Farmers' Perceptions on Agricultural Technical Service and Its Determinants in Colombia : A Case Study of Fedearroz Service in Ibague Province

Alwarritzi, Widya
Laboratory of Agricultural and Farm Management, Division of International Agricultural Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University | Graduate School of Bioresource and Bioenvironmental Sciences

Nanseki, Teruaki
Laboratory of Agricultural and Farm Management, Division of International Agricultural Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University : Professor

Chomei, Yosuke
Laboratory of Agricultural and Farm Management, Division of International Agricultural Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University : Assistant Professor

Blanco Ea, Ximena
Laboratory of Agricultural and Farm Management, Division of International Agricultural Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University | Fedearroz-National Federation Rice, Colombia

他

https://doi.org/10.5109/1801789

出版情報：九州大学大学院農学研究院紀要. 62 (1), pp.237-244, 2017-02-24. Faculty of Agriculture, Kyushu University
バージョン：
権利関係：

J. Fac. Agr., Kyushu Univ., **62** (1), 237–244 (2017)

Farmers' Perceptions on Agricultural Technical Service and Its Determinants in Colombia : A Case Study of Fedearroz Service in Ibague Province

Widya ALWARRITZI[1], Teruaki NANSEKI*, Yosuke CHOMEI, Ximena BLANCO EA[2], Winston MARTE[3] and Rada KHOY[1]

Laboratory of Agricultural and Farm Management, Division of International Agricultural Resource Economics, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University, Fukuoka 812–8581, Japan

(*Received October 17, 2016 and accepted November 4, 2016*)

Colombian agricultural industry which contributes to the current country's GDP is expected to take benefit from the Trade Promotion Agreement (TPA) that will eliminate tariffs and other barriers to trade in goods and services between The United States and Colombia. Furthermore, a synergy needs to be built by the Colombian government and agricultural sector to protect the interest of Colombian farmers from the negative impact of the TPA. In relation to it, this study tries to fill the gap by evaluating the farmers' perception on the effectiveness of Fedearroz, one of the agro–chains of the Ministry of Agriculture that act as representative of producers aimed at defending and representing rice farmers nationwide. The farmers' perception on quality of service was assessed by Likert scale to derive reliable insight into a phenomenon in certain situation. The analysis result shows that farmers perceived the input price, variety development, rice price behavior and credit requirement as the most satisfying services among those provided by Fedearroz. In addition, determinant factors influencing farmers' perception on Fedearroz's services is evaluated using probit model. The empirical result mainly revealed several factors that tend to increase the probability of satisfaction to Fedearroz service, which mainly includes farmers' productive age, role of technical assistant to choose fertilizer and soil analysis for fertilization parameter.

Key words: Farmers, Fedearroz, Perception, Rice, Colombia

INTRODUCTION

The United States–Colombia Trade Promotion Agreement (TPA) is a bilateral free trade agreement between the United States and Colombia. Sometimes called the Colombia Free Trade Agreement, it was signed on November 22, 2006. TPA is a comprehensive agreement that will eliminate tariffs and other barriers to trade in goods and services between the United States and Colombia.

In 2009, the earnings of the rice industry were 1.87% of GDP. In producing municipalities, rice accounts for 60% of GDP, 48% of employment, and 80% of people's income (https://ricepedia.org/colombia), highly organized by FEDEARROZ (National Federation of Rice), one of the agro–chains of the Ministry of Agriculture. Fedearroz act as representative of producers aimed at defending and representing rice farmers nationwide; promotes technological development, seeking economic efficiency and increased competitiveness.

Fedearroz has four main services such as comercial service, technical support, economics research, and credit supply. Commercial service provide farmers with supplies like seeds, fertilizers, insecticides, and equipment required to assist in better farming. The quality of services can be known by judging farmer's perception on quality, availability and prices. Technical support range from education function in the form of training to utilize resources wisely, selecting the seed variety, as well as in the form of research function. Those services provide linkage between farmers and researchers and ensure that research findings are culturally compatible, technologically feasible, and economically profitable. Economics Research is related to the ICT (information and communication technology) development for farmers that provides analysis result of price behavior of rice and guidance to apply SACFA (Computerized Management System Farms Arroceras). Thus, it is expected to enhance farmers with knowledge on best season to sell price and manage their farm effectively. To ensure farmers to run their farm sustainably by providing several financing scheme that are easily accessed, managed and processed, Fedearroz provide credit supply with specific financing term.

However, there are lack of supporting study that clarify the farmers' evaluation on Fedearroz service. As stated by Alonge and Martin (1995), farmers' perception on extension service emerged as the best predictor of adoption agricultural technology and improved farming productivity. Hence, the current study aimed (1) to analyze farmers' perception on the quality of technical service provided by Fedearroz and (2) to examine determinant factors influencing farmers' overall perception on Fedearroz's services.

[1] Graduate School of Bioresource and Bioenvironmental Sciences
[2] Fedearroz–National Federation Rice, Colombia
[3] Dominican Republic Ministry of Agriculture
* Corresponding author (E–mail: nanseki@agr.kyushu-u.ac.jp)

MATERIAL AND METHOD

Sample and study site

The data used in this study were obtained from 105 rice farmers belonging to Fedearroz's member in Ibague, Colombia, but only 70 samples were used in the analysis. The survey used structured questionnaire to 105 local farmers by face–to–face interview in 2015. The respondents were asked about four main topics of Fedearroz including commercial services, technical supports, economic research and credit supplies service. The quality of service provided by Fedearroz was assessed by Likert scale of measurement, ranging from 1 (bad) to 5 (excellent). As pointed out by Gay (1987), descriptive research is very important for deriving reliable insight into a phenomenon in certain situation. Therefore, descriptive analysis is employed to assess farmers' perception on the quality of service provided by Fedearroz. For further analysis, the respondents' perceptions were prioritized according to the mean and CV's (coefficient of variation) with lower variation of perceptions placed on a higher rank. In order to examine the determinant factors of farmers' perception on Fedearroz's services, probit model was applied in this study. For further analysis, we aggregated overall farmers' satisfaction as dependent variable in the model.

Probit estimation

Determinant of farmers' satisfaction on Fedearroz services presented in dichotomous dependent variables. Assuming the Y dependent variables is average farmers' response of their satisfaction aggregated from: good, very good, and excellent. In probit model, the farmers' satisfaction, notated as *P(ST)*, given the socio–economics factors and farming characteristic (Z) can be expressed as follows.

$$\boldsymbol{P}(\boldsymbol{ST}=\mathbf{1}|\mathbf{Z})=\int_{-\infty}^{\mathbf{Z}'\beta}\phi(t)dt = \Phi(\mathbf{Z}'\boldsymbol{\beta})$$

with the marginal effect for the normal distribution.

$$\partial P/\partial Z= \phi(\mathbf{Z}'\boldsymbol{\beta})\ \boldsymbol{\beta}$$

Where $\phi(t)$ is the standard normal density.
In addition, the goodness–of–fit measure for linear probability model can be reported as the percent correctly predicted. Referring to Wooldridge (2013) for each i, the predicted probability can be computed as ST_i = 1, given the variables, Z_i. If $[(\Phi(\hat{\beta}_0+\hat{\beta}_1 Z_i)>\mathbf{0.5}]$, ST_i is predicted to be unity; if $[(\Phi(\hat{\beta}_0+\hat{\beta}_1 Z_i)\leq\mathbf{0.5}]$, ST_i is predicted to be zero. The percentage of times the predicted ST_i matches the actual ST_i is the percent correctly predicted.

EMPIRICAL RESULT

Descriptive analysis of farmers' perception on Fedearroz

Commercial services include services that provide farmers with materials like seeds, fertilizers, insecticides, and equipment required to assist in better farming. The farmer's perception can be known by judging three factors, namely; quality, availability and prices. Figure 1, 2 and 3 show the farmer's perception regarding the quality, availability and price of seeds provided by the association respectively, taking into account that more than half respondent found the all commercial service indicators as good. This is due to the quality of seeds provided by Fedearroz that always meet the standard based on research and development result in regards to each farm condition. However, It was found that the service quality should be increased through better logistic and product delivery to maintain product's availability according to seasonal demand, as there are 4% of respondent giving bad comment and 27% giving regular comment regarding the availability of seeds.

In addition, input quality will have large contribution to farmer's productivity. The perception of Fedearroz

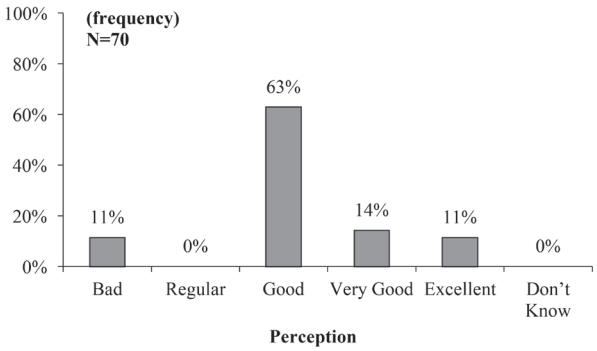

Fig. 1. Farmers' perception on seed quality.

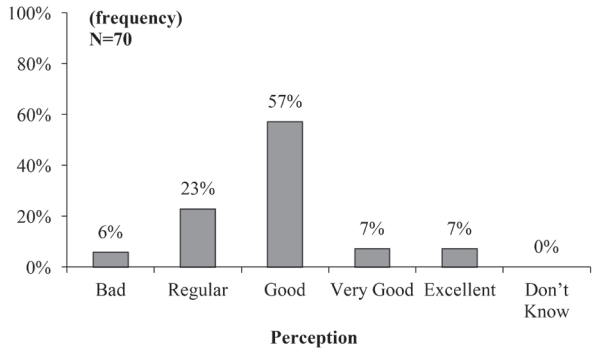

Fig. 2. Farmers' perception on seed vailability.

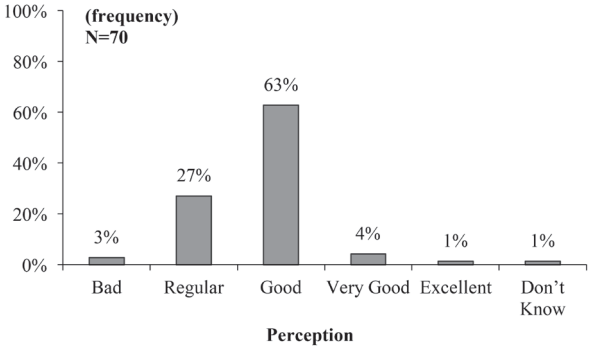

Fig. 3. Farmers' perception on seed price.

input quality, availability and price perceived by farmers are shown in Figure 4, Figure 5 and Figure 6. Similar to the previous discussion, input quality and availability is regarded as good by more than 70% of respondent, with more than 80% of respondents were satisfied with input quality, availability and price provided by Fedearroz.

The scope of technical services involves the extension of knowledge, skills and experiences from where they originate to where they are eventually accepted and widely practiced. The roles of technical support given by Fedearroz ranging from education function in the form of training to utilize resources wisely, training for decision making, as well as in the form of research topics function. Figure 7 shows the perception of farmers regarding the research topics disseminated by the association. This chart shows that the qualification of the farmer in terms of knowledge about the research topics is good at 61%. This result implies that massive dissemination of research topics should be made, so that those farmers who have known the topics could transcend to the others that are unaware of these issues.

In similar fashion, Figure 8 shows that annual training sessions and database update of customers or AMTEC program perceived as good by more than 60% of respondents. However, there 24% of farmers do not know about this quality because of both program are not widely applied to all farmers in the study site. Since the most of respondents qualifies technical services as good, we conclude that Fedearroz has superiority in terms of research and development of rice farming in Ibague.

Figure 9 and 10 indicates that 59% and 77% of the farmers have good experience with training session and technology transfer given by Fedearroz. Based on field observation, farmers in the study area prefer field study

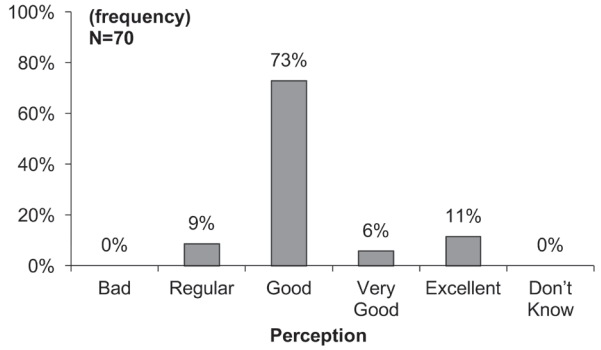

Fig. 4. Farmers' perception on input quality.

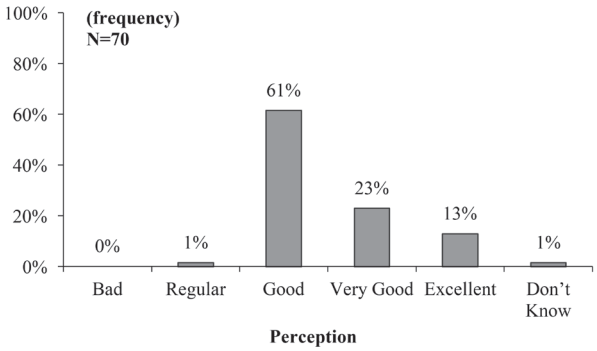

Fig. 7. Farmers' perception on research topics.

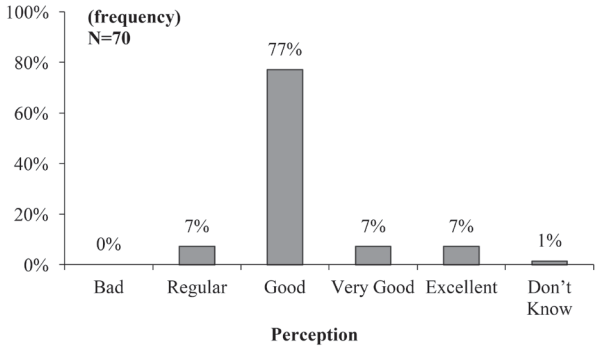

Fig. 5. Farmers' perception on input availability.

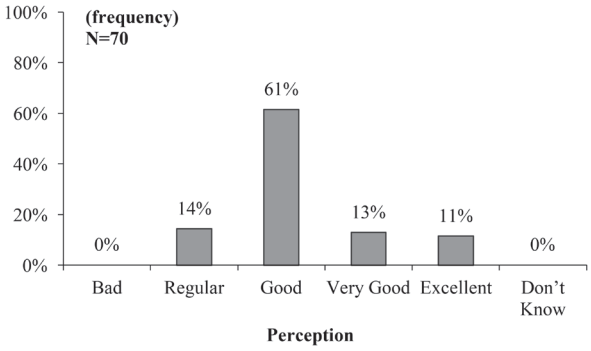

Fig. 8. Farmers' perception on training.

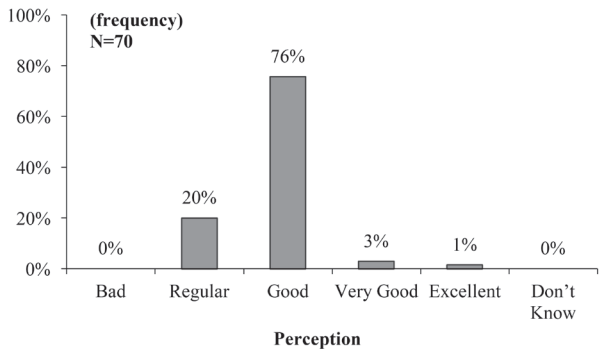

Fig. 6. Farmers' perception on input price.

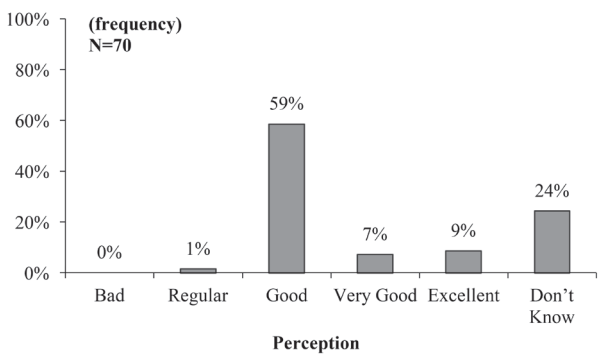

Fig. 9. Farmers' perception on AMTEC program.

at least once in a month as the alternative way to transfer farming knowledge. It is important to Fedearroz to provide tools that help to disseminate information is needed in order to increase the coverage of the project.

Figure 11 shows that more than 50% of producers are satisfied with the development of varieties of Fedearroz, since they have clear knowledge of the demanding process that involves obtaining a certified variety. Interestingly, 53% of farmers do not know about the work of Fedearroz related to technical advice, as can be seen from Figure 12, since this service is provided through the special programs (Refer to Figure 9). However, all the farmers who know about this service are satisfied with it.

In economics research services, farmers are qualifying the behavior of rice prices. In this case, Fedearroz help farmers to mitigate the behavior of the price by a bi–monthly report on the behavior of rice prices that had always been published for farmers. However, farmer's perception on this service was decent, with majority of the respondent perceived it as a regular (Figure 13). In contrast, Figure 14 result showed that 53% of the producers has no knowledge about the program of evaluation costs SACFA designed by Fedearroz due to the coverage of the services is not fully cover all region. However, 39% of farmers that knew and used the program are satisfied. The discrepancy of result showed in Figure 14 implies that there is a dissemination problem currently occurs.

Highlight on dissemination problem also can be seen in credit supply evaluation. Figure 15 and 16 shows that around 50% of producers know about Fedearroz's credit supply. Result also indicated that more than 30% of respondents do not know about this financial service,

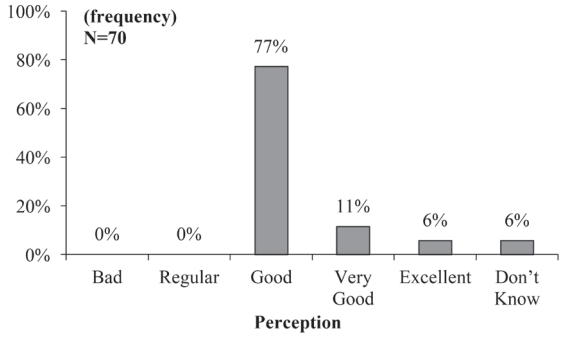

Fig. 10. Farmers' perception on technology transfer.

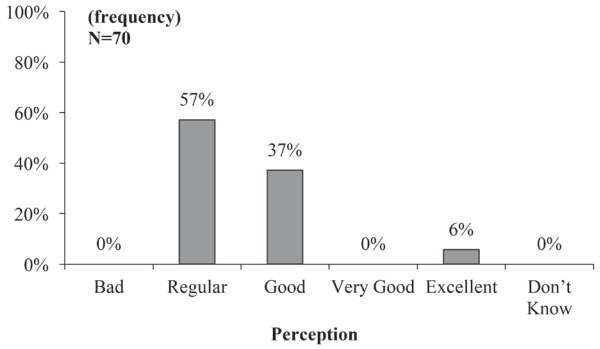

Fig. 13. Farmers' perception on rice price behavior.

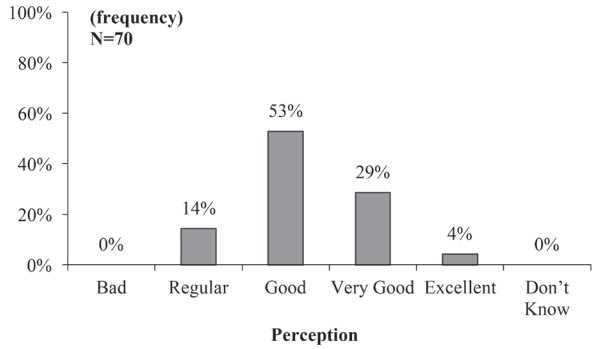

Fig. 11. Farmers' perception on variety development.

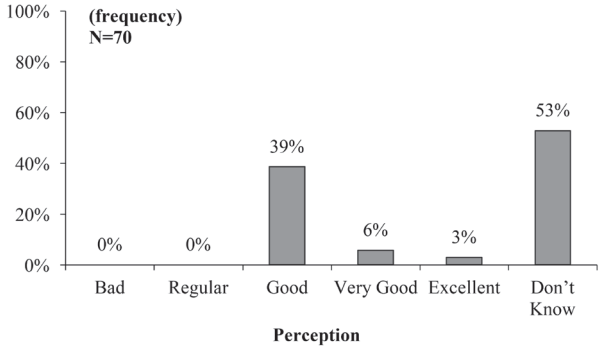

Fig. 14. Farmers' perception on management software of rice (SACFA).

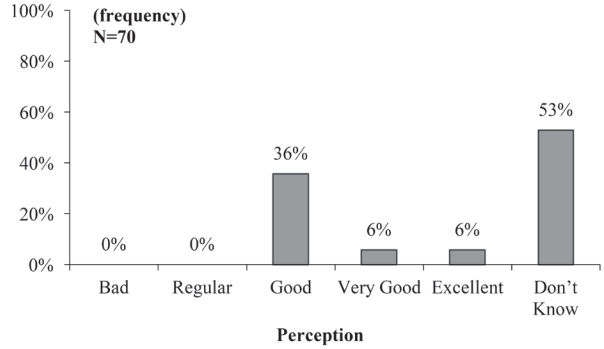

Fig. 12. Farmers' perception on technical support.

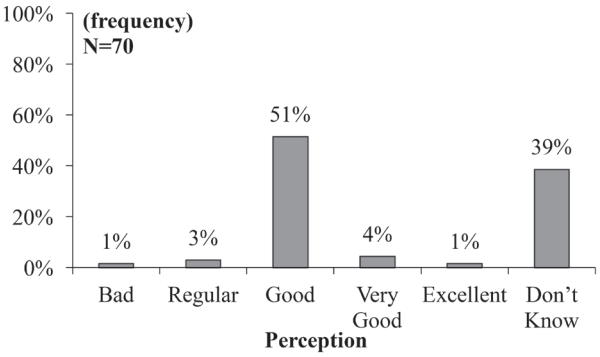

Fig. 15. Farmers' perception on credit requirement.

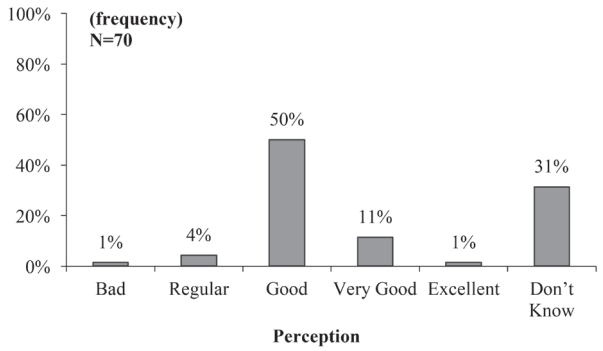

Fig. 16. Farmers' perception on financing and terms.

but they will evaluate as good if they knew it.

Farmers' perception on the quality of Fedearroz

We focus on the mean and CV of each Fedearroz service to explain farmers' perception. Smaller CV implies lower variation of perception, placed in the higher rank. In previous studies, Buadi *et al.* (2013) and Elias *et al.* (2015) have applied this method to examine the level of farmers' satisfaction with the agricultural services. The result shows that farmers perceived input price, input quality and input availability provided by Fedearroz as highest–level quality among the commercial services. This finding is simillar to Nabare (2007), where farmers perceived the importance of technical service providing farm input because its relation to the fund (credit) to maintain their farm.

Based on the mean score and CV's, variety development, research topics and training are considered as highest quality among technical assistant service by Fedearroz. This finding is in line with farmers concerning climate uncertainty and water availability; i.e new seed variety is needed. Fedearroz has superiority in term of rice price behavior information to farmers in Ibague. It is implied with the rank of the rice price behavior which higher than SACFA management software. This is probably due to farmers still experience selling rice product through local paddy mills, inevitably resulted in longer supply chain and potentially reduced value added of their product. Farmers may tend to sell their product when they understand the best selling periods which in line with Buadi *et al.* (2013).

Since Fedearroz provides credit with accessible requirement, most of the farmers perceived its services as good. According to Iheduru (2002), accessible requirement i.e timelines of credit disbursement is very

Table 1. Mean and CV's of services quality provided by Fedearroz

Variable	*N*	Mean	Std. Dev.	CV
Comercial Service				
Seed quality	70	3.143	1.026	0.326
Seed availability	70	2.871	0.9	0.313
Input quality	69	3.157	0.845	0.268
Input availability	69	3.1	0.745	0.24
Seed price	69	2.7	0.729	0.27
Input price	70	2.857	0.519	0.182
Overall mean		2.971		
Technical Assistant				
Research topics	69	3.429	0.844	0.246
Training	70	3.214	0.832	0.259
Amtec program	53	2.500	1.549	0.619
Technology transfer	66	3.057	0.931	0.304
Variety development	70	3.229	0.745	0.231
Technical support	33	1.586	1.757	1.108
Overall mean		2.84		
Economic Research				
Rice price behavior	70	2.543	0.774	0.305
SACFA management software	69	1.529	1.674	1.095
Overall mean		2.036		
Credit Supply				
Credit requirement	45	1.857	1.544	0.832
Financing and terms	50	2.129	1.541	0.724
Overall mean		1.993		

Note: Likert–scale used for this assesment is as follows: (1) bad, (2) regular, (3) good, (4) very good, (5) excellent

important when credit is used for the seasonal activity such as agriculture. However, more than 30% of the farmers in this study area still don't know about credit service provided by Fedearroz.

Probit estimation result

The aggregated perception revealed that 83% farmers were satisfied with overall agricultural technical services provided by Fedearroz. Based on the chi–square test for goodness–of–fit, the model justify that relationship between variables are significant; Likelihood ratio is 129.96 and significant at 1%.

Previously, Socio economics background of farmers was found become important factor that affect expectation of farmers on agricultural extension services (Ganpat *et al*., 2014). Table 3 shows that Farmers age, decision to choose fertilizer, fertilization parameter, preference on technology are significant determinants of farmers' on satisfaction to overall service quality. The effect of farmer's age is positively significant at 5%, implying that the probability of productive farmers being satisfied with Fedearroz service is 0.26 higher than non–productive farmer.

Farmers who choose fertilizer based on technical assistant advice from are likely to increase the odd of being satisfied with Fedearroz service by 0.37 (5% significant), compared to farmers with other decision. This is probably due to Fedearroz has advantages in terms of research and development to affect the provision of inputs on each plot in accordance with the condition.

The likelihood of being satisfied (0.26) with Fedearroz services also can be found if farmers that conducted soil analysis as parameter to fertilizer application. By Fedearroz assistance, farmers were able to estimate appropriate amount of fertilizer that should be applied in their plot. Ghamire and Martin (2011) noted agricultural extension staff had given important role to help delivering of the development process. Furthermore, they emphasized the need for the development of the soft skills of staff to properly deliver technologies to the farmers.

Moreover, agronomic management technology such

Table 2. Statistics of variable used in probit model

Variable	Unit	Mean	Std. Dev.	Min.	Max.
Average farmers' satisfaction (Y)	Dummy	0.829	0.38	0	1
Satisfied response = 1; Otherwise = 0					
Education	Dummy	0.771	0.423	0	1
Graduated from secondary school or more= 1; Otherwise = 0					
Age	Dummy	0.857	0.352	0	1
Productive age = 1; Otherwise = 0					
Landsize	Dummy	0.557	0.5	0	1
Production land ≥ 100 Ha; Otherwise = 0					
Distance to Fedearroz office	Dummy	0.357	0.483	0	1
0–50 km = 1; Otherwise = 0					
Importance of weed control	Dummy	0.929	0.259	0	1
Important = 1; Otherwise = 0					
Decision to apply phytosanitary	Dummy	0.8	0.403	0	1
Technical assistant = 1; Otherwise = 0					
Decision to choose fertilizer	Dummy	0.914	0.282	0	1
Technical assistant = 1; Otherwise = 0					
Phytosanitary control application	Dummy	0.30	0.462	0	1
Applied = 1; Otherwise = 0					
Soil test analysis	Dummy	0.771	0.423	0	1
Applied = 1; Otherwise = 0					
Fertilization parameter	Dummy	0.6	0.493	0	1
Soil test = 1; Otherwise = 0					
Preference on technologies of agronomic management	Dummy	0.486	0.504	0	1
Hybrid variety = 1; Otherwise = 0					
Preference on technologies of administrative management	Dummy	0.329	0.473	0	1
Farm planning = 1; Otherwise = 0					
Preference to sell rice product	Dummy	0.514	0.503	0	1
Supermarket = 1; Otherwise = 0					

Note : Number of observation is 70

Table 3. Determinant factor associated with farmers' satisfaction on Fedearroz

Variables	Parameter estimate	Coef.	Std.	z	P>z
Education	0.163	1.170	0.923	1.270	0.205
Age	0.261	1.876 **	0.795	2.360	0.018
Land size	0.068	0.490	0.674	0.730	0.468
Distance to Fedearroz	–0.147	–1.055	0.853	–1.240	0.216
Importance of weed control	–0.011	–0.079	1.090	–0.070	0.943
Decision to apply phytosanitary	–0.129	0.930	0.729	–1.280	0.202
Decision to choose fertilizer	0.377	2.711 **	1.263	2.150	0.032
Phytosanitary control application	–0.129	0.930	0.729	–1.280	0.202
Soil test analysis	–0.098	–0.703	0.997	–0.710	0.481
Fertilization parameter	0.260	1.872 **	0.805	2.330	0.020
Preference on technologies of agronomic management	0.212	1.524 **	0.757	2.010	0.044
Preference on technologies of administrative management	0.151	1.084	0.864	1.260	0.209
Preference to sell rice product	0.228	1.644 *	0.994	1.650	0.098
Constant		–0.070	1.486	–0.005	0.963
Pseudo R^2 = 0.4671					
Likelihood ratio = 129.96***					

Note: No. of observation is 70; *,**, *** are significant at 10%, 5%, and 1%, respectively

as hybrid variety is widely preferred by farmers in Ibague in order to overcome water and weather uncertainty. This new technology preference results in satisfaction probability by 0.21. This study implies that farmer with supermarket as marketing preference are more likely (0.23) to satisfy with Fedearroz. Vast majority of farmers, however, sell their product to local and large mill, which provide less benefit to farmers. In order to improve marketing channel in Colombia, Fedearroz will establish technology and management system that support farmers in order to be able to sell their rice products directly costumer.

CONCLUSION AND RECOMMENDATION

This study determines the level of farmers' perception with the quality of agricultural extension service and identifies determinant factors for its service. The empirical results revealed that farmers perceived the input price, variety development, rice price behavior and credit requirement as the most satisfying services among those provided by Fedearroz. As the perceived input price is the highest for satisfaction, Fedearroz needs to focus on input quality with specific needs of farmers. Other important service should be developed such as variety of rice in order to help farmer from weather uncertainty (climate change issue). Besides, Credit supply is one of the weak point of the Fedearroz services, even though it has accessible requirement and financing term. However, information related to credit supply should be better disseminated in the future.

Result shows that 83% of respondents were satisfied with overall agricultural technical services provided by Fedearroz. Still, there are several services that should be evaluated to increase satisfaction especially in terms of dissemination of information related to the economic research and credit supply. The empirical results revealed that farmers productive age, role of technical assistant to choose fertilizer, soil analysis for fertilization parameter, hybrid variety and marketing preference increase the probability of farmers' overall satisfaction. As technology preferences are the most important driving factor for satisfaction, Fedearroz should focus on improving technical staff skill in providing its service, i.e. the knowledge transfer method and frequency of training or visitation.

ACKNOLEDGEMENT

This research is supported by JST (Japan Science and Technology Agency), SATREPS Project. The authors would like to thank Dr. Dongpo LI, Kyushu University, for his kind support in preparing this paper.

REFERENCES

Alonge, A.J., Martin, R.A., 1995, Assesment of the Adoption of Sustainable Agriculture Practice: Implication for Agricultural Education, *Journal of Agricultural Education*, **3**(3): 34–42

Buadi, D.K., 2013, Farmers' Perceptions of the Quality of Extension Service Provided by NGO in Two Municipalities in the Central Region of Ghana, *Agricultural Systems*, **120**: 20–26

Ghamire, N., Martin, R., 2011, A project C development model: Implications for extension education, Journal of International Agricultural and Extension Education, **8**(2): 5–17

Ganpat, W.G., Webster, N., Narine, L.K., 2014, Farmers' Satisfaction with Extension Services in the Organization of Eastern Caribbean, *Journal of International Agricultural and Extension Education*, **21**(3): 49–62

Gay, L.R., 1987, *Competencies for Analysis and Application*.

Education Research, Merrill Publishing Company, London
Ricepedia, 2009, *The Online Authority on Rice*, http://ricepedia.org/Colombia, accessed on 20 September 2016
Iheduru, N.G, 2002 *Women Entrepreneurship and Development*, The Gender of Micro–finance in Nigeria, Presented at 8th Interdisciplinary Congress on Women, Makerere University, Kampala, Uganda
Nabare, D., 2007 *The Perceived Impact of LACOSREP Micro Credit Scheme on Women Farmers` Livelihood in The Upper East Region of Ghana*, M.Phil Thesis, Department of Agricultural Economics and Extension, University of Cape Coast, Ghana
Wooldridge, J. M. 2013 *Introductory Econometrics: A modern Approach*. Fifth Edition, Nelson Education, Ltd., Michigan State Univ. Press, Michigan, pp. 560–566