Farmers' Satisfaction with the Services of National Irrigation Administration: The Case of Irrigation Systems in Bulan, Sorsogon

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Abstract – The Philippine National Irrigation Administration (NIA) is mandated to help the agriculture sector both in the lowland and the upland farming communities in improving farmers' income through irrigation development. This descriptive research aimed at determining the extent of satisfaction of national irrigation systems farmer-beneficiaries in Bulan, Sorsogon. There were 45 respondents selected through stratified random sampling. The researchers used a survey-questionnaire that gave both quantitative and qualitative data. Findings revealed that the farmers were moderately satisfied with the services provided by National Irrigation Administration (NIA). Specifically, the younger farmers who are members of irrigators' association under San Ramon Irrigation System located in the upstream and have average seasonal yield of more than 75 sacks per hectare were more satisfied than the other beneficiaries of National Irrigation Administration. It is recommended for NIA to continue the construction of agricultural infrastructure projects, especially the concreting of irrigation canals in order to supply water to different areas, particularly to those in the downstream. Similarly, NIA should also take into consideration the experiences of older farmers in determining irrigation problems and designing solutions. NIA should likewise focus on giving technical assistance to those who have lesser yield, especially that their productivity is mostly affected by the amount of water supply. Moreover, the implementation of IMT must be revisited and be intensified with emphasis on educating the irrigators' associations about their roles and responsibilities as differentiated with the role of NIA.

Keywords – Farmers' Satisfaction, Irrigation System, NIA Services, Sorsogon

INTRODUCTION

The agricultural sector plays a crucial role in developing countries' economy as the main source of food, income and employment to rural areas. Agricultural improvements and productive land use are fundamental to achieving food security, poverty alleviation and overall sustainable development [1]. Bresciani and Valdes [2] highlighted the contribution of agricultural development to poverty reduction as a result of maintained food production. In their case study, they found that the effect of agriculture to poverty reduction was mainly facilitated in labor market channel.

Similarly, Diao [3] explained in his research that agriculture remained the most basic source of income, maintaining its significance in preventing increase of poverty rate through rural income growth. Moreover, The World Bank [4] reported that rural poverty decline is a product of three pathways which includes farming.

In order to maintain agricultural development, communities have to invest in agricultural infrastructure. Inadequate infrastructure can be a significant constraint to growth and productivity because infrastructures raise agricultural productivity which greatly contributes to rural growth, facilitates higher agricultural wages and creates opportunities for non-farm labor [5]. One of the most fundamental infrastructures needed to aid the continuity of agricultural security is the irrigation system. In the Philippines, for example, irrigation has benefited many farmers both in the targeted lowland farmers and the upland farming

communities [6]. In fact, higher technical efficiency in rice production and improved income distribution were recorded in the lowland farmers as a result of irrigation development.

The National Irrigation Administration is the agency tasked to manage the irrigation systems in the country in order to help the agriculture sector, as mandated by RA 3601 [7]. Specifically, NIA has the mandate to "investigate, study, improve, construct and administer all irrigation systems in the Philippines." In 2017, farmers have achieved victory in pushing for free irrigation services [8]. Particularly for those who are benefited by national irrigation systems, irrigation service fees have been removed.

Despite the effort of the government to ensure quality irrigation services, several problems are still met in terms of irrigation services [9], [6], [10]. The first step in addressing these problems is the determination of the status of irrigation services as perceived by its beneficiaries— the farmers.

It is in this premise that the Farmers' Satisfaction Survey (FSS) is conducted to determine the farmers' assessment on the services provided by NIA to the irrigation systems in the Municipality of Bulan. This first-class municipality is located at the southwestern tip of Luzon and is characterized by being coastal, agricultural and commercial. Being one of the largest contributors to the agricultural income of the Province of Sorsogon, Bulan has two national irrigation systems.

OBJECTIVES OF THE STUDY

This study generally aimed to determine the extent of satisfaction of national irrigation systems (NIS) farmer-beneficiaries on the services of National Irrigation Administration (NIA) in Bulan, Sorsogon. Specifically, it sought to: (1) determine the extent of satisfaction of farmers, (2) find out the extent of satisfaction of farmers when grouped according to their profile in terms of association, farm location, age, sex and yield; (3) test whether there is a significant difference on the extent of satisfaction of farmers when grouped according to their profile; and (4)

recommend intervention strategies needed to improve the services of NIA in the municipality.

MATERIALS AND METHODS

This descriptive research design employed the mixture of quantitative and qualitative method of analysis. The main instrument used was a survey-questionnaire composed of three parts: (1) the profile of the farmer-respondents, (2) the level of satisfaction of farmers on the services of NIA, and (3) comments and suggestions of the farmers on the services of NIA.

The respondents of this study were the randomly selected 45 farmer-beneficiaries of national irrigation systems (NIS) in the Municipality of Bulan, Sorsogon. There were five irrigators' association under the NIS, two in San Ramon NIS and three in San Francisco NIS. Stratified random sampling technique was employed to the targeted respondents allocating equally to the identified five Irrigators' Association (IA), namely SANDETARFAB, John Peter, Polot-Bulan, SOMASTRIA, and AQUILALA with nine farmer-respondents each. They were further divided into three strata; namely, upstream, midstream and downstream based on the location of their rice field with three famer respondents each stratum.

Face-to-face interview was employed to clarify their responses in the questionnaire. To facilitate validation of the written responses, field visits to the agricultural farm in the area was made.

The descriptive statistical tools used in this study were frequency count and weighted mean (WM). The scale below was used to determine the extent of satisfaction of farmer-beneficiaries based on weighted mean.

In order to determine whether there is a significant difference on the extent of farmer's satisfaction when grouped according to their profile, One-way Analysis of Variance (ANOVA) with 5% margin of error was employed. Comments and suggestions were analyzed to support the quantitative results of the study.

RESULTS AND DISCUSSION

Extent of Satisfaction of National Irrigation Systems (NIS) Farmer-Beneficiaries

Table 1 shows the extent of satisfaction of NIS farmer-beneficiaries on the services of National Irrigation Administration. The farmers are moderately satisfied in all the 10 identified NIA services. Among the ten identified services, farmers were found satisfied the most on the quality of construction/rehabilitation of irrigation facilities and structures with the weighted mean of 3.42, described as *moderately satisfied*. It was followed by the timeliness of delivery and distribution of irrigation water, and by awareness of the contents and implication of Irrigation Management Transfer (IMT) program with weighted means of 3.40 and 3.38 respectively. Last in rank was the action on requests on the rehabilitation/construction of irrigation systems/projects with weighted mean of 3.11 only.

This result was supported by the farmers' feedbacks which concentrated on the construction and repair of irrigation canals. Positive comments were provided by the farmers in terms of the quality of construction/rehabilitation of irrigation facilities and structures, they expressed their appreciation as *"mayad an patrabaho* [the projects are of good quality]" and *"diri tulos nararaot an mga patrabaho* [the projects last]" which justified the rank of the area in terms of satisfaction.

On the other hand, farmers' remarks regarding the action on requests for the rehabilitation/construction of irrigation systems/projects which got the lowest weighted mean centered on *"na-dedelay an pagpahingayad nan pagpasemento san mga kanal* [there is delay in the repair and construction of irrigation canals]". The insufficient NIA's manpower to monitor the distribution of irrigation water and insufficiency of water supply to farmlands especially during dry season was also identified as reasons for the delay of services. It was further revealed by the qualitative data that farmers were unable to differentiate the role of irrigators' associations and the role of NIA in maintaining irrigation systems. This was evident in their comments regarding the maintenance of cleanliness of irrigation canals. Through the field visit, it was validated that, indeed, most of the irrigation canals were poorly maintained which would limit the flow of water. However, under the Irrigation Management Transfer (IMT) Program, the maintenance of the cleanliness of irrigation canals is a responsibility of the irrigators' association; hence, the farmers themselves. This meant that farmers need to be oriented with their roles in the participatory management of irrigation canals.

The quantitative and qualitative data also revealed that farmers' satisfaction is multidimensional. This is in consonance with the study of Yakubo [11] which found that farmers base their satisfaction on irrigation services on several parameters such as fairness of the distribution, irrigation infrastructure, water supply during dry season, and sufficiency and competence of manpower of the agency that administer irrigation systems. Moreover, the study of Lauraya and Sala [12] explained that one of the most vital indicators of irrigators' performance and satisfaction is the organizational climate within the irrigators' association. Irrigation Management Transfer, therefore, is also an important aspect of irrigation service satisfaction.

Table 1. Extent of Satisfaction of National Irrigation Systems Farmer-Beneficiaries

NIA Services	Weighted Mean	Description	Rank
Compliance in the implementation of agreed cropping calendar	3.27	Moderately Satisfied	5.5
Timeliness of delivery and distribution of irrigation water	3.40	Moderately Satisfied	2
Equitability in the delivery and distribution of irrigation water	3.29	Moderately Satisfied	4

Action on requests for the rehabilitation/ construction of irrigation systems/projects	3.11	Moderately Satisfied	10
Quality of construction/rehabilitation of irrigation facilities and structures	3.42	Moderately Satisfied	1
Action on requests for technical advisory/support services	3.13	Moderately Satisfied	8.5
Quality of technical advisory/support services provided	3.27	Moderately Satisfied	5.5
Action on requests for trainings and other capacity building programs	3.13	Moderately Satisfied	8.5
Quality of trainings and other capacity building programs provided	3.24	Moderately Satisfied	7
Awareness of the contents and implications of IMT program	3.38	Moderately Satisfied	3
Average Weighted Mean	**3.26**	**Moderately Satisfied**	

Extent of Satisfaction of Farmers when Grouped according to their Profile

Table 2 presents the satisfaction of farmers on the services of NIA to national irrigation systems as they were grouped according to the irrigators' association they belong to. It was found that farmers who belong to John Peter IA, Inc. were the most satisfied with average weighted mean of 4.17 described as *satisfied*. SANDETARFAB IA, Inc. shared the same description with weighted mean of 3.87, making it second in rank. It was noted that John Peter IA and SANDETARFAB IA are beneficiaries of San Ramon irrigation system located at the eastern part of Bulan, Sorsogon.

On the other hand, farmers who are members of SOMASTRIA IA, Inc. and Polot-Bulan IA, Inc. were *moderately satisfied* represented by the weighted means 2.99 and 2.91, respectively. The

farmers under AQUILALA IA, Inc. had the least average weighted mean of 2.39 described as *less satisfied*. The mentioned irrigators' association of SOMASTRIA, Polot-Bulan IA and AQUILALA IA are under the San Francisco irrigation system located at the northern part of Bulan, Sorsogon.

Findings revealed that those irrigators' association that belong to San Ramon irrigation system were more satisfied than those that belong to San Francisco irrigation system. San Ramon irrigation system is more accessible and much smaller in area than in San Francisco. Because of the accessibility of San Ramon and much easier to manage than in San Francisco, monitoring and evaluation can be easily done and so the farmers can receive all the benefits and services provided by NIA.

Table 2. Extent of Satisfaction of Farmer-Beneficiaries per Irrigators' Association (IA)

NIA Services	SANDETARFAB IA, Inc. (n=9)		John Peter IA, Inc. (n=9)		Polot-Bulan IA, Inc. (n=9)		SOMASTRIA IA, Inc. (n=9)		AQUILALA IA, Inc. (n=9)	
	WM	D	WM	D	WM	D	WM	D	WM	D
Compliance in the implementation of agreed cropping calendar	4.11	S	4.22	S	3.11	MS	2.78	MS	2.11	LS
Timeliness of delivery and distribution of irrigation water	4.22	S	4.22	S	3.00	MS	3.33	MS	2.22	LS

Equitability in the delivery and distribution of irrigation water	3.67	S	4.22	S	3.00	MS	3.22	MS	2.33	LS
Action on requests for the rehabilitation/ construction of irrigation systems/projects	3.67	S	4.00	S	2.44	LS	3.11	MS	2.33	LS
Quality of construction/rehabilitation of irrigation facilities and structures	3.89	S	4.44	S	2.89	MS	3.22	MS	2.67	MS
Action on requests for technical advisory/support services	3.78	S	3.67	S	3.11	MS	3.00	MS	2.11	LS
Quality of technical advisory/support services provided	4.00	S	4.11	S	3.11	MS	2.78	MS	2.33	LS
Action on requests for trainings and other capacity building programs	3.67	S	4.11	S	2.33	MS	2.67	MS	2.89	MS
Quality of trainings and other capacity building programs provided	3.56	S	4.22	S	3.11	MS	2.78	MS	2.56	MS
Awareness of the contents and implications of IMT program	4.11	S	4.44	S	3.00	MS	3.00	MS	2.33	LS
Ave WM	**3.87**	**S**	**4.17**	**S**	**2.91**	**MS**	**2.99**	**MS**	**2.39**	**LS**
Rank	**2**		**1**		**4**		**3**		**5**	

Table 3 displays the extent of satisfaction of NIS farmer-beneficiaries on the services of NIA according to the location or stratum (upstream, midstream, or downstream). It can be noted that farmers in the upstream gave the highest average weighted mean of 3.43 described as *moderately satisfied*. It was followed by midstream with 3.26 average weighted mean and last in rank was downstream with 3.10 average weighted both described as *moderately satisfied*.

Table 3 further shows that the farmers, when grouped according to farm location, were moderately satisfied with the services provided by NIA.

Furthermore, those farmers in the upstream and midstream were satisfied with the timeliness of delivery and distribution of irrigation water than in the downstream. This connotes that those in the upstream could receive enough water supply which made them more satisfied than those in the downstream. If this would continue, farmers in the downstream would not benefit much in the irrigation system which might affect their rice production and efficiency. Thus, NIA should look into the best strategy on how they could provide an equal water distribution all throughout the farm locations.

Table 3. Extent of Satisfaction of National Irrigation Systems Farmer-Beneficiaries by Farm Location

NIA Services	Upstream (n=15)		Midstream (n=15)		Downstream (n=15)	
	WM	D	WM	D	WM	D
Compliance in the implementation of agreed cropping calendar	3.47	MS	3.20	MS	3.13	MS

Timeliness of delivery and distribution of irrigation water	3.67	S	3.60	S	3.00	MS
Equitability in the delivery and distribution of irrigation water	3.33	MS	3.33	MS	3.07	MS
Action on requests for the rehabilitation/ construction of irrigation systems/projects	3.07	MS	3.13	MS	3.13	MS
Quality of construction/rehabilitation of irrigation facilities and structures	3.20	MS	3.43	MS	3.07	MS
Action on requests for technical advisory/support services	3.47	MS	2.87	MS	3.31	MS
Quality of technical advisory/support services provided	3.20	MS	3.33	MS	3.33	MS
Action on requests for trainings and other capacity building programs	3.47	MS	3.13	MS	2.87	MS
Quality of trainings and other capacity building programs provided	3.60	S	3.27	MS	3.00	MS
Awareness of the contents and implications of IMT program	3.80	S	3.33	MS	3.13	MS
Ave. WM	**3.43**	**MS**	**3.26**	**MS**	**3.10**	**MS**
Rank	**1**		**2**		**3**	

Table 4 provides the extent of satisfaction of NIS farmer-beneficiaries on the services of NIA according to their age. Among the 8 age groups, farmers aged 42-48 gave the highest average weighted mean of 3.98 with equivalent description of *satisfied*. Age groups 35-41 and 49-55 shared the same description with average weighted means of 3.58 and 3.53 respectively. Last in rank was age group 84-90 with average weighted mean of 2.30 with equivalent description of *less satisfied*.

Data further shows that those younger farmers were more satisfied with the services provided by NIA than the older farmers. This could be supported by the result of satisfaction on the technical advisory/ support services and trainings and other capacity building programs provided by NIA where the younger farmers were more satisfied than the older ones. This could be attributed to the cultural practices of the older farmers where they had difficulty in adapting the new trends and modern approaches introduced by the agency. On the other hand, those young farmers have the capacity to adopt the new trends and modern way of irrigation system introduced by NIA.

Table 4. Extent of Satisfaction of National Irrigation Systems Farmer-Beneficiaries by Age Bracket

NIA Services	Age Bracket (years)															
	35-41 (n= 5)		42-48 (n = 9)		49-55 (n= 6)		56-62 (n= 7)		63-69 (n= 9)		70-76 (n= 5)		77-83 (n= 2)		84-90 (n= 2)	
	WM	D	WM	D	WM	D	WM	D	WM	D	WM	D	WM	D	WM	D
Ave. WM	**3.58**	**S**	**3.98**	**S**	**3.53**	**S**	**2.81**	**MS**	**3.18**	**MS**	**2.74**	**MS**	**2.95**	**MS**	**2.30**	**LS**
Rank	**2**		**1**		**3**		**6**		**4**		**7**		**5**		**8**	

Table 5 shows the extent of satisfaction of farmers on the services of National Irrigation Administration to the irrigation systems in the locality. It was displayed that both the female and male respondents expressed their similar evaluation as *moderately satisfied* represented by 3.38 and 3.25 means, respectively. It can be further viewed that female respondents were more satisfied in the quality of technical advisory/support services provided by NIA than their male counterpart. Male farmers were practitioners in the field than female farmers that made the male ones independently do the task or job in the farm even without the support services or technical assistance of NIA.

Table 5. Extent of Satisfaction of National Irrigation Systems Farmer-Beneficiaries by Sex

NIA Services	Male (n= 37)		Female (n = 8)	
	WM	D	WM	D
Compliance in the implementation of agreed cropping calendar	3.32	MS	3.00	MS
Timeliness of delivery and distribution of irrigation water	3.41	MS	3.50	S
Equitability in the delivery and distribution of irrigation water	3.30	MS	3.25	MS
Action on requests for the rehabilitation/ construction of irrigation systems/projects	3.03	MS	3.50	S
Quality of construction/rehabilitation of irrigation facilities and structures	3.41	MS	3.50	S
Action on requests for technical advisory/support services	3.00	MS	3.50	S
Quality of technical advisory/support services provided	3.19	MS	3.75	S
Action on requests for trainings and other capacity building programs	3.14	MS	3.25	MS
Quality of trainings and other capacity building programs provided	3.30	MS	3.25	MS
Awareness of the contents and implications of IMT program	3.46	MS	3.25	MS
Ave. WM	3.25	MS	3.38	MS
Rank	2		1	

Table 6 shows the level of satisfaction of farmers on the services of NIA to irrigation systems association farmers when grouped according to their average seasonal yield in terms of number of sacks (or 50 kgs) per hectare. It was displayed that those who reaped 76-100 sacks per hectare were the most satisfied with average weighted mean of 3.35 described as *moderately satisfied*. They were followed by farmers with average seasonal yield of 101 sacks and above with 3.22 average weighted mean which was also described as *moderately satisfied*. The same description was revealed for farmers who reaped 75 sacks and below per hectare with average weighted mean of 3.03 which was the lowest among the three.

Data further show that farmers had the same level of extent of satisfaction. However, it could be inferred that those with yield of at least 76 sacks per hectare were more satisfied than those with lower yield. This could be attributed to the timeliness of delivery and distribution of irrigation water where those with higher yield could receive better services in terms of water distribution. Another attribution that could be inferred is the quality of construction and rehabilitation of irrigation facilities and structures. This means that the yield of the farmers is affected by the quality of irrigation services which also corresponds to the farmers' satisfaction. It is notable that those with yield of at least 76 sacks per hectare were more satisfied with the implementation of IMT program. This

connotes that those with higher yield received and experienced good services from their irrigators' associations.

Table 6. Extent of Satisfaction of National Irrigation Systems Farmer-Beneficiaries Grouped by Yield

| NIA Services | Yield (Number of 50-kg sacks per hectare) | | | | | |
| | 75 and below (n=8) | | 76-100 (n=24) | | 101 and above (n=13) | |
	WM	D	WM	D	WM	D
Compliance in the implementation of agreed cropping calendar	3.38	MS	3.21	MS	2.89	MS
Timeliness of delivery and distribution of irrigation water	3.13	MS	3.42	MS	3.62	S
Equitability in the delivery and distribution of irrigation water	3.50	S	3.25	MS	3.23	MS
Action on requests for the rehabilitation/ construction of irrigation systems/projects	3.13	MS	3.17	MS	3.00	MS
Quality of construction/rehabilitation of irrigation facilities and structures	3.25	MS	3.58	S	3.23	MS
Action on requests for technical advisory/support services	2.88	MS	3.21	MS	3.00	MS
Quality of technical advisory/support services provided	2.75	MS	3.50	S	3.23	MS
Action on requests for trainings and other capacity building programs	2.88	MS	3.38	MS	2.92	MS
Quality of trainings and other capacity building programs provided	2.88	MS	3.42	MS	3.31	MS
Awareness of the contents and implications of IMT program	2.88	MS	3.42	MS	3.77	S
Ave. WM	**3.06**	**MS**	**3.35**	**MS**	**3.22**	**MS**
Rank	**3**		**1**		**2**	

Difference on the Extent of Satisfaction of Farmers When Grouped by Profile

Table 7 presents the result of the Analysis of Variance (ANOVA) employed on the data in order to find out whether there is a significant difference among the levels of farmer's satisfaction when grouped according to their profile using 0.05 level of significance.

It is revealed that there is a significant difference among the levels of farmers' satisfaction when they were grouped according to association, farm location, age and yield which implies that these profiles had influence to the results of the survey.

In terms of association, John Peter IA and SANDETARFAB IA were found to be the most

satisfied. This result was reinforced by the qualitative data. Farmers in John Peter IA, Inc. and SANDETARFAB IA, Inc. generally commended the services, especially in terms of compliance to cropping calendar, and timeliness and adequacy of irrigation water distribution: *"nasusunod an cropping calendar* [the cropping calendar is followed]" and *"nakaabot sa amo an tubi sa tama na oras nan panahon* [we receive irrigation water on time]." On the other hand, the remarks of famers in AQUILALA IA, Inc. were influenced by their distance from the irrigation dam located at Bgy. San Francisco: *"diri nakaabot an tubi* unless *mag-uran* [we cannot receive water anymore unless there is rain] and *"pirmi nauuna an sa San Francisco kaya diri*

nakaabot sa amo an tubi [farmers in Bgy. San Francisco are always the first to receive irrigation water making it difficult to reach our farm].” In addition, because of the insufficiency of water supply, most of the respondents revealed that they are already using water pump: *“nauurhi kami kadalasan kaya nagpabugsok ako waterpump* [we are usually the last to receive irrigation water so I installed water pump in my field].”

In terms of farm location, the extent of satisfaction of those in the upstream, which was recorded the highest, was understandable because of their location from the source of irrigation water. They were the first batch to receive water supply making their satisfaction higher than the other two. On the other hand, those in the downstream were the last to receive irrigation water; hence, the least extent of satisfaction: *“minsan na-dedelay kasi nasa ibaba ang sakahan namin* [the distribution of irrigation water is delayed at time because we are in the downstream]”. Based on the farmers’ remarks, the insufficient supply of water that reaches farmlands in the downstream leads to disorganization among the farmers: *“nag-aaragawan san tubi kay kulang* [farmers are competing for water supply]”; *“naghihiriran na an mga parauma kay kulang an tubi* [clash among farmers arise because the water supply is insufficient].”

Table 7. Test of Difference on the Extent of Satisfaction of Farmer-Beneficiaries
When Grouped According to their Profile

Profile	F_{comp}	F_{crit}	p-value	Decision on Ho	Interpretation
Association	89.17	2.58	0.00	Reject	significant
Farm Location	6.45	3.35	0.01	Reject	significant
Age	10.72	2.14	0.00	Reject	significant
Sex	2.07	4.07	0.17	Accept	not significant
Yield	4.67	3.32	0.02	Reject	significant

In terms of age, the qualitative data revealed that younger farmers were most satisfied because they were more familiar with the status of farmlands as a result of them being more active in farming compared to older ones. On the other hand, older farmers tended to compare present situation with those they experienced before: *“san sadto matubion pa, niyan halos wara na* [there was enough water supply before, but today, there is almost none].” This made them less satisfied compared to the younger farmers.

In terms of yield, it was revealed that those who reaped the lowest number of sacks per hectare were the least satisfied. They were the ones who receive the least water supply which often results to minimal average yield. Since water is one of the most fundamental needs in rice farming, they were extremely affected by lack of water supply. On the other hand, farmers who reaped more than 75 sacks per hectare were more satisfied because the irrigation services greatly contribute to their seasonal yield.

On the other hand, it was found that the level of satisfaction had no significant difference when the farmers were grouped according to sex. This was the interpretation because the decision was to accept the null hypothesis as a result of p-value of 0.17 which was greater than the alpha value of 0.05

CONCLUSIONS AND RECOMMENDATIONS

The farmer-beneficiaries were moderately satisfied with the services provided by the National irrigation administration (NIA) in Bulan, Sorsogon. Specifically, the younger farmers who are members of irrigators’ association under San Ramon Irrigation System located in the upstream and have average seasonal yield of more than 75 sacks per hectare were more satisfied than the other beneficiaries in the irrigation system. There is no significant difference in the farmers’ satisfaction when grouped according to sex.

It is recommended for NIA to continue the construction of agricultural infrastructure projects, especially the concreting of irrigation canals in order to supply water to different areas, particularly to those in the downstream. Similarly, NIA should also take into consideration the experiences of older farmers in determining irrigation problems and designing solutions for such. Moreover, the implementation of IMT must be revisited and be intensified with emphasis on educating the irrigators' associations about their roles and responsibilities as differentiated with the role of NIA. The agency should also focus on giving technical assistance to those who have lesser yield, especially that their productivity is mostly affected by the amount of water supply. Lastly, in order to effectively monitor the implementation of its services, more personnel with appropriate knowledge and competence must be added in the Office of National Irrigation Administration in Bulan, Sorsogon.

REFERENCES

[1] Khanna, N., & Solanki, P. (2014, February). *Agrotechnology.* Retrieved from omicsonline.org: https://www.omicsonline.org/proceedings/role-of-agriculture-in-the-global-economy-15678.html

[2] Bresciani, F., & Valdes, A. (2007). *Beyond Food Production: The Role of Agriculture in Poverty Reduction.* United Kingdom: Food and Agriculture Organization of the United Nations; Edward Elgar Publishing, Inc.

[3] Diao, X. (2010, November). Economic Importance of Agriculture for Sustainable Development and Poverty Reduction: Findings from a Case Study in Ghana. Paris, France.

[4] (2008). *World Development Report.* Washington, DC: The World Bank.

[5] Llanto, G. M. (2012, April). The Impact of Infrastructure on Agricultural Productivity. Makati City, The Philippines.

[6] Yao, R. T. (2005, August). Impacts of Irrigation Development on Agricultural Productivity, Resource Allocation and Income Distribution: A Longitudinal Analysis from Palawan, The Philippines. Lafayette, Indiana, United States of America.

[7] (2018). Retrieved from lawphil.net: www.lawphil.net/statutes/repacts/ra1963/ra_3601_1963.html

[8] Domingo, R. W. (2017). Retrieved from inquirer.net: business.inquirer.net/216151/free-irrigation-among-duterts-top-achievement-in-first-100-days/amp

[9] Bhuiyan, S. I. (2013). Technical Farm-Level Issues in Irrigation for Rice-based Farming Systems: An Intercountry Synthesis. Los Baños, Laguna, The Philippines.

[10] Habito, C. F., & Briones, R. M. (2005). Philippine Agriculture over the Years: Performance, Policies and Pitfalls. Philippines.

[11] Yakubov, M. (2011). Assessing Irrigation Performance from the Farmers' Perspective: A Qualitative Study. Tashkent, Uzbekistan.

[12] Lauraya, F. M., & Sala, A. L. (1995). *Performance Determinants of Irrigators' Association in National Irrigation Systems in Bicol, the Philippines: An Analysis.* Colombo: International Irrigation Management Institute.