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COMMUNICATION APPROACH FOR AGRICULTURAL TECHNOLOGY TRANSFER IN VARIOUS AGRO-ECOSYSTEM ZONES:

A Case Study in South Sumatra Province

Fawzia Sulaiman

Indonesian Center for Agro Socio-Economic Research and Development, Jalan Achmad Yani 70, Bogor 16161, Indonesia

ABSTRACT

An effective communication and dissemination of research results should be based on the natural resource endowment in each agro-ecosystem and the socio-economic background of the prospective clientele. The objective of this study was to examine several forms of communication approaches for disseminating agricultural technology and information. This study was based on a baseline survey conducted in four agro-ecosystems of South Sumatra Province, i.e. tidal swamp, swamp, dry lowland, and irrigated lowland. Results indicated that the social economic condition and natural resource endowment of farmers in the swamp agro-ecosystem zone (AEZ) of Ogan Komering Ilir is suitable for fishery development instead of food crop agribusiness. However, farmers in the swamp AEZ need technologies that reduce their workload in land cultivation and weeding activities. Further, as field extension workers (FEWs) were considered as the source of agricultural information by most farmers, the involvement of FEWs in agricultural research and technology assessment will increase the effectiveness of the innovation transfer, especially in the tidal swamp and irrigated lowland AEZs. In the four AEZs, the FEWs and farmer group leader can be used as an effective channel to convey agricultural technology and information in South Sumatra Province.

[*Keywords*: Technology transfer; agroecosystems; South Sumatra].

INTRODUCTION

Agricultural development is a complex process that is affected by the interaction and inter-relation of many factors. These factors range from natural resource endowment in a respective area, socio-economic, cultural, and political factors. As a part of agricultural development in a certain agro-ecosystem, the agribusiness involves the use of appropriate technology packages, the provision of farm inputs, and the existence of infrastructures and supporting institutions such as financial and extension institutions, postharvest and marketing services of agricultural products. Research is necessary to generate and develop technological packages and its components that are suitable to farmers' socio-economic background and biophysical condition of natural resources. However, research only is not sufficient. An effective communication and dissemination of research results as a mean of transferring technology to enable the end-users to adopt the new technology is also crucial.

Even though many researches have been conducted and their results as technological packages have been published in scientific and semi-popular journals, the technologies have not been transferred successfully and well implemented by farmers (Acoba, 2001). Thus, the poor adoption of technologies is also determined by the process of technology transfer. Basuki *et al*. (2000) reported that the average frequency of field extension workers (FEWs) in conducting food crops technology transfer in West Nusa Tenggara was only once a year with a range between none (zero) to five times a year. The average percentage of FEWs' activity in conducting technology transfer ranging from 4.7 to 7.7% from the total activities of FEWs. This finding indicates that a more effective communication approach is needed in disseminating research results, especially as technology generation, transfer, and adoption are critical factors in the agricultural development.

In developing an effective communication approach, Abbott (1990) asserted some lessons that can be learned from research as follows: (1) communication is a lengthy and uneasy process, (2) people learn in a different rate of learning, (3) it is important to know what motivates people to learn, (4) information seeking is not substitutive, but additive, (5) there is no set order of knowledge, attitudes and behavior in bringing about change, (6) learning to bring about

change is often a group activity, (7) understanding the "rules" that go along with the message is important, and (8) the rapid progress of information and communication technology creates difficult problems for communicators. Furthermore, to formulate an effective communication approach, accurate socio-economic data, coupled with the conduct of technology need assessment in participatory manner is needed. The objective of this study was to examine several forms of communication approaches for agricultural technology transfer and to recommend suitable means in given circumstances.

METHODS

The survey was conducted in 2001 covering four major agro-ecosystem zones (AEZs) in South Sumatra Province, which were irrigated lowland, tidal swamp, swamp, and dry lowland. The survey areas were Ogan Komering Ulu (OKU) for irrigated and dry lowland, Ogan Komering Ilir (OKI) for swamp land, and Musi Banyuasin (MUBA) for tidal swamp. Four farming system zones (FSZs), which could represent each of those four AEZs, were chosen as the survey locations. The FSZ samples were chosen based on these following considerations: (1) the areas were the center of agricultural production, (2) they were potential areas for agricultural development, (3) the areas had adequate physical infrastructures, and (4) AEZ maps of at least a scale of 1 : 250,000 and baseline data in the respective AEZ were available. The locations of those four selected FSZs are presented in Table 1.

Since an AEZ area is not determined by the administrative boundary, the population numbers of the four survey locations were not available in the existing statistical data. A random sampling was used to draw 30-31 household samples in each AEZ due the relatively homogenous condition of the households' socio-economic condition. Three out of four survey locations (dry lowland and irrigated lowland AEZs of OKU, and tidal swamp AEZ of MUBA) were originally transmigration areas. The number is considered to be adequate as it would not be significantly different compared with those drawn from unlimited population. The collected data covered: (1) household characteristics, (2) land ownership and land holding structures, (3) income and expenditure structures, and (4) level of technology application and cost structures. Some socio-economic variables relating to the communication aspects such as farmer's sources of technology, communication media being used, the availability of needed technology, and farmer's perception regarding the available technologies were also collected. Based on the analysis of the baseline data and farmers' perception regarding some aspects of agricultural technology transfer, the communication approach is suggested.

Results of the baseline survey indicated four types of household's land holdings as follows: (1) farm laborers (landless), (2) small holding, (3) medium holding, and (4) large holding. The definitions of each group are as follows: (1) landless: a household that does not have access to land in the respective year; (2) small holding: the household's land holding $< \mu - 0.50$ SD (μ = the sample's average of household land holding, SD = standard deviation); (3) medium holding: $\mu - 0.50$ SD < the household's land holding $< \mu + 0.50$ SD; (4) large holding: the household's land holding $> \mu + 0.50$ SD.

The baseline data also indicated three types of household's income, which were low, medium, and high-income households. The definitions of each type are as follows: (1) low income household: household's income $< \pi - 0.50$ SD (π = the sample's average

Table 1 . Location of selected farming system zones and number of household samples in each agro-ecosystem of South Sumatra.

Agro-ecosystem zone	Number of sample				Subdistrict	Main commodity
	Musi Komering	Ogan Komering Ulu	Ogan Total Ilir			
Tidal swamp	30	-	-	30	Pembantu Muara Telang	Rice, coconut
Dry lowland	-	31	-	31	Peninjauan	Rubber, vegetables
Irrigated lowland	-	31	-	31	Belitang	Rice, vegetables
Swamp	-	-	30	30	Kayu Agung	Rice, fish
Total	30	62	30	122		

of household income, SD = standard deviation); (2) medium income household: π - 0.50 SD < household's income < π + 0.50 SD; (3) high income household: household's income > μ + 0.50 SD.

RESULTS AND DISCUSSION

The pertinent information on household characteristics and farmer's perception regarding some aspects of agricultural technology transfer is presented in Tables 2 and 3. As nearly as all households in study areas depended on agriculture for their livelihood, ranging from 78.6% in the dry lowland of OKU to 100% in the tidal swamp area of MUBA. This implies that agricultural development should become the priority of the MUBA, OKU and OKI district governments and technology transfer becomes one of the determinating factors to achieve agricultural development goals in those districts. This observation is supported by the fact that most of farmers in the less fortunate AEZs (tidal swamp and swamp areas) were somewhat dissatisfied with the available farming technology, ranging from 46.7% in the swamp of OKI to 80% in the tidal swamp of MUBA (Table 3).

Table 2. Socio-economic profile of households in various agro-ecosystem zones of South Sumatra.

Socio-economic profile	Musi Banyuasin (tidal swamp)	Ogan Komering Ulu		Ogan Komering Ilir (swamp)
		Dry lowland	Irrigated lowland	
Educational background (%)				
Primary School	87.3	75.7	64.0	79.1
Junior High School	12.7	12.9	14.7	11.9
Senior High School	0	11.4	20.0	9.0
University	0	0	1.3	0
Occupation (%)				
Agriculture	100	78.6	86.7	82.1
Non-agriculture	0	21.4	13.3	17.9
Land holding (ha)[1]				
Tidal swamp	2.117	0	0	0
Swamp	0	0	0	0.482
Upland planted by perennial crops	0.387	0.911	0.194	0
Upland planted by seasonal crops	0	0.705	0.052	0.027
Rice field	0	0.218	0.808	0
Pond	0	0.001	0.048	0.267
Land ownership (ha)				
Tidal swamp	2.067	0	0	0
Swamp	0	0	0	0.390
Upland planted by perennial crops	0.387	0.991	0.194	0
Upland planted by seasonal crops	0	0.665	0.035	0.027
Rice field	0	0.210	0.752	0
Pond	0	0.001	0.048	0.267
Land ownership classification (%)				
Landless	0	12.9	3.2	90.0
Small	0	9.7	29.0	3.3
Medium	3.3	22.6	32.3	3.3
Large	96.7	54.8	35.5	3.3
Annual income (million rupiah)				
Agriculture	4.99 (92%)	6.34 (68.4%)	6.74 (92.9%)	1.64 (43.2%)
Non-agriculture	0.44 (8%)	2.93 (31.6%)	0.51 (7.1%)	2.26 (58.6%)
Annual expenditure (million rupiah)				
Food	2.503 (74.1%)	3.59 (75.3%)	2.964 (67.3%)	2.519 (65.3%)
Non-food	0.876 (25.9%)	1.18 (24.7%)	1.394 (32.7%)	1.338 (34.7%)
Ownership of electronic communication appliances (%)				
None	3.3	29.0	12.9	16.7
One appliance	56.7	54.9	48.4	50.0
More than one appliances	40.0	16.1	38.7	33.3

[1]Household land holding and land ownership do not indicate famers' access to the farmland, as one can rent swampland from local government

Table 3. Farmer's source of agricultural technology, communication media being used, and farmer's perception regarding the available technologies in various agro-ecosystem zones of South Sumatra.

Perception of farmers	Musi Banyuasin (tidal swamp)	Ogan Komering Ulu		Ogan Komering Ilir (swamp)
		Dry lowland	Irrigated lowland	
Source of agricultural technology (%)				
Field extension worker	90.0	41.9	80.7	30.0
AIAT staff[1]	3.3	32.3	0	30.0
Farmer group leader	00	12.9	12.9	23.3
Others	6.7	9.7	6.4	13.3
No perception	0	3.2	0	3.3
Communication media being used (%)				
Printed material	0	3.2	0	0
Electronic media	0	25.8	25.8	13.3
Farmer group meeting	80.0	35.5	45.2	53.3
Others	20.0	22.6	9.7	6.7
No perception	0	12.9	19.3	26.7
Perception regarding the available technologies				
Very satisfied	0	12.9	3.2	3.3
Quite satisfied	20.0	48.4	61.3	43.3
Somewhat dissatisfied	80.0	32.3	29.0	46.7
Dissatisfied	0	0	3.2	0
No perception	0	6.4	3.2	6.7

[1]AIAT = Assessment Institute for Agricultural Technology

Socio-Economic and Communication Aspects in the Tidal Swamp AEZ

Tidal swamp areas of South Sumatra encompass 1.3 million ha, whereas only 39.4% (329,897 ha) that has been put into reclamation program (Soentoro and Hermanto, 1999). Further, Soentoro and Hermanto (1999) asserted that agricultural technologies generated for tidal swamp AEZ through the South Sumatra Tidal Swamp Farming System Project started in 1997, have not optimally been adopted. Conversion of the potential area into rice field still faces some technical, biophysical, and socio-economic constraints. This implies that technology transfer should not only focus on technical and biophysical aspects, but also consider the socio-economic aspects, especially the supporting institutions that are conducive to the adoption of technology.

The educational level of household members was a primary school (87.3%). There were no household members who had senior high school or university educational background. Since the survey location in the tidal swamp AEZ was originally a transmigration area, there was no landless and small land ownership household. During the early settlement period, a household was allocated 2 ha of farmland. However, the low productivity of the land likely caused the low income and educational level of the household members. The opportunity to work in non-farm occupation was limited, indicated by the occupation of all heads of household was farming.

Land holding in the tidal swamp AEZ of MUBA was the largest compared with those of other three study areas, however the land productivity is low. Introduction of technologies specifically generated for tidal swamp such as land use system and micro-water management, the use of fertilizer and ameliorant, integrated pest management, weed control, high quality seed, agricultural machinery, postharvest technology, and increasing planting intensity, has resulted in an increase in land productivity (Soentoro and Hermanto, 2000). Thus, intensifying agricultural technology transfer without improving infrastructures and creating a conducive condition for farmers to enable them to adopt technology, would not solve the main problem. Some pertinent socio-economic data that should be considered in formulating communication approach for technology transfer in the tidal swamp AEZ are presented in Table 2.

The problems and constraints in agricultural development in this AEZ were reflected in the perception of the majority of farmers (80%) who were somewhat dissatisfied with the available technologies. In this respect, there is a need to identify the

cause of farmers' dissatisfaction with the available technologies, whether it is due to technologies existing in the area are not suitable to farmers need and or the technologies available in the technology sources such as the Assessment Institute for Agricultural Technology (AIAT) or universities, have not been effectively disseminated to their intended users. Farmer's source of agricultural technology, communication media being used and farmer's perception regarding the available technologies (Table 3) is an important information in formulating communication approach for technology transfer.

The ownership of communication appliances such as radio and or television sets in the tidal swamp AEZ was high, however no farmer used these electronic media to look for agricultural information. Furthermore, farmer group leaders were not considered as a source of agricultural information. The majority of farmers (90%) considered that FEW is a source of agricultural technology and information. This implies that FEWs were relatively the sole source of agricultural information and technology for farmers, and they can be used as an effective communication channel in agricultural technology transfer through the farmer group meeting. The majority of farmers (80%) used the farmer group meeting as a communication medium to look for agricultural technology and information.

Socio-Economic and Communication Aspects in the Dry Lowland AEZ

The survey location of the dry lowland AEZ of OKU was originally a transmigration area. The average land holding and land ownership of upland planted to perennial crops (0.911 ha) was higher compared with that planted by seasonal crops (Table 2).

The majority of household members' educational background was primary school (75.7%) and 12.9% and 11.4% of household members had junior and senior high school educational background, respectively. The average household's income in the dry lowland AEZ of OKU was the highest compared with those in the other three survey areas. The non-farm employment, especially logging, was likely the source of income that support the expenditures for schooling.

Besides food crops farming, many farmers also grew rubber to support their livelihood. Since rubber was an important source of household's income, adequate extension materials to increase rubber production were needed.

Data in Table 2 show that the average household income in the dry lowland AEZ is higher than the average household expenditure. This implies that farmers can afford to buy agricultural inputs that are needed for adopting technology. However, the process of agricultural technology transfer seems unsatisfactory in this AEZ, as 32.3% of farmers were somewhat dissatisfied with the available technologies. In this respect, the farmer group meeting should be used more frequently as the medium for technology transfer, since it was the most frequent medium being used by farmers (35.5%) to seek agricultural technology and information.

The occupational background of the prospective clientele is an important consideration in developing the communication approach for the agricultural innovation transfer. The percentage of household members (21.4%) who had non-agricultural occupation was highest in the dry lowland compared to those of others. Based on research results conducted in nine lagging villages in Central Java, Mubyarto (1994) concluded that the self-reliance among community groups was higher in more urbanized villages. This was indicated by a higher rate of non-agricultural sources of income in the area.

As the survey area was used to be the location of a livestock project focusing on beef cattle, the South Sumatra AIAT conducted a three-year technology assessment of cattle production started in 1997. For this reason, the staff of South Sumatra AIAT were considered as the source of technology information by 32.3% of farmers (Table 3). However, the staff of South Sumatra AIAT are not easily accessible. Their main office is located in the capital city of the South Sumatra Province. The more accessible and also effective communication channels for agricultural technology transfer in this AEZ are FEWs and farmer group leaders who were considered as the source of technology information by 41.9% and 12.9% of farmers, respectively.

The ownership of electronic communication appliances of farmers in the dry lowland AEZ of OKU was the lowest compared with the other three survey areas. However, number of farmers who used electronic media to look for agricultural technology and information was higher compared with those in the tidal swamp and swamp areas (Table 3). This implies that radio and or television sets can be used to disseminate agricultural technology and information for farmers in the dry lowland AEZ of OKU.

The percentage of farmers who used electronic media to look for agricultural technology in the dry lowland AEZ was similar with that in the irrigated

lowland AEZ of OKU. The educational level of household members in those two AEZ was also higher compared with those in the tidal swamp and swamp AEZs. The higher educational level was likely the factor that influences a higher usage of electronic media to look for agricultural technology.

Socio-Economy and Communication Aspects in the Irrigated Lowland AEZ

The educational level of household members in the irrigated lowland AEZ of OKU was the highest compared with those in other three survey areas, where 14.7% and 20.0% of household members had junior high school and senior high school educational background, respectively. This finding is not surprising as the survey location is an established agricultural area, which was originally a transmigration area in the colonial era. Considering the farmers' educational level, extension printed materials can be used by farmers, at least among farmer group leaders.

The size and structures of land holding and land ownership are important factors that influence the farmer's receptivity in adopting agricultural innovation. These are also important considerations in determining the most appropriate approach in the technology transfer activity. The average household land ownership and land holding were 0.752 ha and 0.808 ha, respectively, where there were only a small percentage of households which were landless (3.2%) (Table 2).

The majority of farmers in the irrigated lowland AEZ of OKU were quite satisfied (61.3%) and very satisfied (3.2%) with the available technology (Table 2). This is because the survey location has long been established as one of the main rice producing areas in South Sumatra. The government agricultural policy, which is biased toward rice, is also supportive toward the provision of rice farming technology.

The majority of farmers considered that FEWs (80.7%) and farmer group leaders (12.9%) were the main source of agricultural technology (Table 2). Therefore, farmer group meeting should be used as the communication medium for agricultural technology transfer. This implies that extension materials produced by the South Sumatra AIAT and other institutions such as agricultural extension organization, District Agricultural (related) Services and the university, should also be disseminated to farmer group leaders.

The farmer group meeting is an extension method facilitated by a FEW and or the farmer group leader. Most of farmers (45.2%) in the irrigated lowland AEZ used the farmer group meeting as a communication medium to look for agricultural technology and information. Radio and television sets are also effective communication channels to be used in the early stage of the adoption process. Despite 12.9% of households in this survey area did not own an electronic communication appliance, but 25.8% of farmers used these media to look for agricultural technology and information.

Socio-economic and Communication Aspects in the Swamp AEZ

The survey area in the swamp AEZ is relatively near the capital town of OKI with a good road condition. However, limited resources owned by the household are likely to impede the household members to attain a better educational level. Data in Table 2 show that the average household income in the swamp AEZ of OKI was the lowest compared with those in the other three survey areas.

The average land ownership and land holding were also the lowest (less than 0.5 ha) and land productivity was low. The survey area was occupied by local ethnic community, where the land fragmentation has been in progress for several generations. About 90% of farmers were landless (Table 2) and the main occupation of household members (82.1%) was agriculture. However, the average size of the land holding and land ownership does not represent the actual household's land holding. There is an opportunity to rent a piece of swampland from the local government through an auction system. The very limited and poor land-based agricultural resources of farmers preclude them to expand staple food production in this AEZ. The development efforts should be geared, therefore, toward fishery and other income generating activities in non-agricultural sectors.

The structures of household income and expenditure in the swamp AEZ of OKI indicate that they are subsistent farmers. Most men also worked in non-farm sectors, and many farming activities were left to women. They used either very limited or no technology at all. As farming in the swamp AEZ is a heavy and tedious work, especially land preparation and weeding, the technology that can reduce the heavy workload of women farmers is badly needed.

Table 3 shows that farmer group meeting was the most frequent communication medium used by farmers (53.3%) in this survey area. The FEW and

farmer group leader, who are the facilitators of the farmer group meeting, can be used as effective communication channels, as 30% and 23.3% of farmers respectively claimed them as their source of agricultural technology and information.

Even though electronic communication appliances such as radio and television sets are considered as nonproductive assets, the information on ownership of these communication appliances is an important consideration in the use of the communication channels to reach the prospective clientele. Moreover, perception of farmers regarding some aspects of agricultural innovation transfer is an important consideration in developing an effective communication approach. Table 3 shows that only 16.7% of households in the swamp AEZ of OKI did not have a communication appliance, and nearly a half of the farmers (46.7%) were somewhat unsatisfied with the available technologies.

Communication Approach

The extension method and communication media being used for technology transfer in the four AEZs should be suited to the farmer's educational background. The majority of farmer's educational level was primary school, ranging from 64% in the irrigated lowland of OKU to 87.3% in the tidal swamp AEZ of MUBA (Tables 2 and 3).

The most frequent use of interpersonal communication such as in the farmer group meeting implies that the delivery system of agricultural extension is still predominant in all study areas. This extension method is frequently used by farmers to look for agricultural technology and information, ranging from 35.5% in the dry lowland AEZ of OKU to 80% in the tidal swamp AEZ of MUBA.

The FEW and farmer group leader can be used as an effective communication channel to reach farmers in all AEZs, except in the tidal swamp AEZ of MUBA where farmer group leader was not considered as a source of agricultural information. In this respect, FEWs were considered as the source of agricultural information by a majority of farmers in all study areas, ranging from 30% in the swamp area of OKI to 90% in the tidal swamp AEZ of MUBA (Tables 2 and 3).

Considering that majority of farmers used the farmer group meeting as the most frequent extension method, FEWs need adequate knowledge and skills in interpersonal communication and group dynamics. This is in line with Lionberger and Gwin (1982) who asserted that three prior conditions necessary for a FEW's success as a change agent are: (1) the capability of the FEW to communicate, (2) the availability of necessary support system for the FEWs and for farmers to adopt technology, and (3) the government policy that is conducive for the FEWs and farmers to gain social and economic benefits.

As nearly all farmers in the study areas depended on FEWs for acquiring agricultural technology and information, the agricultural research institution such as the South Sumatra AIAT should provide adequate technical back-stopping toward FEWs to convey research results to farmers. This is especially true as 53.4% farmers in the swamp AEZ of OKI and 80% in the tidal swamp of OKU were somewhat dissatisfied with the available technologies. The perception of farmers in tidal swamp and swamp AEZs is also a reflection of complex problems they face such as the unavailability of appropriate technology and infrastructures. On the other hand, 61.3% of farmers in the dry lowland and 64.5% of irrigated lowland of OKU District were already satisfied with the available technologies.

The delivery system is still predominant in all study areas. Therefore, the FEWs should be provided by adequate technical training, extension materials, teaching aids, and operational budget to enable them to conduct effective extension programs. So far, the provision of training, extension materials, and budget for FEWs to conduct an effective extension program is far from adequate (Sulaiman *et al*., 2001).

Results of an interview with the information staff of the South Sumatra AIAT indicated that due to the budget limitation, this agricultural research institution did not disseminate its printed extension materials such as leaflets, brochures and posters to farmers. The printed materials were mostly distributed to FEWs and or District Agricultural (related) Services. Except in the dry lowland AEZ of OKU (3.2% of farmers), there were no farmers in the other three AEZs who used printed materials to seek agricultural information. A further inquiry is needed to address why the printed material was not commonly used by farmers, whether it is related to farmer's preference or the inaccessibility of this communication medium.

Except in the tidal swamp AEZ, the electronic media such as radio and or television sets can be used as a communication channel to convey agricultural technology and information in the other three survey areas, especially in the dry lowland and irrigated lowland AEZs of OKU. Around 25% of farmers in the dry lowland and irrigated lowland AEZs of OKU, and

more than 12.5% of the farmers in the swamp area of OKI, used radio and or television sets to look for agricultural technology and information.

Since the household income was higher than the household expenditure (Table 2) in the three study areas (except in the swamp AEZ of OKI), farmers are likely to be able to afford farming inputs to adopt recommended technology. This implies that farmers are likely to be responsive toward agricultural technology transfer. In this respect, MUBA and OKU District Governments need to facilitate efforts to intensify agricultural extension activities in their areas of jurisdiction.

The implementation of the decentralization policy in the early 2001 has resulted in basic changes of the organizational structure and management in agricultural (related) institutions at the provincial and district levels, which are not conducive to the effectiveness of extension organization and personnel (Sejati *et al.*, 2001). The lack of understanding on the benefits of agricultural human resource development through extension among decision makers has added to the ineffectiveness of extension organization and personnel. The ineffectiveness of the agricultural (related) institutions that hold extension functions at the district level is a serious impediment to the agricultural technology transfer.

CONCLUSION AND RECOMMENDATION

The slow process of the agricultural innovation transfer has been realized as a serious impediment in the acceleration of agricultural development. The success of innovation transfer depends on the effectiveness and linkage among research, extension, and farmer organizations.

The delivery system of the agricultural extension is still predominant in all study areas. The majority of farmers still depend on field extension workers for acquiring agricultural technology and information. Therefore, efforts to increase the effectiveness of the extension organization and personnel are badly needed. The Agency for Agricultural Human Resource Development and Extension needs to increase the intensity of its advocacy and public awareness programs, especially to the district government policy makers, regarding the important role of extension in the agricultural regional development.

The dissemination of research results should be based on accurate natural resource endowment and socio-economic data of the prospective users which can be derived from the characterization baseline survey. In the case of South Sumatra, the swamp AEZ of OKI is not suitable for food crop development. Fishery is the most suitable to be developed in this area. Moreover, as the average household income in the swamp AEZ of OKI is the lowest compared with the other three AEZs, a multi-sectoral coordination is needed to encourage off-farm and non-farm income generating activities.

The South Sumatra AIAT should increase its technical backstopping toward field extension workers, since the majority of farmers in the four AEZs consider them as their main source of agricultural technology and information. The extension materials should also use multimedia, to convey its research results. In this respect, 25% of farmers in the dry lowland and irrigated low land AEZs of OKU used electronic media to seek agricultural information, and around a half of the household samples in all survey areas owned these mass communication appliances. Further, the agricul-tural extension materials should also be designed to facilitate field extension workers and or farmer group leaders in farmer group meetings. Considering that the farmer group meeting is the most frequent communi-cation medium being used by farmers, the field extension workers need more training in interpersonal communication and group dynamics.

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