used to compile data from published literature, reports, and policy documents on the commercialization of bioethanol power plants in the Philippines. It can provide a comprehensive overview of the regulatory, economic, environmental, and social aspects of the commercialization framework, as well as historical trends and recent developments.

4. Expert consultations: Academics, researchers, industry practitioners, and government officials can provide valuable insights and perspectives on the commercialization framework, as well as potential solutions and recommendations for addressing challenges and opportunities.

To ensure data validity, reliability, and representativeness and take into account the target population's ethical and cultural considerations, data collection procedures should be pre-tested

and piloted with a small sample of respondents to identify potential issues and ensure that they are appropriate for the research context. Lower costs than paper mailings (postage, printing, etc.); automation and real-time results (SurveyMonkey, Qualtrics, Redcap, etc.); less time (printing, preparing, and stuffing mailings, driving to a post office to mail them); a convenient method for respondents (internet access, no need to send responses back to the researcher); and a larger sample size. Ritter, Lorig, and Matthews (2004) found no statistically significant differences between paper and online surveys, but they found that online surveys required less follow-up. The Tailored Design Method (TDM) of Dillman (2014) emphasizes the effectiveness of online surveys in achieving a high response rate.

The researcher will create and manage the online survey questionnaire Bioethanol Power Plant Status in the Philippines - Online Version using Microsoft® Forms (2012), a comprehensive survey management software that allows survey administrators to generate individual emails and manage individual survey access. Respondents will be given the website's address and asked to complete all fields. As soon as they arrived at the website, respondents were presented with a greeting message, consent to participate, and an overview of the study. If they agreed to participate, they completed the questionnaire. Respondents acknowledged that by clicking "next" to start the questionnaire, they consented to participate and have their responses used for research.

Respondents were told it could take 10 to 15 minutes to complete the questionnaire, but they could leave at any time if they didn't want to participate. Participation was confidential and voluntary. There were required questions, so respondents could answer them and submit the survey.

Once the questionnaire is completed, the participant is redirected to the Microsoft® Forms website, where the data is encrypted and stored in a database on the server until the survey is over. After the database is closed, the data is retrieved in a comma-separated format and a Microsoft Excel® formatted file and entered into the Statistical Package for. In order to increase response rates, Dillman, Smyth, and Christian (2009) recommended a web-based

questionnaire. The email addresses, first names, and last names of the population are imported into the survey administration software Microsoft® Forms, and a unique identification code is generated for each individual. This allows for personalized email communication between the researcher and correspondents.

Data Modelling

The researcher used descriptive statistics—frequency, means, medians, percentiles, and standard deviations—to answer research questions using SPSS Version 24. According to Pallant (2013), descriptive statistics are appropriate for describing the characteristics of a survey. A process was used to organize and prepare the open-response question data, classify it, and analyze/develop descriptions and themes from it. A code book for Statistical Package for the Social Sciences, Version 24 data analysis was created.

Results and Discussion

1. Essential Instruments for Assessing the Financial Viability of Bioethanol Power Plant in the Philippines

The following variables were considered in assessing the essential instruments for financial viability of Bioethanol Power Plant in the Philippines: market demand; option for financing; cost of raw materials; return of investment; cash flow projection; analysis of net present value; operational expenses; capital expenditures; taxation; sensitivity analysis; risk management; and stakeholder analysis.

1.1 Market Demand - data shows that respondents “agree” on market demand as one of the essential instruments for assessing the financial viability of bioethanol power plant construction in the Philippines. The findings were supported by the overall weighted mean of 4.44 and standard deviation of 0.67.

1.2 Cost of Raw Materials - survey showed that respondents “agree” that cost of raw materials is one of the essential instruments for assessing the financial viability of bioethanol power plant. This was confirmed by the overall weighted mean of 4.23 and standard deviation of 0.91.

1.3 Return on Investment - data on the table revealed that respondents “agree” on their assessment on the essential instruments for financial viability of bioethanol power plant in the Philippine in terms of return on investment (ROI). This finding was supported by the overall weighed mean of 4.44 and standard deviation = 0.77.

1.4 Cash Flow Projections - results show that the assessment of respondents on the essential instruments for assessing the financial viability of bioethanol power plant in the Philippines “agree” in terms of cash flow projections. This finding was supported by the over-all weighted mean of 4.33 and standard deviation = 0.88.

1.5 Analysis of Net Present Value - the assessment of respondents on the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine “agree” in terms of analysis of net present value. Supporting this finding was the over-all weighted mean of 4.31 and standard deviation = 0.83.

1.6. Operational Expenses - survey revealed that the assessment of respondents on the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine “agree” in terms of operational expenses. The finding was confirmed on their overall weighted mean of 4.37 and standard deviation = 0.63.

1.7. Capital Expenditures - respondents “agree” on their assessments on the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine in terms of capital expenditures. Attesting to confirm this finding was the respondents’ overall weighted mean of 4.34 and standard deviation = 0.67.

1.8. Depreciation and Amortization - data showed that respondents “agree” on their assessment of the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine in terms of depreciation and amortization. This finding was supported by the over-all weighted mean of 4.42 and standard deviation of 0.75.

1.9. Taxation - respondents “agree” on the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine in terms of taxation. Supporting to this finding was the over-all weighted mean of 4.31 and standard deviation of 0.77.

1.10. Sensitivity Analysis - respondents were asked to the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine in terms of sensitivity analysis. Based on their assessment the respondents "strongly agree" on the essential instruments in terms of sensitivity analysis for financial viability of bioethanol power plant in the Philippines. This finding was supported by the over-all weighted mean of 4.50 and standard deviation of 0.75.

1.11. Risk Management - assessments of respondents revealed that they "agree" as to aspects of risk management as one of the essential instruments for assessing the financial viability of bioethanol power plant in the Philippine. The finding was based on their overall weighted mean of 4.46 and standard deviation of 0.66.

1.12. Stakeholders' Analysis - respondents assessed that they "strongly agree" as to essential instruments for assessing the financial viability of bioethanol power plant in the Philippines. The finding was confirmed from the overall weighted mean of 4.55 and standard deviation 0.69.

Summary of the Essential Instruments for Assessing Financial Viability of Bioethanol Power Plant in the Philippines

Variables	Weighted Mean	Standard Deviation	Verbal Interpretation
Market Demand	4.44	0.67	Agree
Cost of Raw Materials	4.23	0.91	Agree
Return on Investment	4.44	0.77	Agree
Cash Flow Projection	4.33	0.88	Agree
Analysis of Net Present Value	4.31	0.83	Agree
Operational Expenses	4.37	0.63	Agree
Capital Expenditures	4.34	0.67	Agree

Depreciation and Amortization	4.42	0..75	Agree
Taxation	4.31	0.77	Agree
Sensitivity Analysis	4.5	0.75	Strongly Agree
Risk Management	4.46	0.66	Agree
Stakeholder Analysis	4.55	0.69	Strongly Agree
Overall Weighted Mean	**4.39**	**0.76**	**Agree**

2. Crucial Tools in Recognizing Potential Environmental Factors that could Impact the Project's Environmental Sustainability

The following variables were considered in assessing the crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability: land use, water use, waste management, air quality, biodiversity, and climate change.

2.1 Land use - assessments of respondents revealed that they "agree" as to aspects of land use as the crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability. The finding was based on the overall weighted mean of 4.45 with standard deviation of 0.59.

2.2. Water use - respondents assessed that they "agree" as to crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability. The finding was supported by the weighted mean of 4.46 with standard deviation 0.69.

2.3. Waste Management - respondents "agree" on waste management as the crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability. The findings were attested on the overall weighted mean of 4.46 and standard deviation 0.56.

2.4. Air Quality - respondents " strongly agree" on their assessment in terms of air quality as the crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability. Substantiating to this finding was over-all weighted mean of 4.53 with standard deviation 0.71.

2.5. Biodiversity - data revealed that the respondents are “strongly agree” on their assessment on the crucial tools in recognizing potential environmental factors that could impact the project’s environmental sustainability in terms of biodiversity. This finding was supported by the over-all weighted mean of 4.59 and standard deviation 0.82.

2.6. Climate Change - assessment of respondents on the crucial tools in recognizing potential environmental factors that could impact the project’s environmental sustainability “strongly agree” in terms of climate change. Supporting this finding was the over-all weighted mean of 4.55 and standard deviation 0.69.

Summary of Crucial Tools in Recognizing Potential Environmental Factors that could impact the Project's Environmental Sustainability

Variables	**Weighted Mean**	**Standard Deviation**	**Verbal Interpretation**
Land use	4.45	0.59	Agree
Water use	4.46	0.69	Agree
Waste Management	4.46	0.56	Agree
Air Quality	4.53	0.71	Strongly Agree
Biodiversity	4.59	0.82	Strongly Agree
Climate Change	4.55	0.69	Strongly Agree
Overall Weighted Mean	**4.51**	**0.68**	**Strongly Agree**

3. Important Instrument for Assessing Potential Social Consequences for Capability Building related to Bioethanol Power Plant Construction in the Philippines

The following variables were considered as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines: employment, community engagement, social inclusion, human rights, health and safety, cultural heritage, participation of stakeholders, local content, social infrastructure,

impact on livelihood, transparency and accountability, impact on health, education and training, and social benefits.

3.1 Employment - survey showed that respondents are “agree” in their assessment of employment as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was attested by the overall weighted mean of 4.35 with standard deviation 0.75.

3.2. Community Engagement - respondents “strongly agree” on their assessment on community engagement as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. Attesting to the result of the finding was the overall weighted mean of 4.60 with standard deviation 0.63.

3.3. Social Inclusion - survey shows that respondents “agree” in their assessment in terms of social inclusion as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was supported by the overall weighted mean of 4.40 with standard deviation 0.65.

3.4. Human Rights - respondents “strongly agree” in their assessment in terms of human rights as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was supported by the overall weighted mean of 4.50 with standard deviation 0.76.

3.5. Health and Safety - respondents “agree” in their assessment in terms of health and safety as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was supported by the overall weighted mean of 4.39 with standard deviation 0.60.

3.6. Cultural Heritage - results shows that respondents “agree” in their assessment in terms of cultural heritage as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was supported by the overall weighted mean of 4.43 with standard deviation 0.90.

3.7. Participation of Stakeholders - results shows that respondents “agree” in their assessment in terms of participation of stakeholders as an important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. This was supported by the overall weighted mean of 4.46 with standard deviation 0.80.

3.8. Local Content - results showed that respondents “agree” on their assessment of the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines in terms of local content. This was confirmed by the overall weighted mean of 4.41 with standard deviation 0.89.

3.9. Social Infrastructure - results showed that respondents “agree” on their assessment of the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines in terms of social infrastructure. Attesting to the finding was by the overall weighted mean of 4.45 with standard deviation 0.80.

3.10. Impact on Livelihood - survey showed that respondents “agree” on their assessment on impact on livelihood as the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. Confirming to the finding was by the overall weighted mean of 4.28 with standard deviation 0.77.

3.11. Transparency and Accountability - data revealed that respondents “agree” on their assessment on transparency and accountability as the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines. Supporting the finding was by the overall weighted mean of 4.42 with standard deviation 0.83.

3.12. Impact on Health - respondent “agree” their assessment on the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines in terms of impact on health. Serving to confirm this finding was the respondents’ overall weighted mean of 4.45 and standard deviation 0.83.

3.13. Education and Training - data showed that respondents “agree” on their assessment on education and training as important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines This finding was supported by the over-all weighted mean of 4.46 and standard deviation 0.82.

3.14. Social Benefits - assessment of respondents “agree “on social benefits as important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines Supporting to this finding was the over-all weighted mean of 4.44 and standard deviation 0.86.

Summary of the Important Instruments for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines

Variables	**Weighted Mean**	**Standard Deviation**	**Verbal Interpretation**
Employment	4.35	0.75	Agree
Community Engagement	4.6	0.63	Strongly Agree
Social Inclusion	4.4	0.65	Agree
Human Rights	4.5	0.76	Strongly Agree
Health and Safety	4.39	0.6	Agree
Cultural Heritage	4.43	0.9	Agree
Participation of Stakeholders	4.46	0.8	Agree
Local Content	4.41	0.89	Agree
Social Infrastructure	4.45	0.8	Agree
Impact on Livelihood	4.28	0.77	Agree
Transparency and Accountability	4.42	0.83	Agree
Impact on Health	4.45	0.83	Agree
Education and Training	4.46	0.82	Agree

Social Benefits	4.44	0.86	Agree
Overall Weighted Mean	**4.42**	**0.801**	**Agree**

Conclusion

On the account of the foregoing significant findings the following conclusions were drawn.

1. Overall, respondents "agree" on their assessment as to the essential instruments for assessing the financial viability of bioethanol power plant in the Philippines as indicated by the overall weighted mean rating of 4.39 and standard deviation 0.76. Thus, a clearly defined set of standards and policies must be communicated among stakeholders on the construction of bioethanol power plant in the Philippines in order to achieve successful and optimum project output.

2. Overall, the respondents "strongly agree" on their assessment of the on the crucial tools in recognizing potential environmental factors that could impact the project's environmental sustainability in terms of land use, water use, waste management, air quality, biodiversity, and climate change. Attesting the results are the overall composite weighted mean of 4.51 and standard deviation 0.68.

4. Overall, the respondents "agree" on their assessment of the important instrument for assessing potential social consequences for capability building related to bioethanol power plant construction in the Philippines in terms of the selected variables: Employment, Community Engagement, Social Inclusion, Human Rights, Health and Safety, Cultural Heritage, Stakeholder Participation, Local Content, Social Infrastructure, Impact on Livelihood, Transparency and Accountability, Impact on Health, Education and Training and Social Benefits. Attesting the results are the overall composite weighted mean of 4.42 and with standard deviation 0.801.

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Aldin Cabase Layaguin

Ethical Approval

Web-based survey studies are often unidentified and exempt from institutional review board approval, so they do not require signed informed consent. The original data is restricted to the researcher and his advisor. A consent email describing the context and purpose of the study was sent to potential participants. The email contained instructions for accessing the survey via a web link. Participants may withdraw from the study at any time without penalty. This study informs respondents of their rights and gives them ample opportunities to decline participation without penalty. Demographic data and survey responses are encrypted and stored on a researcher-only computer for non-respondent follow-up, categorization, and error correction.

Many respondents value the "Prefer Not to Answer" option because it improves data quality or response rates, according to Fisher & Smith (2021). The report would only provide aggregate data to interested nursing organizations. The researcher acknowledges that respondents can be identified based on their responses to individual surveys. The minimal risk of confidentiality was addressed in the same way as previous risks. In addition, the researcher was aware that indirect identifiers may compromise respondents' privacy.

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