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Abstract

This study evaluated farmers' adoption and satisfaction levels regarding services provided by the National Irrigation Administration (NIA) in the Angat-Maasim River Irrigation System (AMRIS), spanning selected municipalities in Bulacan and Pampanga, Philippines. Using a descriptive-correlational research design, data were collected from 393 randomly selected farmers through structured questionnaires. Results showed that while farmers exhibited high adoption levels of NIA irrigation practices (M = 4.51), satisfaction was moderate (M = 4.33), with communication receiving the highest and infrastructure maintenance the lowest ratings. Poor infrastructure maintenance was the most frequently cited problem (M = 3.03). A weak but significant positive correlation (r = 0.333) was found between adoption and satisfaction, suggesting that compliance may be driven more by institutional norms than by personal satisfaction. Findings highlight the importance of enhancing infrastructure, expanding training, and involving youth and women in irrigation governance to improve service effectiveness and sustainability.

Keywords: *adoption, agricultural services, farmer satisfaction, infrastructure, irrigation services, NIA, satisfaction, water management*

Introduction

Irrigation remains a cornerstone of agricultural productivity in the Philippines. It enables year-round cultivation, increases cropping intensity, and mitigates the impact of unpredictable rainfall, especially in rice and high-value crop production. The National Irrigation Administration (NIA) serves as the lead agency for delivering irrigation services. Since its inception, NIA has significantly contributed to national food security by constructing and managing irrigation systems nationwide. Its effectiveness can directly influence farm outputs and farmer well-being.

Despite these contributions, the Philippine irrigation sector continues to face persistent challenges at both national and regional levels. These include aging infrastructure, water delivery delays, uneven distribution, and limited technical training. In Central Luzon—often referred to as the country's rice granary—such issues remain pressing, particularly as the region relies heavily on irrigated agriculture. Farmers in this region frequently report concerns related to the timeliness, adequacy, and reliability of irrigation services. This study examines farmers' adoption and satisfaction with NIA services in the Angat-Maasim River Irrigation System (AMRIS), a critical infrastructure in Central Luzon. Existing studies (e.g., Naz, 2018; Mariano et al., 2012) focus on other regions or broader irrigation systems, leaving a research gap specific to AMRIS. For instance, Medalla et. al. (2012) explored satisfaction in Sorsogon, but no

comprehensive study has evaluated AMRIS farmers' experiences.The literature on irrigation adoption highlights extension services as key drivers (Mariano et al., 2012), while satisfaction studies emphasize infrastructure reliability (Delos Reyes & Schultz, 2020). Given that satisfaction is linked to engagement, compliance, and long-term sustainability, this study provides evidence-based insights into service gaps and opportunities for improving irrigation governance. To the best of the researcher's knowledge, this is the first study in the locality that simultaneously investigates both the adoption and satisfaction of farmers with AMRIS irrigation services. The findings aim to support future policy interventions, enhance irrigation management strategies, and strengthen the delivery of services tailored to farmers' real needs.

Materials and Methods

This study employed a descriptive-correlational research design. The respondents consisted of 393 farmers from 116 Irrigators' Associations in AMRIS, selected using stratified random sampling across upstream, midstream, and downstream zones from April to May 2025. All 393 farmers completed the questionnaires. The instrument used was a researcher-designed structured questionnaire covering demographic profile, adoption practices, problems encountered, and level of satisfaction with NIA services. The computed Cronbach's alpha value was 0.87, indicating high internal consistency and strong reliability of the survey instrument. Data analysis included descriptive statistics, and multiple linear regression, conducted using SPSS software. Weighted mean interpretation followed a 5-point Likert scale.

Results and Discussion

Socio-Demographic Profile

Most respondents were male (84.5%) with an average age of 58. Education levels were generally low, with 40.97% attaining only a high school education. The average monthly income was ₱15,692, and farm sizes ranged from 1–3 hectares for 64.12% of respondents. Limited training attendance (1–3 sessions) was also noted, underscoring the need for more inclusive and accessible capacity-building programs.

AMRIS farmers' high adoption of irrigation practices (M = 4.51), including irrigation schedules, water-saving techniques, and NIA-led activities, reflects robust institutional influence and the critical water needs of rice farming. Compared to Medalla et. al. (2012) findings of moderate adoption (M = 3.8–4.2) in other Philippine systems, AMRIS's high adoption and uniformity suggests stronger NIA oversight or cohesive farmer groups. Indammog (2025) similarly noted reliance on NIA services but highlighted regional variations absent in AMRIS, pointing to possible advantages such as consistent water delivery or organized associations. In contrast, Naz (2018) reported lower adoption levels (M ≈ 3.5) in South Asian systems due to unreliable water supply and weak governance. AMRIS's structured schedules and monitoring likely drive its success, aligning with findings that reliable water supply and regular extension services enhance adoption rates (Mariano et al., 2012). However, Naz's observation that alternative water sources reduce compliance raises questions about AMRIS farmers' available irrigation alternatives, a factor not examined in this study.

Compliance with cropping adjustments and NIA trainings suggests receptivity to extension services, echoing Laborte et al. (2012), who reported higher adoption with regular extension contact and good management practices. AMRIS's compliance may stem from penalties, peer pressure, or habit, as Medalla et al. (2012) and Turner (2007) suggest. Feder et al. (1985) stressed the importance of tailored extension for effectiveness, but AMRIS lacks data on training content, unlike critiques of top-down extension approaches in other developing contexts.

While AMRIS outperforms some other systems, the role of coercion versus trust remains unclear. Turner (2007) cautions that forced adoption may undermine sustainability. Socioeconomic factors, such

as wealth or water access, noted by Naz (2018), are also underexplored in AMRIS. Qualitative research is needed to clarify whether adoption reflects genuine benefits or external pressures, ensuring long-term engagement and equitable policy design.

Table 1

Socio-Demographic Profile

Variable	Indicators	Frequency	Percentage
Age	18-35 (Young Adults)	13	3.31
	36-55 (Middle-aged Adults)	147	37.40
	56 and above (Older Adults)	233	59.29
Sex	Male	332	84.50
	Female	61	15.50
Educational Attainment	No formal education	0	0.00
	Elementary Undergraduate	13	3.30
	Elementary Graduate	42	10.70
	Highschool Undergraduate	56	14.20
	Highschool Graduate	161	41.00
	College Undergraduate	58	14.80
	College Graduate	63	16.00
Civil Status	Single	33	8.40
	Married	330	84.00
	Widowed	30	7.60
Monthly Income	Below 7,500	73	18.58
	From 7,501-15,000	158	40.20
	From 15,001-30,000	148	37.66
	Above 30,000	14	3.56
Trainings Attended	None	33	8.40
	1-3	199	50.60
	4-6	78	19.80
	7 and above	83	21.10
Farm Size	Less than 1 hectare	86	21.90
	1-3 hectares	252	64.10
	4-6 hectares	35	8.90
	More than 6 hectares	20	5.10

Table 1 presents the demographic profile of 393 farmers. Most were male (84.5%), aged 56 and above (59.29%), with a high school education (41.0%). Monthly income averaged ₱15,692, with 64.1% owning 1–3 hectares. Limited training attendance (50.6% attended 1–3 sessions) highlights the need for accessible capacity-building. These demographics reflect an aging farming population with modest resources (Palis, 2020).

Adoption of Irrigation Services

Farmers exhibited high adoption levels (M = 4.51), particularly in complying with NIA water regulations. While this may imply strong engagement, it may also reflect obligatory compliance rather than voluntary participation. This aligns with previous research suggesting that enforced practices may not always indicate true satisfaction.

The results show a high overall adoption of irrigation practices (M = 4.51), with particularly strong agreement in complying with irrigation schedules, water-saving techniques, and participation in NIA-led activities. This level of adoption may be attributed to both necessity and institutional influence, especially given the seasonal dependency of rice farming on reliable water access. However, such high adoption may not necessarily equate to voluntary engagement; rather, it may reflect a lack of alternative options or dependence on NIA services, as observed in studies by Medalla et al. (2012) and Indammog (2025).

Interestingly, the strong compliance among farmers in adjusting cropping patterns and attending NIA trainings suggests an openness to institutional guidance. This is consistent with Mariano et al. (2012), who emphasized that farmers with regular contact with extension services tend to adopt improved irrigation practices more readily. However, the high adoption must also be viewed with caution, as other factors—such as fear of penalty, peer pressure within irrigators' associations, or habit—might drive participation more than genuine satisfaction or trust in service quality.

Table 2

Level of Adoption

Statement	Mean	Standard Deviation	Verbal Description
1. I regularly use the water supplied by the Angat-Maasim Rivers Irrigation System for my farming Activities.	4.54	0.499	Strongly Agree
2. I have adopted the recommended irrigation schedules provided by the National Irrigation Administration	4.20	0.676	Strongly Agree
3. I follow the guidelines for water-saving techniques promoted by the irrigation service.	4.52	0.535	Strongly Agree
4. I have invested in equipment or infrastructure to better utilize the irrigation water from the system.	4.26	0.612	Strongly Agree
5. I participate in training or meetings organized by NIA to improve my irrigation practices	4.64	0.600	Strongly Agree
6. I find the irrigation service reliable enough to depend on for my crop production.	4.35	0.758	Strongly Agree
7. I have adjusted my cropping patterns based on the availability of water from the Angat-Maasim Rivers Irrigation System.	4.54	0.524	Strongly Agree
8. I comply with the water usage policies set by the National Irrigation Administration.	4.71	0.459	Strongly Agree
9. I actively cooperate with other farmers to ensure fair water distribution from the irrigation system.	4.67	0.469	Strongly Agree
10. I am willing to adopt new technologies or practices recommended by the National Irrigation Administration to improve water use efficiency.	4.66	0.501	Strongly Agree

Legend: Mean scores reflect agreement levels on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Compared to previous studies in other irrigation systems (e.g., Naz, 2018), AMRIS farmers appear to adopt NIA's recommendations more uniformly. This may be due to better-structured irrigation schedules or more active monitoring in the region. Nevertheless, further qualitative inquiry may help determine whether this compliance is motivated by perceived benefits or by social or institutional compulsion.

Problems Encountered

The primary issue reported was poor infrastructure maintenance (M = 3.03). This is a long-standing problem in Philippine irrigation systems, negatively affecting delivery schedules and crop outcomes. Although drainage was the least problematic, regular seasonal maintenance is still necessary. The findings on poor maintenance of irrigation structures as the top concern for AMRIS farmers align closely

with broader literature on irrigation system challenges in developing countries, particularly in the Philippines. Chronic underfunding and deferred maintenance lead to deteriorating infrastructure and unreliable water delivery (David, 1995; Inocencio, David, & Briones, 2013). This is corroborated by studies noting that many Philippine irrigation systems suffer from aging canals, silted waterways, and malfunctioning gates, reducing efficiency, especially in downstream areas (Inocencio, David, & Briones, 2013; Clemente et al., 2020; David & Inocencio, 2014).

Globally, similar issues are documented in reports highlighting aging infrastructure barriers in developing countries. Addressing these requires a multifaceted approach, combining increased funding, strengthened governance, community-level ownership, and basic maintenance protocols (Meinzen-Dick, 2014; Braig, 2018).

Table 3

Problems Encountered by Farmers

Problems Encountered	Mean	Rank
a) Poor Maintenance of Structure	3.03	1
b) Unreliable Water Delivery	3.40	2
c) Low Technical Knowledge/Training in Irrigation	4.90	3
d) Lack of access to water	5.00	4
e) High cost of irrigation	5.07	5
f) Water shortage	5.76	6
g) Inequitable water distribution	5.86	7
h) Use of outdated/inefficient system	6.47	8
i) Conflicts among water users	7.75	9
j) Poor drainage	7.78	10

Table 4

Level of Satisfaction of Farmers

Items	Mean	Standard Deviation	Verbal Description
1. Reliability of water supply from the Angat-Maasim River Irrigation System	4.28	0.685	Strongly Satisfied
2. The quality of water delivered through the irrigation system meets my farming needs.	4.30	0.644	Strongly Satisfied
3. The irrigation schedule provided by the National Irrigation Administration is convenient for my crop production.	4.35	0.735	Strongly Satisfied
4. Fairness of water distribution among farmers in my area	4.33	0.758	Strongly Satisfied
5. The maintenance of canals and irrigation infrastructures is adequate and timely.	4.15	0.757	Strongly Satisfied
6. The NIA Staff are responsive and helpful when I have concerns.	4.45	0.716	Strongly Satisfied
7. I am satisfied with the communication and information provided about irrigation services and policies.	4.51	0.594	Strongly Satisfied
8. The irrigation system has positively impacted the farm productivity and income.	4.27	0.647	Strongly Satisfied
9. I feel that the no irrigation service fees help the farmers	4.38	0.709	Strongly Satisfied
10. Quality of trainings and Performance of the Angat-Maasim River Irrigation System.	4.36	0.678	Strongly Satisfied

Legend: Mean scores reflect agreement levels on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)

Satisfaction with NIA Services

Overall satisfaction was high (M = 4.33), with communication efforts receiving the highest rating. However, satisfaction with infrastructure was lowest, highlighting a mismatch between policy outreach and actual service quality. This indicates that while farmers feel informed, the physical conditions of irrigation systems still require significant improvement.

Correlation Between Adoption, Problems, and Satisfaction

There was a statistically significant but weak correlation between adoption and satisfaction (r = 0.333, p < .01). This suggests that while adoption may be high, it is not solely due to satisfaction but may also be driven by institutional pressure or necessity. Interestingly, the uniformly high rating for problems (M = 5.50, SD = 0.00) suggests possible flaws in the survey design or shared dissatisfaction, which requires further qualitative exploration.

Table 5

Correlation Between Adoption, Problems and Satisfaction

Variable	Mean	Std. Deviation	R-Value	R Square	p-Value	Result
Adoption Level	1.491	.3840				
Problems	5.500	.0000	.333[a]	0.111	0.000	Significant
Level of Satisfaction	1.655	.4720				

Correlation analysis is a statistical method used to evaluate the strength and direction of the relationship between two or more variables. It is widely applied in agricultural research, including studies on irrigation systems, to understand how factors such as adoption of practices, encountered problems, and user satisfaction interrelate. The Pearson correlation coefficient (R), R-squared (R^2), and p-value are key metrics that indicate the strength, explained variance, and statistical significance of these relationships, respectively. In the context of the AMRIS farmers' data, correlation analysis provides insights into how adoption levels, problems with irrigation systems, and satisfaction are associated, offering a foundation for addressing systemic issues like poor infrastructure maintenance.

The correlation analysis shows a moderate positive correlation (r = 0.333) between adoption level and problems/satisfaction. This suggests that higher adoption is associated with slight improvements in satisfaction or slight variations in perceived problems. The R^2 value (0.111) indicates that only 11.1% of the variability in problems or satisfaction is explained by adoption, implying that other factors (e.g., infrastructure issues) are more influential. The p-value (p < .001) confirms the correlation is statistically significant, as it is well below the .05 threshold, and was calculated using standard t-tests for correlation.

The zero standard deviation for problems (SD = 0.00) indicates that all farmers reported the same level of issues, likely reflecting widespread maintenance challenges. The moderate standard deviations for adoption (SD = 0.38) and satisfaction (SD = 0.47) suggest variability in farmers' engagement with practices and their perceptions, which could be analyzed further using additional surveys or focus group discussions.

The findings from the AMRIS study reflect what many irrigation experts have already observed: poor infrastructure and weak system maintenance often hold back the benefits of adoption. For example, David (2015) noted that underfunded irrigation systems in the Philippines result in unreliable water delivery, which limits their impact, similar to what was seen in AMRIS, where problems were widespread and adoption only had a moderate effect (r = 0.333).

Instead of relying on digital tools or AI, simple approaches like farmer-led maintenance groups, government repairs, and field surveys can help improve the system. Inocencio et al. (2016) support this

by showing how shared maintenance responsibilities lead to better outcomes. Globally, the International Water Management Institute (IWMI, 2018) found that aging infrastructure is a common barrier to success in developing countries, and Delos Reyes and Schultz (2020) recommend training farmers directly to boost adoption where technical knowledge is low.

Governance also matters. Satisfaction often depends on how well irrigators' associations function. As Meinzen-Dick (2014) and Braig (2018) suggest, local workshops and dialogue between farmers and the NIA can improve coordination without needing advanced technology. Even though organizations promote digital solutions, manual tools like water schedules and visual checks still work, especially in areas with limited resources.

In short, AMRIS farmers face structural and maintenance issues that limit the benefits of adoption. However, through community involvement, traditional extension services, and basic tools, these challenges can be addressed, proving that high-tech solutions are not always necessary for meaningful improvements in irrigation.

Conclusion

This study examined farmers' adoption and satisfaction with the irrigation services provided by the National Irrigation Administration (NIA) through the Angat-Maasim River Irrigation System (AMRIS) in selected municipalities of Bulacan and Pampanga. Findings revealed a high level of adoption of irrigation services, indicating strong compliance with NIA's policies and recommended practices. However, this high adoption did not correspond to a high level of satisfaction, as overall satisfaction was only moderate. The weak but statistically significant relationship between adoption and satisfaction suggests that farmers' adherence to irrigation protocols may be driven more by institutional requirements or necessity than by positive service experiences. Notably, maintenance of irrigation infrastructure emerged as the most critical concern, receiving the lowest satisfaction ratings, while communication efforts by NIA were generally appreciated by farmers.

These results highlight a disconnect between compliance and satisfaction. While farmers continue to adopt the system, their satisfaction depends on the quality, reliability, and responsiveness of the services provided. To sustain long-term engagement and improve farmer well-being, NIA must address key service delivery gaps, particularly in infrastructure maintenance, and ensure that policy enforcement is accompanied by tangible improvements that enhance the overall farmer experience and trust in the irrigation system.

Study Limitations

This study was limited by its focus on selected municipalities in Bulacan and Pampanga, which may not fully represent the experiences of farmers in other regions served by AMRIS or other irrigation systems. Although the sample size was statistically adequate, it may not capture the perspectives of farmers from remote or socioeconomically marginalized areas. The use of self-reported survey data may also introduce response bias, as participants may overreport or underreport their true experiences. Additionally, the study did not account for external variables such as climate variability, farm income fluctuations, and access to government support programs, all of which may influence adoption and satisfaction.

Future Research Directions: Future studies should expand the geographical scope to include a broader range of regions and irrigation systems to enhance generalizability. Moreover, longitudinal research could provide insights into how adoption and satisfaction evolve over time in response to policy changes or infrastructure improvements. Additionally, qualitative approaches, such as in-depth interviews or focus groups, could uncover nuanced reasons behind the disconnect between adoption and

satisfaction. Exploring the role of external factors, such as climate change, market dynamics, or access to credit, could further contextualize farmers' experiences. Finally, investigating the effectiveness of specific interventions, such as targeted infrastructure upgrades or enhanced farmer training programs is recommended to guide NIA in addressing service gaps and improving satisfaction.

Recommendations

Based on the findings, various areas require strategic development to improve the farmer experience and ensure the long-term viability of irrigation services provided by the Angat-Maasim River Irrigation System (AMRIS). The recommendations below concentrate on tackling the least performing indicators, such as infrastructure maintenance, limited training participation, poor youth engagement, and gender imbalance:

1. Due to the high mean problem rating for poor canal maintenance (M = 3.03), NIA may allocate more funds and create local maintenance teams for faster repairs.
2. As 50.6% of farmers attended only 1–3 trainings, NIA may offer incentives and localize training content to increase participation and effectiveness.
3. Given the aging farmer population (average age = 58), programs like agri-scholarships and technology-based farming initiatives may be introduced to attract young people.
4. With only 15.5% of female respondents, NIA may conduct gender-focused training and encourage women's involvement in Irrigators' Associations.
5. Due to wide income disparities among farmers, NIA may develop income-based irrigation payment schemes to ease financial burdens.
6. Since adoption and satisfaction are not strongly correlated (r = 0.333), regular satisfaction surveys may be conducted separately to identify actual service gaps.

References

Braig, K. F. (2018). The European Court of Human Rights and the right to clean water and sanitation. *Water Policy, 20*(2), 282–307. https://doi.org/10.2166/wp.2018.045

Clemente, R. S., Fajardo, A. L., Ballaran, V. G., Jr., Ureta, J. C. P., Baulita, A. S., & Tapire, K. C. J. (2020). *Assessing the resurgent irrigation development program of the Philippines: National irrigation systems component* (Discussion Paper Series No. 2020-01). Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps2001.pdf

David, C. C. (1995). *Philippine irrigation development: Overview, determinants, and policy issues* (PIDS Discussion Paper Series No. 1995-26). Philippine Institute for Development Studies. https://hdl.handle.net/10419/187300

David, C. C., & Inocencio, A. B. (2014). *Measuring irrigation performance: Lessons from national systems* (PIDS Policy Notes No. 2014-20). Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspn1420.pdf

Delos Reyes, M. L. F., & Schultz, B. (2020). An assessment of farmers' perspective in support of the modernization of national irrigation systems in the Philippines. *Irrigation and Drainage, 70*(2), 207–223. https://doi.org/10.1002/ird.2537

Feder, G., Just, R. E., & Zilberman, D. (1985). Adoption of agricultural innovations in developing countries: A survey. *Economic Development and Cultural Change, 33*(2), 255–298. https://doi.org/10.1086/451461

Indammog, F. (2025). Implementation of Free Irrigation Service Act at Upper Chico Irrigation System (UCRIS): Basis for sustainability plan. *AIDE Interdisciplinary Research Journal, 10*, 196–215. https://doi.org/10.56648/aide-irj.v10i1.161

Inocencio, A. B., David, C. C., & Briones, R. M. (2013). *A rapid appraisal of the irrigation program of the Philippine government* (Final report). Department of Budget and Management & Philippine Institute for Development Studies. https://www.dbm.gov.ph/wp-content/uploads/DBM%20Publications/FPB/ZBB-2013/A%20RAPID%20APPRAISAL%20OF%20THE%20IRRIGATION%20PROGRAM%20OF%20THE%20PHILIPPINE%20GOVERNMENT.pdf

International Water Management Institute. (2018). *IWMI annual report 2018*. https://www.iwmi.org/annual-reports/iwmi-annual-report-2018/

Laborte, A. G., de Bie, K., Smaling, E. M. A., Moya, P. F., & Boling, A. A. (2012). Rice yields and yield gaps in Southeast Asia: Drivers of yield variability. *European Journal of Agronomy, 35*(2), 76–86. https://doi.org/10.1016/j.eja.2011.08.005

Mariano, M. J., Villano, R., & Fleming, E. (2012). Factors influencing farmers' adoption of modern rice technologies and good management practices in the Philippines. *Agricultural Systems, 110*, 41–53. https://doi.org/10.1016/j.agsy.2012.03.010

Medalla, V. B., Marmol, J. N. S., & Dio, R. V. (2012). The farmers' satisfaction with the services of National Irrigation Administration: The case of irrigation systems in Bulan, Sorsogon. *Asian Journal of Management Sciences, 2*(2), 84–93. https://asianjournals.org/online/index.php/ajms/article/view/188

Meinzen-Dick, R. (2014). Property rights and sustainable irrigation: A developing country perspective. *Agricultural Water Management, 145*, 23–31. https://doi.org/10.1016/j.agwat.2014.03.017

Naz, G. M. (2018). Farmers' satisfaction on National Irrigation Administration (NIA) services in Sorsogon. *Asian Journal of Management Sciences, 1*(2), 119–133. https://www.asianjournals.org/online/index.php/ajms/article/view/77

Palis, F. (2020). Aging Filipino rice farmers and their aspirations for their children. *Philippine Journal of Science, 149*(2), 351–361. https://doi.org/10.56899/149.02.10

Turner, R. J. (2007). Review of *Diffusion of innovations* (5th ed.), by E. M. Rogers. *Journal of Minimally Invasive Gynecology, 14*, 776. https://doi.org/10.1016/j.jmig.2007.07.001