Journal of Public Affairs and Development
Vol. 9: 33-51 (2022), ISSN 2718-9228

Policy option to address low rice seed technology adoption of farmers in Sariaya, Quezon, Philippines

Meljun R. Banogon[1*], Lielanie O. Barrion[2], Imelda DG. Olvida[3], and Ma. Theresa R. Sawit[4]

ABSTRACT. The importance of access to and the proper utilization of technology in improving farm productivity is widely recognized. For this reason, many interventions focus on the development and promotion of farm technologies in rural areas. Sariaya, Quezon is one of the recipients of the programs of the Department of Agriculture (DA), particularly the Bayanihan Agri Clusters (BACs), the Rice Competitiveness Enhancement Fund (RCEF), and the Rice Business Innovations Community Program (RiceBIS). While these programs are being implemented, the adoption of certified seeds technology in the community remains low. Policy Delphi technique was employed to formulate policy outcome forecast, issue statement, and the corresponding goal of the low technology adoption (as a core problem). This paper centers on the limited knowledge and negative attitude of farmers towards the technology due to the limited direct extension services. Experts note that there is a high probability (70.83%) that poverty among rice farmers will persist if this problem is left unabated. Hence, two policy options are proposed: (1) increase the number of local government unit-based extension workers; and (2) develop private village-based extension agents. The analytic hierarchy process was utilized in determining the best policy option. Results show that increasing the number of LGU-based extension workers in Sariaya, Quezon is the best policy alternative compared to developing private village-based extension agents and maintaining the status quo. The resources needed to implement this initiative by the LGU of Sariaya can be complemented by the resources coming from the implementation of Executive Order No. 138.

Keywords: *Delphi technique, policy alternative, forecasting, agricultural extension*

---

[1]Ateneo School of Government, Ateneo de Manila University, Quezon City, Philippines
https://orcid.org/0000-0003-3473-0274
[2]City College of Calamba, Laguna, Philippines
https://orcid.org/0000-0002-2160-6517
[3]Development Division, Philippine Rice Research Institute, Laguna, Philippines
https://orcid.org/0000-0002-6829-7141
[4]Research and Development Division, Philippine Carabao Center, Nueva Ecija, Philippines
https://orcid.org/0000-0002-7094-3050
*Corresponding author: mbanogon@ateneo.edu

BACKGROUND OF THE PROBLEM AND POLICY ISSUES

Agriculture provides income and food to a large number of people on top of its significant economic contributions (Mpiima et al., 2019). The agriculture sector contributes 24.30% to national employment (Philippine Statistics Authority, 2020). However, major challenges such as low productivity and slow growth have resulted in high poverty incidence within the sector. Farmers remain poor with an average monthly income of PhP 4,167 (USD 75) per month, which is below the estimated poverty threshold.

Low technology adoption is among the many interrelated factors contributing to poverty and poor agricultural sector performance (Galang, 2019). This situation persists even with the myriad of technology options available and developed for specific locations and conditions. Thus, it is imperative that farmers' capacity to adopt appropriate technologies should be supported by a cohesive policy environment that supports and promotes technology adoption, because if this is not addressed, there is a high probability that poverty in the sector will persist (Cororaton, 2004).

Many rural farming communities in Sariaya, Quezon depend on agriculture as their main source of income. Some 37 of its 43 barangays are considered rural and depend on farming and fishing for livelihood. The local government unit of Sariaya has been promoting modern rice production technologies since early 2000 with the introduction of the Hybrid Rice Program and the PalayCheck Program of the Department of Agriculture. However, a study in 2017 showed that the uptake of modern rice technology in Sariaya remains low as evidenced by the unimpressive adoption of certified seeds (8.9%) and the relatively low rice yield (3-3.5 tons per hectare). Farmers cited limited knowledge, negative attitude towards the technology, and lack of capital as the primary reasons for non-adoption of recommended technologies (Fernandez & Torres, 2017).

In 2021, the abovementioned findings were echoed among members of the RiceBIS community, where only 9% were adopters of rice seed technology. They produced 4.4 t/ha of rice during the dry season of 2021 and earned an average income of PhP 28,840.71 (Philippine Rice Research Institute, 2021).

The need to look at technology adoption is paramount if the aim is to increase productivity and lift farm households out of poverty. While many studies identify the various determinants of technology adoption,

only a few have looked into the indirect factors, such as change agents and social systems, which can significantly influence the level of adoption of farming technologies or practices (Manalo et al., 2021). Direct factors refer to the characteristics of the technology itself and of the end-users (e.g., age and education). Indirect factors are external to the technology in question and to the end-users. Among the convergence of indirect factors identified in the study of Manalo et al. (2021) are the work overload issue of agriculture extension workers (AEWs), lack of support mechanisms, and poor ICT facilities in the community.

Awareness is a precondition before farmers can develop the interest to try, evaluate, and finally adopt certain technologies. Farmers become aware of new technologies through agents or intermediaries. The AEWs are the primary agents directly delivering information about technologies to farmers in the country. However, the number of AEWs in many farming communities, including Sariaya, Quezon, is few relative to the number of farmers. According to its municipal agriculturist, one agricultural extension worker, on average, handles a minimum of 200 farmers from 3-4 *barangays* (village). AEWs also handle committee leadership and membership within their unit, plus other activities organized by the office of the local chief executive that are mostly agriculture-related. This kind of set-up could negatively impact on the performance of the AEWs and the quality of services they provide to farmers. Given the inadequacy of AEWs and their numerous engagements, in the process, they have become "jack of all trades, master of none" (Ani & Correa, 2016).

Aside from providing information about new agricultural technologies, the AEWs also link farmers to other support services that can further improve the latter's capacity to adopt technologies. One of the most important forms of assistance needed by smallholder farmers is credit. The limited capital can be complemented by credit assistance so that farmers may avail themselves of new technologies. There exist formal credit options that offer low interest rates for agricultural producers in the country; however, most smallholder farmers still access credit from informal lenders. Poliquit (2006) notes farmers prefer informal lenders because of (1) easy and quick credit availability; (2) absence of voluminous requirements and collateral; and (3) proximity to their residence. When farmers find it difficult to access formal credit because of the required submission of business proposals or feasibility study, the AEWs who have the necessary knowledge may enhance farmers' capacity and facilitate the submission of documents.

While farmers are the primary decision-makers when it comes to agricultural technology adoption, it is important to pay attention to indirect factors such as the role of AEWs. Many programs are implemented to ensure the availability and affordability of technologies such as the conduct of research studies, and the provision of subsidies, credit and cash assistance to farmers, yet the adoption remains low. It is high time to look into other alternatives that would strengthen the accessibility of the technology and of the other requirements needed to apply the technology.

Objectives

Technology is a tool to increase farm productivity. Improvement in farm productivity may only be achieved if the technology is accessed and applied by farmers. Prior to access and proper application is the need of farmers to become aware of the technology and its benefits. There are various studies reporting that access to technology and capital are the main variables of technology adoption among farmers. Seed technology recommended by the DA has reached Sariaya, Quezon but the adoption remains low. Thus, this paper presents policy alternatives to help address the low seed technology adoption in the area. Specifically, the paper intends to:

1. Identify the various rice production policies and programs in the locality;
2. Formulate the forecast statement, related issue, and goal statements of the low technology adoption in the community;
3. Formulate and evaluate policy options; and
4. Provide recommendations to enhance seed technology adoption in the community.

METHODOLOGY

Gathering of secondary data and expert consultation were conducted to determine the existing policies, facilities, and social environment relevant to the adoption of rice seed technology in the locality.

To formulate the forecast statement, related issue, and goal statements, policy Delphi technique was employed by consulting experts chosen based on either of the following criteria: (a) has been into rice production in Sariaya, Quezon in the past 7 years; or (b) directly providing extension services to rice farmers in Sariaya, Quezon in the past 7 years.

Policy Delphi technique is a qualitative forecasting technique based on iteration, controlled feedback, informed multiple advocacies, and structured conflict (Dunn, 2018).

In this paper, the agricultural extension agents were considered experts because of their knowledge and experience in promoting the adoption of rice seed technologies. Rice farmers, on the other hand, were also considered experts because they are the end-users of rice technologies and farm practices. Two farmers and four extension workers accepted the authors' invitation and were then interviewed in person. They were asked to comment on the forecast, the importance of the issue at hand, and the desirability of the goals. The team originally targeted more experts from both groups but was limited by COVID-19 restrictions. Farmers' consultation was conducted separately from the consultation with the extension agents. This set up prevented possible undue influence of the extension agents on farmers' responses.

Analytic Hierarchy Process (AHP) (Saaty, 1980) was employed to select the best policy option to address the low rice seed technology adoption among farmers in Sariaya, Quezon. Three criteria were considered pertaining to viability and acceptability in selecting the ideal policy suited to the target decision-maker and implementer. The same experts were consulted to judge the policy options based on the selected criteria.

Pairwise Comparison

The experts compared each policy option based on the criteria set using the scale of relative importance (Table 1). The geometric mean approach was applied to reach a consensus among the experts' judgments. Each of the numbers in the scale represents the degree of importance of one element or option over another element or option when evaluated using the same criterion.

Consistency Test

It was performed to spot inconsistencies in the informants' judgments. This was done by computing the consistency ratio using the formula shown below:

Consistency Ratio = Consistency Index (C.I.) / Random Index (R.I.)

C.I = $\frac{\lambda \max - n}{n - 1}$ *where* n is the number of compared criteria or elements

R.I. = 0.58 (based from the random index table of Saaty, 1980)

Table 1
Scale of relative importance used for pairwise comparison

Scale	Judgment	Explanation
1	Equal importance	The two policies contribute equally to the objective
3	Moderate importance of one over another	Experience and judgment slightly favor one policy over another
5	Strong importance	One policy is strongly favored
7	Very strong importance	One policy is highly favored and is supported with practice/experience
9	Absolute importance	The evidence favoring one policy over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed

Note. Adopted from the Analytic Hierarchy Process of Saaty (1980).

A judgment matrix is considered consistent if the consistency ratio is less than 10%. The computed consistency ratio across all pairwise combinations and criteria were less than 10% (2% for social acceptability, 5% for administrative feasibility, and 1% for technical feasibility), which implies that the judgments were consistent. Thus, all pre-identified criteria can be used for the selection of the best policy option to address low adoption of rice seed technology among farmers.

Analysis of Factors that may Influence the Implementation of Policy

Experts were consulted to comment on existing infrastructure, facilities, and social environment affecting the implementation of the preferred policy option.

POLICY AND OUTCOMES

Technology Adoption Situation-related Policies and Policy Outcome Forecast

Table 2 shows the existing programs and policies in Sariaya, Quezon promoting the adoption of new technologies thereby helping alleviate the poverty situation of rice farmers.

Table 3, on the other hand, shows the result of the consultation guided by the Policy Delphi Technique. On average, the experts stated a 70.83% probability that low rice technology adoption would exacerbate poverty among farmers. Only one of the experts judged that the probability of occurrence of the issue is less than 50%, asserting that most farmers have other sources of income aside from rice production. Nevertheless, all experts agree that low technology adoption of certified rice seeds contributes to poverty among rice farmers. The goal of improving farmers' awareness about modern location-specific certified seed technologies was viewed as highly desirable by most experts.

The experts were also consulted about the possible reasons concerning farmers' low level of technology adoption and awareness or negative attitude on rice seed technology. One of the farmer-respondents asserted that some farmers refuse to adopt the use of certified seeds technology because of the low germination rate they had experienced. Consequently, they have become wary of seeds coming from the government. To address this, he suggested that extension agents should frequently and regularly visit their area, reiterate and remind farmers of the proper use of recommended quality rice seeds and their advantages. However, the municipal agriculture officer (also one of the experts) mentioned that the number of LGU-based AEWs is inadequate to frequently visit all farmers. The current AEW to clients ratio is 1:3 barangays. Most extension workers recognize the minimal provision of extension services in the communities. Two respondents attributed this scenario to the shortage of extension personnel at the level of the local government. It is important to increase the number of extension workers so that the local government unit (LGU) may effectively deliver services to farmers (e.g., providing helpful information through training and adopting new technology).

Meanwhile, limited number of AEWs could result in low adoption of various technologies, including rice seed technology. Thus, it has been shown that increased access to extension and participation in training

Table 2
Existing agriculture policies/programs being implemented in Sariaya, Quezon

Policy/Program	Objective(s)
ONE-DA Agenda: A holistic approach to agriculture and fisheries transformation (Dar, 2021)	It envisions a food-secure and -resilient Philippines with empowered and prosperous farmers and fisherfolks through collective action. Twin goal is to achieve: Masaganang ANI at mataas na KITA.
Farm clustering or the Bayanihan Agri Clusters (BACs)	Provides social protection and safety net measures for resource-poor farmers and fishers through the *Plant, Plant, Plant* Program by way of cash assistance, subsidized credit, and crop insurance. Farm Clustering as a collective approach in resource management effectively integrates local and national government support services, such as mechanization, free seeds and fertilizers, breeder stocks, market access, and other technical support to enable better farmers' or fisherfolks' participation in the value chain.
Rice Competitiveness Enhancement Fund (RCEF)	To help Filipino rice farmers prosper and become globally competitive, the program centers on improving the competitiveness and increasing the income of the Filipino rice farmers through yield improvement, cost reduction, lowering of postharvest losses, and rice value addition. RCEF beneficiaries receive various support from the DA such as free training, certified seeds, mechanization and unconditional cash assistance.
Rice Business Innovations Community Program (RiceBIS)	Aims to form clusters of farmers and organize them into a community of practice geared at developing rice and rice-based enterprises to address farmers' needs from production to processing to marketing. RiceBIS activities are done sustainably to ensure available and affordable rice.
Agrarian Production Credit Program (APCP)	Aims to finance the requirements for agriculture and fisheries, agri-enterprise and/or livelihood projects of agrarian reform beneficiaries. It is a loan program under the DA Agricultural Credit Policy Council.

Table 3
Policy outcome forecast, issue statement, and corresponding goal

Item	Statement	Experts' Judgment
Forecast	The declining performance of Philippine agriculture is caused by low productivity and high production costs, because it has long lagged in technology adoption (Galang, 2019). Poverty incidence among farmers is at 31.6%; fisherfolks, 26.2%; and individuals residing in rural areas at 24.5% (PSA, 2018). The current technology adoption rate in rice farming is less than 10%. Rural farmers, including farmers in Sariaya, Quezon, were earning an average of P100,000 a year or just over P8,000 a month, which is way below the poverty line (Cruz, 2020). The continued low awareness of farmers may further result in low technology adoption. Thus, if low technology adoption will not remain unaddressed, there is a high probability that farmers may continue to be trapped in the poverty cycle.	Probability: 70.83%
Issue	Low technology adoption and lack of awareness of certified rice seeds contributes to increasing poverty incidence among rice farmers.	All informants: Agree
Goal 1	Improve the awareness of farmers about modern location-specific certified seed technologies	I1, I2, I4, I5 & I6: Strongly desirable I3: Desirable
Goal 2	Maintain the level of awareness and attitude of farmers toward technology (status quo)	I1, I3, I4 & I5: Strongly undesirable I2 & I6: Undesirable

programs and organizations is advantageous across agricultural technology domains (Ruzzante et al., 2021). Farmers that regularly engage with AEWs and participate in extension training and demonstration programs may be able to unlock their capabilities and embrace new production techniques, resulting in greater farm productivity over time (Mgendi et al., 2022). It indicates that an adequate number of AEWs might result in successful technology adoption, more specifically on rice seed technology.

Danso-Abbeam (2022) notes that it is vital to focus on developing farmer-led groups to strengthen collaborative action and increase access to agricultural extension and ensure constant structured consultation with AEWs. Makate et al. (2019) recommended strategic features to improve extension access in technological adoption, such as increasing the number of extension workers; improving coordination of extension messages relayed to farmers; capacity development of extension offices and personnel; and increasing funding for national and local extension programs.

Lastly, the local government unit provided its residents with accurate agricultural information. In terms of assistance and information programs, a respondent suggested that the LGU must enhance farmers' engagement in technology promotion and development to enhance their appreciation and use of new rice production technologies, such as high-quality seeds. From consultations, the policy options were formulated (Table 4). To make the analysis more focused, the construction of the alternatives was narrowed into three on the basis of their "fitness" to the sociopolitical condition of the stakeholders and their relevance to the identified problem definition. The option of not doing any intervention was included and explored. Policy options 1 and 2 were proposed to help improve farmers' awareness about modern location-specific certified seed

Table 4
The goal statement and the corresponding policy options

Goal Statement	Policy Options
Goal 1: Improve the awareness of farmers about modern location-specific certified seed technologies	Policy Option 1: Increase the number of LGU extension workers Policy Option 2: Develop private village-based extension agents
Goal 2: Maintain the level of awareness and attitude of farmers toward technology (status quo)	Policy Option 3: No intervention

technologies. Technologies are available because several programs/projects are being implemented in the locality. Some farmers even receive subsidized rice seeds. There is, however, a need to increase the number of extension workers who will provide quality services to rice farmers in Sariaya, Quezon. The provision of seeds should not be the end in itself. It has to be complemented with frequent follow-ups and visits to farmers to properly guide them about its proper use and management.

Policy Alternatives

Figure 1 shows the hierarchy model based on AHP, which presents the policies defined objective (1st level), the set of criteria used in comparing the policy options (2nd level), and the policy options (3rd level). The first criterion (social acceptability) refers to the extent to which the community in Sariaya will accept the design and implementation of the policy option. The second criterion (administrative feasibility) refers to the ease of implementation, particularly the existence of structures or department(s), its resources, and its capability to implement the policy option. Finally, the third criterion (technical feasibility) refers to the availability and accessibility of technology needed to implement the policy option.

In terms of social acceptability, policy option 1 is moderately more important than policy option 2 and is absolutely more important than policy option 3 (Table 5). Policy option 2, on the other hand, is strongly more important than policy option 3. The results imply that the implementation of policy option 1, based on experts' judgment, would easily receive acceptance among the stakeholders in Sariaya, Quezon. Majority of the farmers in Sariaya, Quezon are smallholders and

Figure 1
Hierarchy model

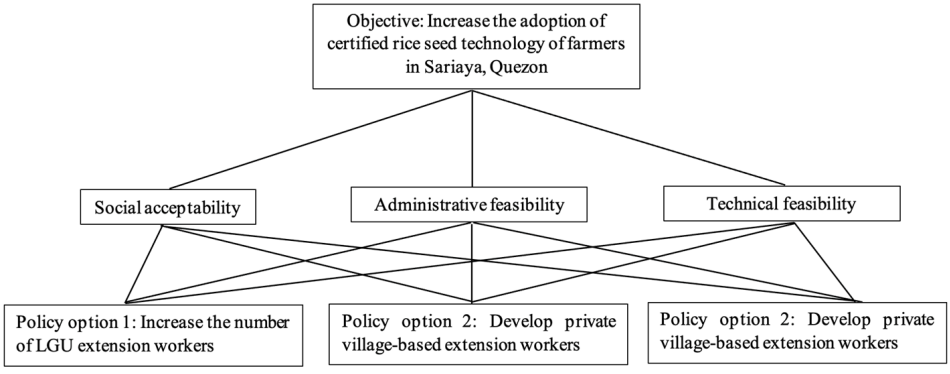

Table 5
Pairwise matrix among policy options in terms of social acceptability

In Terms of Social Acceptability	Policy Option 1	Policy Option 2	Policy Option 3
Policy option 1	1	3	9
Policy option 2	1/3	1	5
Policy option 3	1/9	1/5	1

do not have the capacity to immediately acquire new knowledge and skills related to agriculture using their own resources. Currently, most agri-related technologies are gearing towards digitization or precision agriculture. Many farmers are not yet adept to this new paradigm. Thus, the role of public extension agents is crucial in enhancing technology adoption and eventually in improving farmers' productivity. Extension agents' role is not to impose new technologies and make farmers dependent on their services. Rather, these agents are considered as enablers and intermediaries that will ensure farmers are informed about new technologies and the latter's feedback about these new technologies are properly communicated to the technology developers and policymakers.

In terms of administrative feasibility, policy option 1 is equally essential as policy option 2, and moderately more important than option 3 (Table 6). Policy option 2, on the other hand, is found to have a strong to very strong importance over policy option 3. This means that policy option 2 is perceived by the experts as the easiest to implement in Sariaya,

Table 6
Pairwise matrix among policy options in terms of administrative feasibility

In Terms of Administrative Feasibility	Policy Option 1	Policy Option 2	Policy Option 3
Policy option 1	1	1	3
Policy option 2	1	1	6
Policy option 3	1/3	1/6	1

Quezon. According to the extension workers, this would not require a considerable amount of additional resources from the government although the farmers may cover additional costs as they have to pay for the services of private extension agents.

Policy option 1 is equally important with policy option 2 and absolutely more important than policy option 3 in terms of technical feasibility (Table 7). Policy option 2 is also considered to be absolutely more important than policy option 3. This means that both policy options 2 and 3 are feasible because technologies are available and accessible in the locality.

The computed weights for each of the policy options as regards each criterion is shown in Table 8. In terms of social acceptability, policy option 1 is most preferred. Policy option 2, on the other hand, is most preferred when it comes to administrative feasibility. Policy option 1 and policy option 2 are preferred in terms of technical feasibility.

Table 7
Pairwise matrix among policy options in terms of technical feasibility

In Terms of Technical Feasibility	Policy Option 1	Policy Option 2	Policy Option 3
Policy option 1	1	1	9
Policy option 2	1	1	9
Policy option 3	1/9	1/9	1

Table 8
Pairwise matrix among policy options in terms of technical feasibility

	Social Acceptability	Administrative Feasibility	Technical Feasibility
Policy option 1	0.6696	0.3967	0.4739
Policy option 2	0.2669	0.4967	0.4739
Policy option 3	0.0636	0.1067	0.0523

Quality of Available Infrastructure and Facilities

When it comes to farmers' perspectives on the quality of available infrastructure and facilities, they all recognize the significance of cable television and mobile phone. Mobile phone signals, on the other hand, is variable. Technologies that can contribute to an economically efficient farm sector and farmers' financial viability while improving environmental performance and social acceptability will provide "triple dividends" to sustainability. ICT is a necessity, as it can be an effective tool for cheaper and effective communication between agricultural extension agents and farmers. However, given the scarcity of resources, there are invariably trade-offs in achieving these sustainability goals (Organisation for Economic Co-operation and Development, 2017). Previous studies related to mobile phones have primarily focused on their role in providing price and weather-related information (Aker, 2010).

Extension workers noted that there were no substantial difficulties in terms of infrastructure and amenities. A respondent stated that if there is adequate access to highways, it is easier to acquire other products and commodities where agriculture inputs can be quickly accessed. Furthermore, most respondents agreed that everyone has access to radio, which facilitates promotion and communication of rice technologies, such as School-on-the-Air programs (i.e., lecture and marketing) and other critical information on rice cultivation and technology.

The respondents believed that cable connectivity is beneficial for knowledge and distribution about rice production. A strong internet connection is also location-specific. The internet is the fastest and most efficient method of finding solutions to existing problems. It is also beneficial in searching for information and learning about agricultural technology. With all the limitations in using the mobile phones, they remain the most useful tool in interacting with farmers, local government officials, and extension workers. The area has reliable and accessible electricity and water supply, where everyone has equal access.

Quality of Social Environment

Improved rural living circumstances positively impact the long-term viability of government initiatives. Farmers in Sariaya recognize and appreciate that the local government provides them with various services. Peace and order is never an issue in Sariaya.

People currently live in difficult situation, not only as a consequence of human-caused disasters such as wars, industrial accidents, and other related occurrences but also of natural disasters (Oracion & Banogon, 2019). Extension workers documented issues concerning the water system (as facilitated by NIA), and particular organizational challenges, which are detrimental to maintaining peace and order in the organization. Moreover, the lack of support from local leaders regarding farmers' requirements is a potential issue, as is the fact that political alignment is oftentimes necessary to receive assistance. It has also been observed that there are effective programs that benefit rice farmers, but these programs are sometimes only available to a small group of farmers.

The respondents were also asked to rate the significance of the social environment in light of the previously recognized factors of organizational influence that had been documented. The majority believed that an organized, peaceful, and helpful community will always lead to progress. The local government should emphasize the development of beneficial technologies for farmers over other priorities. On the other hand, farmers would be more unified and cooperative if they are included in the government's priority list. Additionally, extension workers noted a shortage of insurance or that not all farmers can afford to insure their farm goods. This issue is highly significant given the frequency of typhoon occurrence. Among the most important benefits of obtaining insurance as part of a disaster preparedness program is that the burden on farmers will be minimized as they recover from the disaster.

POLICY RECOMMENDATIONS

Policy options were ranked by multiplying the weights of the policy alternatives by the weights of the criteria. A weight equivalent to 0.4 was assigned to the social acceptability criterion or the extent to which the policy is accepted by the community of Sariaya, Quezon. The stakeholders' positive perception for a given policy and its objective can ensure their participation in its implementation. The administrative feasibility criterion, or the extent to which government officials and other relevant groups in Sariaya will be able to implement the policy, was assigned a weight equivalent to 0.3. The successful implementation of a policy also depends on the availability of structures, capability of the agency or department, and availability of resources.

Finally, the technical feasibility, or the degree of availability and accessibility of technology, is also given a weight equivalent to 0.3. A policy is easier to implement if the technology, method, and skills are already existing. Table 9 shows policy option 1 had the highest overall

Table 9
Overall importance of the policy options

Policy Option	Overall Importance (Ranking)
Increase the number of LGU AEWs	0.5290 (1)
Develop village-based private technicians	0.3979 (2)
No intervention	0.0731 (3)

importance with respect to the criteria. Thus, it is recommended that the number of LGU-based extension workers be increased in Sariaya, Quezon. This is timely and may complement the proposed full implementation of the Mandanas-Garcia Ruling (Executive Order No. 138), where the Supreme Court ruled that local governments are entitled to a fair share of all national taxes collected.

To ensure that such recommendations are implemented and that rice seed technology adoption and policy-making processes are improved, likewise, it is essential to address and explain the findings of this study to local officials, partners, and stakeholders in preparation for a possible municipal council ordinance and subsequent implementation and monitoring. Additionally, it is aimed that the study's findings be shared with other municipal, agricultural offices, and local government units to emphasize their crucial roles and responsibilities as vehicles of agricultural development.

The preferred policy option in this paper is based on the current situation of Sariaya using the perspectives of the experts consulted. The team, in consultation with the experts, also recognizes that the preferred policy can be best implemented if there exists effective governance practice and reliable ICT infrastructure. Through effective governance practice, the farmers may enhance their trust in their LGUs. ICT and multimedia systems, on the other hand, are important in delivering services in a modern and innovative way (Bello et al., 2021). ICTs' usefulness is influenced by a variety of factors, including social networks, perceived convenience, and managerial viewpoints (Gollakota et al., 2012; Pick et al., 2014; Birke et al., 2019). Likewise, Birke et al., (2019) explicitly explained that to fully seize the opportunities of ICTs in agricultural extension, the local leaders, specialists and farmers must share a positive attitude toward the use of ICTs in agricultural extension.

It requires a strong political will, determination, and commitment to work for a sustainable agricultural extension, more specifically in rice farming. There is a strong literature backup demonstrating how improved extension services can increase farmers' adoption of new agricultural technologies, specifically rice seed technology that contributes to greater agricultural and economic productivity. Another key conclusion drawn is increasing the number of skilled AEWs yielded the most positive effect.

Influencing and shaping future policy decisions and giving advice on how to convince rural farmers to use innovative ICT methods and applications are moving in the right direction. The research recommends that the LGU of Sariaya should also strengthen the extension services and develop their ICT services using participatory approaches to better understand the pulse from the grassroots.

ACKNOWLEDGEMENT

The authors express their appreciation to Dr. Aileen V. Lapitan and Dr. Maria Luz L. Malabayabas, faculty in-charge of the course on *Methods of Policy Analysis (SPPS 202),* whose invaluable insights significantly contributed to the enhancement of this paper. This article is based on the research paper of the authors on their previous course taken during the 2nd Semester, Academic Year 2021-2022. The authors are current students of PhD in Extension Education and PhD in Development Studies programs of the College of Public Affairs and Development, University of the Philippines Los Baños. Their views are exclusively their own and do not necessarily reflect those of their respective affiliation.

REFERENCES

Aker, J. C., (2010). Information from markets near and far: Mobile phones and agricultural markets in Niger. *American Economic Journal: Applied Economics, 2*(3): 46-59. https://www.aeaweb.org/articles?id=10.1257/app.2.3.46

Ani, P.A. B., & Correa, A. B. D. (2016). Agricultural extension policies in the Philippines: Towards enhancing the delivery of technological services. Accessed from ap.fftc.org.tw/article/1092

Bello, L. O., Baiyegunhi, L., J., S., & Danso-Abbeam, G., (2021). Productivity impact of improved rice varieties' adoption: Case of smallholder rice farmers in Nigeria. *Economics of Innovation and New Technology, 30*(7), 750–766. https://doi.org/10.1080/10438599.2020.1776488

Birke, F. M., Lemma, M., & Knierim, A. (2019). Perceptions towards information communication technologies and their use in agricultural extension: Case study from South Wollo, Ethiopia. *The Journal of Agricultural Education and Extension, 25*(1), 47–62. https://doi.org/10.1080/1389224X.2018.1524773

Cororaton, C. B. (2004). *Rice reforms and poverty in the Philippines: A CGE analysis*. Asian Development Bank Institute. https://www.adb.org/publications/rice-reforms-and-poverty-philippines-cge-analysis#:~:text=Policy%20experiments%20indicate%20that%20while,the%20poor%20are%20adversely%20affected.

Cruz, Jr. R. (2020, March 10). *Farming can be profitable*. BusinessMirror. https://businessmirror.com.ph/2020/03/10/farming-can-be-profitable/

Danso-Abbeam G., (2022). Do agricultural extension services promote adoption soil and water conservation practices? Evidence from Northern Ghana. *Journal of Agriculture and Food Research, 10*, 100381. https://doi.org/10.1016/j.jafr.2022.100381

Dar, W. D. (2021). ONE-DA: A holistic approach to agriculture and fisheries transformation [PowerPoint presentation]. Department of Agriculture. https://www.da.gov.ph/wp-content/uploads/2021/01/ONE-DA-Powerpoint.pdf

Dunn, W. (2018). *Public policy analysis: An integrated approach* (6th ed.). Routledge Taylor & Francis Group.

Fernandez, C. G. P, & Torres, M. A. C. (2017). Baseline *assessment of the RiceBIS Community in Sariaya, Quezon, Wet Season 2016 and Dry Season 2017*. PhilRice Los Baños.

Galang, V. M. P. (2019, July 22). *Agriculture: Low productivity and high production costs*. BusinessWorld. https://www.bworldonline.com/agriculture-low-productivity-and-high-production-costs/

Gollakota, K., Pick, J. B., & Sathyapriya, P. (2012). Using technology to alleviate poverty: Use and acceptance of telecenters in rural India. *Information Technology for Development, 18*(3), 185–208 https://doi.org/10.1080/02681102.2011.643195

Makate, C., Makate, M., Mutenje, M., Mango, N., & Siziba, S. (2019). Synergistic impacts of agricultural credit and extension on adoption of climate-smart agricultural technologies in Southern Africa. *Environmental Development, 32*, 100458. https://doi.org/10.1016/j.envdev.2019.100458

Manalo IV, J., Pasiona S., & Bautista, A. (2021). Understanding the complexities in the adoption of the Rice Crop Manager tool in the Philippines. *International Journal of Agricultural Sustainability, 20*(4), 381–392. https://doi.org/10.1080/14735903.2021.1934363

Mgendi, G., Mao, S., Qiao, F., (2022). Does agricultural training and demonstration matter in technology adoption? The empirical evidence from small rice farmers in Tanzania. *Technology in Society, 70*, 102024 https://doi.org/10.1016/j.techsoc.2022.102024

Mpiima, D. M., Manyire, H., Kabonesa, C., & Espiling, M. (2019). Gender analysis of agricultural extension policies in Uganda: Informing practice? *Gender, Technology and Development, 23*(2), 187-205. https://doi.org/10.1080/09718524.2019.1657610

Oracion, E. G., & Banogon, M. R. (2019). *The status of parishioners in need and the environment as observed by basic ecclesial community members and churchgoers* [A report]. Redemptorist Community, Negros Oriental State University, and Silliman University.

Organisation for Economic Co-operation and Development. (2017). *Agricultural policies in the Philippines*. OECD iLibrary. http://dx.doi.org/10.1787/9789264269088-en

Pick, J. B., Gollakota, K., & Singh, M. (2014). Technology for development: Understanding influences on use of rural telecenters in India. *Information Technology for Development, 20*(4), 296–323. https://doi.org/10.1080/02681102.2013.837806

Philippine Rice Research Institute. (2021). *Rice competitiveness enhancement fund seed program briefer*. Development Communication Division, Philippine Rice Research Institute.

Philippine Statistics Authority (2020, June 30). *Farmers, fisherfolks, individuals residing in rural areas and children posted the highest poverty incidences among the basic sectors in 2018*. https://psa.gov.ph/content/farmers-fisherfolks-individuals-residing-rural-areas-and-children-posted-highest-poverty

Poliquit, L. Y. (2006). *Accessibility of rural credit among small farmers in the Philippines* [Unpublished master's thesis]. Massey University. https://mro.massey.ac.nz/bitstream/handle/10179/1687/02_whole.pdf

Ruzzante, S., Labarta, R., & Bilton, A. (2021). Adoption of agricultural technology in the developing world: A meta-analysis of the empirical literature. *World Development, 146*, 105599. https://doi.org/10.1016/j.worlddev.2021.105599

Saaty, T. L. (1980). *The analytic hierarchy process*. McGraw Hill International.