Available on: https://jefrr.ep-journals.org/ E-ISSN: 3051-3650, P-ISSN: 3051-3642

Journal of Economic Finance Research and Review

Volume: 02 Issue: 07 July 2026

Economic Viability of Hydroponic Farming in Sorsogon Province

Ada J. Escopete
College of Business and Management, Sorsogon State University
ORCID: 0009-0001-0154-892X

Roman Julio B. Infante
College of Business and Management, Sorsogon State University
ORCID: 0009-0003-6125-3001

Published Date: July 18, 2026 **Article DOI: 10.65150/EP-jefrr/V2E7/2026-4**

ABSTRACT: Traditional agriculture could not provide the needs of the increasing population due to land and water resource limitations. Hydroponic farming offers a sustainable solution that reduces environmental impact, conserves resources, and is ideal for urban settings. With its numerous benefits, hydroponics addresses food security, soil degradation, and climate change issues, making it a promising approach for sustainable agriculture. However, many farmers remain reluctant to adopt the technology due to high upfront investment requirements, complexity of installation, its relative novelty, and the limited financial data indicating economic viability. This study is meant to encourage farmers to engage in hydroponics, pointing out its economic viability. This study utilized mixed-method of research to 22 respondents who are actively practicing lettuce hydroponics farming in Sorsogon Province. This research used Gretl and 'R' econometrics software to run descriptive statistics and to compare small, medium, and large hydroponics farms. Results revealed that although the initial setup of the hydroponic farming system is extremely high compared to traditional farming, it still resulted in a 459.67% ROI, which proved that it is economically viable and sustainable. It is recommended therefore that this new farming method be replicated in other provinces of the country.

KEYWORDS: agripreneurs ROI, sustainable

INTRODUCTION

Hydroponics is the future of farming (Duvey & Naim, 2020), as it is a resource-efficient, cost-effective, sustainable, climate-resilient, and environmentally friendly solution to food insecurity (Gonzalez et al., 2022). Hydroponics efficiently uses resources. It has reduced the need for machinery and land compared to traditional farming. There is a 20% reduction in water and fertilizer use, as nutrients and water are precisely delivered to the plants. The water is filtered, recovered, redistributed, and recycled (Alipio et al., 2022). This system addresses soil and space management issues and is ideal for low soil fertility areas, as plants can be propagated in limited spaces, even in urban settings, on rooftops, or in buildings (Gonzalez et al., 2022; Nguyen, 2021). It requires less manual labor (Vyshnavi et al., 2023), eliminating the need for hoeing, weeding, and watering (Rodriguez, 2018). It has a 20-25% higher production yield, producing fresh and high-quality crops that grow up to 50% faster (Nguyen, 2021). Hydroponic plants are nutrient-rich, safe, fresh, clean, and free from fertilizers, pesticides, and chemicals (Dubey & Nain, 2020). Hydroponic products are free from soil-borne insect pests and weeds, and any pests or diseases can be easily managed (Alipio et al. 2022). The assurance of a consistent year-round supply of nutrient-dense products is particularly promising for urban consumers, contributing to food security (Sanchez & Sarmiento, 2023). Moreover, hydroponics is environmentally friendly due to its reduced environmental impact, lower carbon footprint, significant reductions in greenhouse gas emissions, and the mitigation of soil erosion, water contamination, and pesticide use (Martin & Molin, 2019; Vyshnavi et al., 2023) and mitigates climate change (Szenderák et al., 2022). The reduction in labor, water consumption, nutrient usage, and other costs, coupled with higher production yields, leads to increased income, thus increasing economic viability for farmers.

With the growth rate increase of the population of 0.83–0.84% yearly (Worldometer, 2026), demand for fresh, high-quality locally produced agricultural products is expected to increase. When traditional agriculture could not answer because of resource limitations (UN, 2019), hydroponics would be a viable solution; this is why many countries are now adopting hydroponics.

However, in the Philippines, there are only 120 registered hydroponics farms (Jagdish, 2022). Reasons for this are high initial costs, the difficulty of setting up, the technology is still new, and there is limited financial data on the economic viability and entrepreneurial competency deterring the increase in adoption of this agricultural innovation. In the province of Sorsogon, there are fewer than 30 agripreneurs practicing hydroponics. Hydroponics has to be promoted for Sorsoganon agripreneurs to adopt this novel farming practice.

This study seeks to assess the economic viability of hydroponic farming for agripreneurs in Sorsogon. It determined that hydroponic farming presents a viable alternative farming practice that will increase income for agripreneurs, and increase the number of adopters of this farming practice. The study is expected to promote sustainable agricultural practices, improve food security, and stimulate local economic growth by enabling farmers to respond to the increasing demand for hydroponically produced lettuce. Lastly, this research responds to the Sustainable Development Goals (SDGs), specifically Zero Hunger-SDG 2, Decent Work and Economic Growth-SDG 8, and Responsible Consumption and Production-SDG 12. The need for climate-resilient farming systems and local economic empowerment, specifically youth and women-led entrepreneurship.

METHODOLOGY

Research Design

Utilizing a mixed-method design to afford a comprehensive discussion of the viability of hydroponics farming in Sorsogon Province. In mixed-method research, elements of both quantitative and qualitative research are integrated to address the research question (Creswell, 2005; George, 2023). This approach offers a more comprehensive investigation by combining the strengths of each method, resulting in a broader perspective compared to using them separately.

Respondents

Respondents of the study are the 22 agripreneurs engaging in lettuce hydroponics in Sorsogon Province. The researchers utilized the Snowball technique, or chain-referral technique, in the selection of respondents. This is useful since there are no registered hydroponic farmers in the province, in each municipality, or in the Department of Trade and Industry Provincial Office.

Sources of Data

The source of primary data is taken from survey questionnaires administered during interviews. Observations and clarifications from the respondents were done to gather needed information. For more valuable insights into hydroponic farming methods, the researchers employed documentary analysis of the digital documents on different websites. These processes were applied to warrant the reliability and correctness of the study.

Research Instrument

This study used a modified questionnaire from research by Alipio et al, (2022). The modified questionnaire consisted of three parts. Part I is for the socio-demographic profile of farmers, which was prepared by the researchers. Part II is for the costs associated with the hydroponic farming operation, adopted from Alipio et al, while Part III is for sustainability and was also prepared by the researchers.

Data Gathering Procedures

Respondents were interviewed using the survey questionnaire, and follow-up questions were asked for clarification. All data were tabulated, integrated, analyzed, and interpreted using specific formulas for different analyses.

Revenue from lettuce sales and installation and operating costs were gathered to assess the economic viability of hydroponic farming. Likewise, the useful years or economic life of the assets are needed for the computation. There were questions after the cost items to validate the answers above.

Validation of the Research Instrument

The modified questionnaire was reviewed by three experts. They validated the content of the modified questionnaire, one from the Department of Agriculture Provincial Office, one from the academe, and a hydroponic agripreneur. Corrections and recommendations were noted, and revisions were made to improve the questionnaire.

Statistical Tools and Analysis

Gretl (Cottrell & Lucchetti, 2021) and 'R' (The R Core Team, 2024) software were used to run the descriptive statistics and to compare the attributes between small, medium, and large farms. Gretl and 'R' are econometric software that caters to various modelling requirements. The responses were classified and presented systematically according to the different variables of the study.

The Levene's test statistic will use the formula:

$$W = \frac{(N-k)}{(k-1)} \cdot \frac{\sum_{i=1}^{k} N_i (Z_{i.} - Z_{..})^2}{\sum_{i=1}^{k} \sum_{j=1}^{N_i} (Z_{ij} - Z_{i.})^2}$$

Where:

- K is the number of different groups to which the sampled cases belong;
- N_i is the number of cases in the *i*th group;
- N it the total number of cases in all groups;
- Yij is the value of the measured variable for the *j*th case from the *i*th group;

To calculate the mean of continuous variables, the following formula was used:

$$E(X) = \int x \cdot f(x)dx$$

While the mean for discrete variables is computed as:

$$E(X) = \sum_{i=1}^{N} X_i \cdot P(X = x_i)$$

The mean is the average or center of a set of numbers or group (Frost, J. (n.d.). It is calculated by adding up all the values and dividing by how many values there are. The average is important because it serves as the starting point for more advanced tests, like Levene's test. Levene's test examines averages, and checks whether the spread of values around those averages or variance, is the same across different groups. These two are important: the mean gives the typical value, while Levene's test determines whether the groups are equally consistent or if some groups have more variation than others.

Ethical Consideration

Proper research ethics were maintained throughout the conduct of the study. Data Privacy Act of 2021, or Republic Act No. 10173, was appropriately upheld. All information disclosed by the respondents was treated with utmost confidentiality and was solely used for the study. Accordingly, consent from the respondents was solicited, and they were assured of their privacy. Respondents were appropriately oriented and informed of the purpose of the conduct of the interview and data gathering for research. Likewise, there was no minor coerced to be involved, no animal was hurt or exploited, and neither plant was wasted nor misused during the study.

RESULT AND DISCUSSION

From the data gathered, the initial investments hydroponics farming was determined. Table 1 below shows the results of statistics on Fixed Costs in the operation of hydroponic farming.

Table 1. Initial Investment

Variable	Mean	Min	Max
Greenhouse	₱185,000	₱20,000	₱904,000
Greenhouse useful life	8	4	14
Equipment	₱6,050	-	₱22,300
Equipment useful life	3.47	-	6.00
Equipment malfunction	4.55	4.00	5.00
Protective Personal Equipment (PPE)	₱1,180	₱90	₱3,000
Useful life in years	2	-	5
Propagation/germination trays	₱455	-	₱4,000
Useful life in years	4	-	15

Based on the above table, the mean of the greenhouse is ₱185,000.00 with eight years useful life. As expected, the greenhouse has the highest capital outlay and the longest useful life. Most of the greenhouse frames are made of steel, the reason for a longer useful life. Those with a wood frame will have a shorter useful life. The net and plastic sheet covers of the greenhouse will be replaced before the estimated useful life when damaged. Building a commercial greenhouse in the Philippines costs between ₱40,000.00 and ₱600,000.00, depending on size and features. A greenhouse wall should be at least 1.5 meters high to ensure proper ventilation and to keep pests and diseases out. The roof should be covered with plastic to allow light penetration and heat escape (Jagdish, 2024).

The equipment has a mean of ₱ 6,050.00 and a 3.47-year useful life. Some agripreneurs have numerous pieces of equipment, while others have minimal. This result validated that some farmers have some pieces of equipment like water pumps, temperature monitoring control, filtration, blowers, and exhaust fans, while a number have few and others have only one, the total dissolved solids (TDS) meter. The 2 mean useful life of equipment suggests differences in usage intensity or maintenance practices.

Equipment malfunction has a mean of 4.55, or equipment malfunction once every 2 years. This data could not be validated since 21 agripreneurs have operated for only two years, and only one respondent had her hydroponics for five years. Agripreneurs manage malfunctions or downtime through repair. There is low variability in equipment malfunctions, suggesting similar reliability issues across different setups.

PPE has a cost of ₱1,180.00 with a 2-year useful life. Most of the agripreneurs used ordinary clothes for working; only a few used PPE such as gloves, long sleeves, hats, and boots. Hydroponic farming does not require specialized PPE, unlike technical trades. PPE costs vary significantly, reflecting different references and safety measures used. There is moderate variability, suggesting differences in the durability and use of PPE. The useful life mean of PPE is two. The lifespan of farming clothes can vary depending on the quality of the materials, frequency of use, and care taken. Generally, high-quality farming clothes can last from two to five years with proper maintenance. Regular washing, avoiding harsh chemicals, and storing them properly can help extend their lifespan.

The propagation/germination tray mean is ₱455.00 with economic life mean of four years. Three respondents practiced direct planting, where a germination tray is not needed. In direct planting, seed is directly placed in the growing cups. Cost of propagation/germination trays indicate different types or numbers of trays purchased. The number of growing trays is also dependent on the capacity of the farm.

Greenhouses have the only high initial capital outlay for hydroponic farming, which can be recovered within 2-7 years of operation, subject to the type of crop, material, and technology used (Farvardin et al 2024). PPE and germination trays have minimal costs and a short life span. These costs and depreciation will be considered in the evaluation of the viability of hydroponic farming.

Table 2 below displays the operational costs incurred in hydroponic farming. Operational costs are costs directly needed in the operation.

Table 2. Operational Expenses of Hydroponic Farming

Variable	Mean	Min	Max
Salary	₱4,200	₱741	₱17,200
Seed	2,450	20	16,000

Nutrient solution	1,970	250	10,000
Growing medium	218	-	1,700
Cups	740	32	6,650
Sterilization cost	147	50	334
Packaging materials	176	10	1,500
Electricity consumption	486	-	4,000
Maintenance and repairs of equipment	1,140	-	5,000
Total	₱11,527		

The salary has a mean of ₱4,200.00 for all 22 respondents. Salary is computed based on the provincial rate of ₱395.00 daily. The rate was divided by eight hours to get the hourly rate of ₱49.375, which is multiplied by the number of hours spent by the farmer and multiplied again by the number of farmers if more than one farmer is working on the farm. The average number of hours a farmer spends in a hydroponic farm is two hours (Amhydro, 2024). Based on the result, the high variability in salaries indicates significant differences in labor costs among farmers. There is high variability because there is one commercial farm with four workers working 3-3 ½ hours in the 10 greenhouses. Majority of the farms have 2 workers working 2 hours.

Seeds have a mean of ₱2,450.00, while nutrient solution has a mean of ₱1,970.00. As revealed in the result, seeds and nutrient solution for hydroponic systems are pricey. However, three respondents were able to minimize the cost of nutrient solution by making their own mixture; they call it DIY, or they do it themselves. The significant differences in the amount are attributable to the quality of seed used and types of nutrient solution. Farmers buy seeds and nutrient solution online. Hydroponic nutrients come in liquid and solid forms. Liquid nutrients are convenient and quickly absorbed by plants but more expensive and less stable, requiring frequent monitoring. Whereas solid nutrients are cost-effective and stable but require more effort to dissolve and can clog systems if not used properly (Kumar et al 2021).

The growing medium has a mean of ₱218.00. The majority, or 19 of the respondents, used cocopeat as the growing medium, while three respondents used rice hull, foam, and sawdust. The growing medium has a high mean, reflecting different quantities purchased. In addition to this, some sterilize and reuse growing mediums, while others do not incur costs because growing mediums are freely available in the area.

Cups have a mean of ₱740.00, indicating substantial variability in the cost of cups, and diverse purchasing practices or quantities used. Cups used by farmers are either styrofoam or plastics in varying quantities based on their capacity. Another factor is that some sell lettuce without the cups, which are cleaned, sterilized, and reused for the succeeding cropping seasons. Some customers return cups to the farmers, which lessen the cost of cups.

Sterilization cost has ₱147.00 mean, that include the boiling of the growing medium; cleaning, sterilization, and disinfection of cups; tuna boxes for the Kratky system, and tubes for NFT and DFT systems. Hydroperoxide and detergent soap are used for the cups, boxes, and tubes. Whereas one respondent used hypochlorous acid, which, according to her, is safer and is used for materials related to food. Sterilization costs show diverse practices or materials used. Some farmers do not reuse and sterilize the growing medium, which is why there is high variability.

Packaging materials have a mean of ₱176.00; the usual packaging material used is a sando plastic bag for lettuce sold with and without cups. Only one respondent who is a supplier of SM used thicker plastic packaging. Packaging materials have a high mean variability in material costs, suggesting different types or amounts used. The variability of the amount is dependent on the capacity and yield; higher capacity and yield, higher costs of packaging.

The mean of electricity consumption is ₱486.00. Electricity consumption varies widely, suggesting different energy usage patterns. This is because some do not use electricity for the operation. Ten farmers are in the Kratky system with no electricity required for the operation, and three are using solar equipment for their operation, whereas some have high electricity expenses.

Maintenance and repairs of equipment has a mean of ₱1,140.00 because 21 farmers have been operating for only two years, which is why their maintenance costs are lower. Maintenance costs show high mean variability, indicating differences in maintenance needs or practices, same reason for the varied types of greenhouse and equipment. Maintenance costs vary by greenhouse type and location (Jagdish, 2024).

Total operational expenses are ₱11,527.00 for 1 cropping period. The duration for one cropping period is six to eight weeks or 42-56 days (The ZipGrow,2020). Salary had the highest cost, followed by seed, nutrient solution, and maintenance and repairs of equipment. The operational expenses for hydroponic farming are much lower than traditional farming, as supported by Farvardin et al (2024), because of 90-98% less water used, labor savings, and reusable cups and growing medium.

Table 3 below presents the operational reliability of hydroponic farming. It indicates the capacity, technology utilization, resource stability, and challenges farmers encountered.

Table 3. Operational Reliability of Hydroponic Farming

Variable	Mean	Min	Max	Description
Capacity	3.86	1.00	4.00	Over 90%
Use of technology to monitor & control the system	2.55	2.00	3.00	Farmers are using technology in monitoring & control of the system
Sufficient available technology	3.00	3.00	3.00	Availability of technology
Frequency of water shortage	2.45	2.00	3.00	Rarely

Power outages	2.55	2.00	3.00	Rarely
Experience of pest crop diseases	2.00	2.00	2.00	Sometimes

The capacity mean is 3.86 or 90%-95% capacity, because not all germinated seeds will mature, be harvested, and sold. There is a 5-10% threshold for pest/disease infestation, tip burn, or rejected plants. Rejected plants are for family consumption, fed to animals, an ingredient for a value-added product, or composted. One respondent is producing lettuce chips, and two make salad and lumpia. Capacity has low variability, indicating a consistent operational scale among farmers; only one farmer has lower than 50% capacity. Growers estimate that 75% to 80% of lettuce seeds will germinate. Soil needs to be regularly moist and adequately drained to ensure even growth (Greenupside, n.d.).

Use of technology to monitor and control the system has a mean is 2.55, or 10 farmers sometimes use technology, while 12 farmers always use advanced technology to monitor and control the system. NFT and DFT systems require several advanced technologies and equipment to monitor and control the system; however, for the Kratky method, the minimum equipment is a TDS meter used for measuring pH level, water temperature, and nutrient content. There is low variability in the use of technology, suggesting a similar level of technological adoption.

The mean for sufficient available technology is 3, or all farmers agree that there is enough technology in the market for their hydroponic operation, is consistent, with all respondents rating it similarly. Necessary equipment and supplies are available, though online. This can pose a challenge when farmers need immediate supplies, as they may face delivery delays of several days. Despite this, the consensus is that the current market sufficiently meets their technological needs.

The frequency of water shortage mean is 2.45, or farmers experience water shortage rarely, while power outages have a mean of 2.55, or rarely. Water shortage and power outages are rarely experienced in the province for at least 4-8 hours for maintenance of the service providers.

The experience of pest crop diseases has a mean of 2 and has no variability. There is a consensus on the experience of pest crop diseases, suggesting uniform experiences that all farmers sometimes experience pest crop diseases. This experience is manageable; they easily remove the affected plant from the row. If there is a massive infestation, cleaning and sterilizing the entire system is required. Farmers sometimes experience pest crop diseases, but they are manageable because they easily remove the affected plant from the row.

The results indicate higher mean and lower variability for four variables, while two variables have no difference, which means a reliable hydroponic farming operation, but there is still a need for continued monitoring and management to sustain reliable performance.

Table 4 below compares the economic performance of hydroponic farming with traditional farming.

Table 4. Comparative Economic Performance of Hydroponics and Traditional Farming

Variable	Mean	Min	Max	Description
Labor productivity as compared to traditional farming (TF)	3.00	3.00	3.00	Highly productive
System cost as compared to TF	3.00	3.00	3.00	More cost-efficient
Water usage as compared to TF	3.00	3.00	3.00	Lower water usage
Electricity usage as compared to TF	2.14	1.00	3.00	Just the same
Growing time as compared to TF	1.00	1.00	1.00	Faster
Quality yield as compared to TF	1.00	1.00	1.00	Much better

Compared to traditional farming (TF), labor productivity has a mean of 3 or highly productive. Labor is highly productive in hydroponic farming, as compared to soil-based farming, where hoeing, weeding, and watering are required (Rodriguez, 2018). There is no mean variability; all respondents rate highly productive compared to TF, indicating consensus.

For system cost, as compared to TF has a mean of 3 or more cost-efficient. Hydroponic farming requires shorter labor hours, and no fertilizer or insecticide is used. There is a consensus that system costs, as compared to TF, have no variability.

Water usage of hydroponic farming as compared to TF has a mean of 3, which means that it is lower than TF. Water is needed only once for the Kratky system and is recirculated and reused for other systems. Two respondents even use rainwater. All farmers agree that water usage in hydroponic farming is lower than TF.

While for electricity usage, it has a mean of 2.14, or about the same electricity usage as TF. Electricity usage compared to TF indicates different experiences with electricity usage because some do not require electricity, while other has high electricity usage depending on the method used.

The frequency of water shortage is 2.45, or farmers experience water shortage rarely, while power outages have a mean of 2.55, or rarely. Water shortage and power outages are rarely experienced in the province for at least 4-8 hours for maintenance of the service providers.

Growing time and quality yield for lettuce in hydroponics as compared to TF have both means of 1, which means that growing time and quality yield for lettuce in hydroponics are faster and much better than TF, because the essential elements are directly provided to the plants. Growing time and quality yield of lettuce compared to TF have no variability. There is a consensus among farmers that growing time is faster and the quality yield of lettuce is much better compared to TF, indicating uniform views.

The comparative indicators suggest that hydroponic farming demonstrates clear economic advantages over traditional farming. These results show that hydroponic farming is much better than TF. Only electricity usage is almost the same as TF because 12 farmers are NFT and DFT users, who are electricity dependent. With these findings, it validates that hydroponic farming is a more efficient and productive approach than TF.

Below is Table 5, indicating the Return on Investment and Break-even point calculation.

Variable	Mean	Min	Max
Annual revenue	₱1,510,000	₱31,900	₱11,800,000
Depreciation for greenhouse	20,600	2,000	76,000
Depreciation of equipment	1,530	-	5,930
Salaries	203,000	17,800	1,240,000
Electricity	5,300	-	48,000
Maintenance	568	-	5,000
Operational Costs	405,000	-	3,370,000
Other expenses	1,510	-	13,000
Profit/Loss	₱876,000	-338,000	7,890,000
Variable	614,000	38,300	3,840,000
Fixed	24,300	2,150	81,900

Table 5. Profitability Assessment of Hydroponic Farming

Average profit/loss	₱876,179
Divide by: Investment	₱190,612.50
Return on investment	459.67%
Fixed costs	₱24,253
Divide by: Contribution margin ratio	59.46%
Break-even revenue	₱40,785.66

Revenue is taken from the sale of lettuce. Eighteen agripreneurs sell a lettuce head for ₱35.00 or ₱100.00 for 3 lettuce heads, while the four prices range from ₱ 25.00 to ₱ 50.00 per head. Total sales per cropping is multiplied by the number of croppings per year, totaled to annual revenue. The mean for annual revenue is ₱1,510,000.00. Based on Table 1 and Table 2, the yearly depreciation mean for the greenhouse is ₱20,600.00, while the depreciation mean of equipment is ₱1,530.00. Whereas the yearly mean for salaries is ₱203,000.00; for electricity is ₱5,300.00; for maintenance is ₱568.00; and for other expenses is ₱1,510.00, resulting in a profit/loss mean of ₱876,000.00, with all figures rounded off to hundreds. Variable cost mean is ₱614,000, whereas fixed cost mean is ₱24,300.00. Table 5 revealed that the return on investment for the small, medium, and large farm groups is 459.67%, while the break-even revenue is ₱40,785.66.

The result revealed that hydroponic farming is a viable business. An ROI of 459.67% indicates that for every peso invested, the profit is almost 4.6 times the initial investment. This means that within a year of operation, the investment would be recovered 400 times, and break-even revenue would be within three to four cropping cycles. Two respondents shared that the cost of a head of lettuce is ₱5.00 and they could sell it for ₱25.00-₱35.00, which validated this high result of ROI. It means that they could have at least 400% profit in a year's operation. Such a high ROI could attract more investors and farmers to consider hydroponic farming as a lucrative opportunity. This suggests that hydroponic farming is highly profitable. This result is supported by Green Packs (n.d.) that a monthly profit of ₱50,000.00 or ₱600,000.00 for a year of operation can be obtained from a 150-square-meter farm. It also demonstrates the potential for significant returns on relatively modest investments in this sector.

The break-even revenue of ₱40,785.66 indicates the amount of revenue required to cover all fixed costs. At this point, the operation neither makes a profit nor incurs a loss. Understanding the break-even point helps hydroponic farmers set realistic revenue targets and manage their finances effectively. It ensures they know the minimum amount of sales needed to be profitable and points out the importance of maintaining a high contribution margin to cover fixed costs quickly. These financial metrics emphasize the profitability and financial viability of hydroponic farming, suggesting it is a promising venture for both current and prospective farmers.

Based on the findings, hydroponic farming achieves notable economic viability with a high ROI and significant cost-benefit balance. Hydroponic systems optimize resources, including water, space, and controlled environments, reducing pest and disease incidence, enabling year-round production, and requiring lower labor intensity. These factors result in higher productivity and consistent yields compared to traditional farming methods.

Although initial investments and occasional power outages present challenges, the long-term gains from continuous production and lower resource costs outweigh these issues. Despite high costs for infrastructure, materials, and technology, operating costs, including energy, water, nutrients, labor, maintenance for repairs, and consumables, are offset by substantial benefits. These include increased crop yields, efficient resource use, and enhanced environmental sustainability through reduced pesticide use and water conservation. Overall, hydroponic farming offers a viable, sustainable, profitable, and alternative to traditional agriculture.

CONCLUSION AND RECOMMENDATION

The study revealed that hydroponic farming in Sorsogon Province is a viable economic endeavor and has potential for expansion. Hydroponic farming demonstrates strong economic viability and sustainability, offering higher productivity, consistent yields, and efficient resource utilization compared to traditional agriculture. Despite high upfront costs, power outages, and other challenges, the long-term benefits outweigh these limitations. Overall, hydroponics stands as a profitable and environmentally responsible alternative to modern agriculture.

Based on the findings and conclusions, viable recommendations are presented to further increase the acceptance of hydroponic farming in Sorsogon Province. New adopters should consider phased investments in hydroponic systems, starting with small-scale operations to manage initial costs before scaling up. They should continuously strive to master the technology by benchmarking, attending seminars and trainings both online and face-to-face, and sharing good practices with others. Agripreneurs may explore more varieties of lettuce and other agricultural products that can be grown in hydroponics to entice more customers and meet varied preferences. They may incorporate backup power solutions like solar panels and generators to mitigate risks from outages and ensure continuous production. Governments and institutions may incentivize hydroponic adoption through subsidies, research grants, and infrastructure support to encourage sustainable farming practices. Lastly, agripreneurs may resort to other advertising and promotion aside from social media. Through promotion, consumers can be informed about the advantages of lettuce and hydroponic products, like freshness, and health benefits, to have a broader market reach.

REFERENCES

1) Alipio, A. L., Serevo, A. J. G., Tality, D. G. B., & Rosete, M. A. L. (2022). Cost-benefit analysis of soilless cultivation system in Tagaytay City, Philippines. *International Journal of Social and Management Studies (Ijosmas), 3*(2).
2) AmHydro. (2024). *Sustainable hydroponic solutions*. AmHydro. https://amhydro.com
3) Cottrell, A., & Lucchetti, R. (2021, May). *Gnu Regression, Econometrics and Time-series Library*. SourceForge. https://sourceforge.net/projects/gretl/files/manual/ (sourceforge.net in Bing)
4) Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative approaches to research* (2nd ed.). Merrill/Pearson Education.
5) Dubey, N., & Nain, V. (2020). Hydroponics: The future of farming. *International Journal of Environment, Agriculture and Biotechnology*. https://dx.doi.org/10.22161/ijeab.54.2
6) Farvardin, M., Taki, M., Gorjian, S., Shabani, E., & Sosa-Savedra, J. C. (2024). *Assessing the Physical and Environmental Aspects of Greenhouse Cultivation: A Comprehensive Review of Conventional and Hydroponic Methods.* Sustainability, 16(3), 1273**.** https://doi.org/10.3390/su16031273
7) Frost, J. (n.d.). *What is the mean and how to find it: Definition & formula*. Statistics by Jim. Retrieved July 3, 2026, from https://statisticsbyjim.com/basics/mean-definition-formula/ (statisticsbyjim.com in Bing)
8) George, T. (2023). *Mixed methods research*. Scribbr. https://www.scribbr.com/methodology/mixed-methods-research/ (scribbr.com in Bing)
9) Gonzalez, R. S. V., Garcia-Garcia, A. L., Ventura-Zapata, E., Barcenas-Sanchez, J. D. O., & Sosa-Savedra, J. C. (2022). A review on hydroponics and the technologies associated for medium- and small-scale operations. *Agriculture, 12*(646). https://doi.org/10.3390/agriculture12050646 (doi.org in Bing)
10) GreenUpside. (n.d.). *Learn how to grow a green garden with us*. GreenUpside. https://greenupside.com
11) Jagdish. (2022). Hydroponic farming in the Philippines: How to start, cost, profit, crops, and requirements. *Agri Farming*. https://www.agrifarming.in/hydroponic-farming-in-the-philippines-how-to-start-cost-profit-crops-and-requirements (agrifarming.in inBing)
12) Kumar, S., Singh, M., Yadav, K., & Singh, P. (2021). *Opportunities and constraints in hydroponic crop production systems: A review. Environment Conservation Journal, 22(3), 401–408.*Martin, M., & Molin, E. (2019). Environmental assessment of an urban vertical hydroponic farming system in Sweden. *Sustainability, 11*(4124). https://doi.org/10.3390/su11154124
13) Nguyen, M. N. R. (2021). *Agri resilience through vertical farming in PH*. NRI Nomura Research Institute Singapore Pte. Ltd – Manila Branch. https://nrisg.com/wp-content/uploads/2021/07/Agri-Resilience-through-Vertical-Farming-in-PH.pdf (nrisg.com in Bing)
14) Pomoni, D. I., Koukou, M. K., Vrachopoulos, M. G., & Vasiliadis, L. (2023). A review of hydroponics and conventional agriculture based on energy and water consumption, environmental impact, and land use. *Energies, 16*(41690). https://doi.org/10.3390/en16041690
15) Rodriguez, T. A. (2018, May 9). Central Luzon State University (CLSU) is making it easy for agri-entrepreneurs who want to venture into hydroponics or aquaponics growing systems. *Agriculture*. https://agriculture.com.ph/2018/05/09/this-clsu-unit-helps-agrientrepreneurs-wanting-to-go-into-hydroponics/
16) Sanchez, M. A. G., & Sarmiento, J. R. (2023). Hydroponics system for Aemilianum College Inc. *Global Scientific Journal, 11*(4). www.globalscientificjournal.com
17) Szenderák, J., Fróna, D., & Rákos, M. (2022). Consumer acceptance of plant-based meat substitutes: A narrative review. *Foods, 11*(91274). https://doi.org/10.3390/foods11091274 (doi.org in Bing)
18) The R Core Team. (2024). *R: A language and environment for statistical computing*. Reference Index. https://cran.r-project.org/doc/manuals/r-release/fullrefman.pdf (cran.r-project.org in Bing)
19) United Nations. (2019). *The Sustainable Development Goals report 2019*. United Nations Department of Economic and Social Affairs. https://digitallibrary.un.org/record/3819171 (digitallibrary.un.org in Bing)
20) Vyshnavi, A. S., Agarwal, S., Dubey, H., & Jain, L. C. (2023). A study on hydroponic farming. *International Journal for Multidisciplinary Research (IJFMR), 5*(2), IJFMR23022286.
21) Worldometer. (2026). *World population 2026*. https://www.worldometers.info/world-population/ (worldometers.info in Bing)
22) ZipGrow. (2020). *Best crops for hydroponics guide*. www.zipgrow.com