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POLICY DIRECTIONS OF FARM SIZE OPTIMIZATION PROGRAM IN KOREA

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I. Introduction

Korea's agricultural development policies have remarkably changed since 1990. In order to cope with such a new trend as trade liberalization, the government adopted agricultural structure transformation policy in 1990. It was focused on the creation of viable farm units which can compete with foreign large-scaled farmers in terms of cost saving(Rural Development Corporation, 1990).

Green Revolution, implemented by the Rural Development Administration(RDA), was the major agricultural development policy in the 1970s. At that time, increase of food production was one of the most urgent tasks in the country. Price support policy assisted to maintain farm household income level. In the process of Korea's rapid industrialization, the policy had contributed to lessening the income gap between farmers and urban laborers.

In the 1980s, the price support policy for agricultural products encountered limitations due to excessive rice production and increase of government's budgetary deficit. Under the external situations, farmers gradually turned their interest to growing cash crops. However, it took long to adopt cash crops because majority of farmers were aged. They were accustomed to growing rice and reluctant to alter their cropping systems, which required them to take high risks. Without stable marketing system and production skills, many farmers

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¹ Increase in aged farmers' group was rapidly worsened by the great exodus of rural youth and young farmers under the urban-oriented industrialization policy.

failed to adopt cash crops.

Under the circumstances, Korea's government adopted the 'farm size optimization program'² in 1990. Appearance of such international norm as trade liberalization was a major factor to adopt it. It was considered that farmland would be consolidated from the aged to major farmers especially with relatively large-size rice farm.

The objectives of the study are: i) to analyze the characteristics of current farm size optimization program, ii) to identify performance and limitations of the program, and iii) to suggest policy directions of the program. Survey method was adopted to prove the author's perspectives.

II. Characteristics of Farm Size Optimization Program

1. Theoretical Basis of Farm Size Optimization Program

Farmland, with labor and capital, is one of the important production factors. The core part of the farm size optimization program is to make farmers save production cost with optimal farm sizes(Shin, 1995). This is based on the neoclassical productivity theory which proposes that farm income depends on the combination of production factors such as labor, land, and capital(Shaffer, 1989).

There are some theoretical bases for a government to intervene in farmland market. They are related to imperfectness of land market and publicity of agricultural structure transformation process in socioeconomic situations of Korea. First, the government intervention is justified by land supply side problem. In order to transform agricultural structure in terms of farm size, farmland should be highly mobilized. However, farmland supply, based on the proper price for agricultural production, is quite limited. It is mainly due to the scarcity of land resource in the Korean setting. The national land is relatively narrow and there are many aged small farmers who are rarely able to change their jobs. This is a rationale for the government to foster land supply.

² It is a part of the agricultural structure transformation policy which aims to create viable and sizable farm units by major crops.

Second, there is also land demand side problem in that most farmers do not have enough finances to purchase or lease farmland for preparing large farms. This justifies the government to give financial assistance to the farmers who are dedicated to large-scale farming.

Third, there are also public aspects in agriculture. Major cases are functions of environmental conservation, community maintenance, and social stabilization. Especially, there is an urgent task to stably acquire basic food like rice in the trade liberalization era. It offers a rationale for the government to assist major rice farmers to create efficient management units.

2. Major Contents and Performance of Farm Size Optimization Program

2.1. Major Contents of the Program

The farm size optimization program represents agricultural structure policy. The objectives of the program are: a) to raise price competitiveness of agricultural products through the enlargement of farm size and land consolidation, and b) to foster specialized major rice farmers to get high income(RDC, 1990).

The program is classified as three projects, “land purchase,” “long-term land lease,” and “land exchange and consolidation.” Major traits of the program may be summarized as follows(RDC, 1993):

- a) Focus on the major rice farmers;
- b) Demand side policy; and
- c) Loan assistance with long-term and low interest rate³.

2.2. Performance of the Program

The Rural Development Corporation(RDC) carries out the agricultural structure transformation program. Its major role is to help farmers attain the level of sizable farming through purchasing, leasing, or exchanging farmland.

³ Annual interest rate for loan is 4%(repayment in 20 years with a two-year grace period).

TABLE 1 Performance of Farm Size Optimization Program

Unit: ha, number, million won

CLASSIFICATION	1988	1989	1990	1991	1992	1993	1994	1995	1996	TOTAL
Purchase										
– Size	13,135	9,959	7,255	7,294	7,053	8,484	4,354	5,079	4,932	67,545
– Household	33,769	22,993	17,707	15,252	13,283	17,422	8,573	8,634	9,061	146,694
– Loan	199,428	199,648	235,390	322,847	330,615	410,134	215,233	235,000	266,500	2,414,795
Lease										
– Size	–	–	3	8	36	180	792	1,795	2,806	5,620
– Household	–	–	5	14	65	326	929	1,765	2,912	6,016
– Loan	–	–	48	160	807	4,029	19,997	39,999	64,999	130,039
Exchange										
– Size	–	–	–	50	18	120	248	189	152	777
– Household	–	–	–	168	71	422	1,007	1,901	1,665	5,234
– Loan	–	–	–	337	156	958	2,927	5,000	5,040	14,418

Note: One dollar is approximately equivalent to 1,500 Won.

Source: RDC, Evaluation of Farm Size Optimization Program, RDC, 1997.

(Table 1) shows the amount of money loaned and the size of farmland leased, purchased, and exchanged. The assistance for agricultural structure improvement has been mainly given to the method of purchasing. The assistance for leasing land started in 1990 and it has been increasing steadfastly. Since 1990, the program has been implemented by the RDC, whereas it had been done by the agricultural cooperatives from 1988 to 1989. The amount of loan for land purchase since 1991 is higher than that of 1988 and 1989. However, the size of farmland assisted is reversed. It is mainly due to the sharp increase of land price during the late 1980s. The total size of farmland purchased and leased with the government assistance during 1988-1996 is 73,165 ha. This is about 8.2 percent of farmland in the 'agriculture promotion area'.

⁴ Public investments for agriculture are prioritized in this area. It was about 46.0 percent of the total farmland in 1996.

The effects of the program can be summarized as follows: i) increase of farm household income through cutdown on production cost and alteration of cropping system; ii) consolidation of farmland; iii) increase in the number of young farmers; iv) stabilizing farm management base by strengthening land ownership; and v) strengthening farmer's willingness to settle in rural areas(Kim, et al, 1995).

2.3. Limitations of the Program

There were also some limitations encountered in the current farm size optimization program. First, the out-migration rate in rural areas have not been high since 1990⁵. It was expected that many small farmers would abandon farming for nationwide agricultural restructuring under the trade liberalization of agricultural products. However, it has not happened thus because rice import is still limited and domestic market price of rice is maintained at a high level. Above all, there is no rapid increase in non-farm employment opportunities for the marginal farmers who are mostly aged. Enlarging farmland by major rice farmers has gradually become limited because there is shortage of land supply at a reasonable price⁶.

Second, demand-driven policy is strong but supply-support policy is weak. In order to complement this imbalance, 'direct payment project for fostering sizable farming' has been adopted in 1997. It seems that there is an overly strict limit in the age for receiving subsidy by offering farmland and the amount of the subsidy of the program is too little.

Third, in current condition, it is questionable whether the key farmers can follow the process of farm size optimization program which puts an emphasis on the enlargement of rice farm size. It is due

⁵ Major rice farmer policy is based on the assumption that major rice farmers would expand their farm sizes by the remarkable decrease of farmhouseholds.

⁶ The ceiling of reasonable land price for financial assistance is calculated from agricultural profitability based on cost-benefit analysis. The current maximum land price for purchase subsidy in the farmland size optimization program is 25,000 won. It is derived from the notion that land is the means of agricultural production (especially rice production).

⁷ The amount of subsidy is 640 thousand won/ha for retiring farmers without difference between leasing and selling. The age limit to get subsidy is 65 or more.

to the fact that farmhousehold level is considered a basic unit for farm size optimization while land supply is limited. There can be at least three ways to optimize their farm size: one is to alter cropping system under given conditions of land, labor, and capital; another is to expand farmland under given cropping system; and the third is to alter both cropping system and farm size.

III. Results of Data Analysis

1. Sampling Method for Data Gathering

Five subcounties (Myon's) in five provinces were selected by typical cropping systems. The cropping systems selected to sample agricultural areas were suburban agriculture, mountainous vegetables, greenhouse, rice-greenhouse complex, and rice (Im and Park, 1994). Two villages were selected in each sub-county sampled. And based on the distribution of farm sizes and farmhousehold head's ages, around 16 household heads per each village were interviewed to identify their opinions on their future farm sizes. Before interviewees were selected, such information as size of farmland, number and age of farmers, retained agricultural machinery of all households in the villages were gathered through village heads based on land cards and their knowledge.

2. Characteristics of Households Sampled

The number of households in the villages was 635, in total. Among them, farmhouseholds were 493(77.6%), and non-farmhouseholds, 142(22.4%). The number of household heads interviewed was 159. All of them were farmers, except one who has recently been retired from farming.

The ratio of non-farmhouseholds was higher in suburban area(30.1%). It was the lowest in greenhouse area(9.4%). The average number of farmers in farmhouseholds was 2.0. And there was no difference in the number among the areas.

3. Change in Farm Size

3.1. Current Farm Size

3.1.1. By Sample Area

(Table 2) shows that there are differences in farm size among the sample areas which represent different cropping systems. Rice growing oriented areas maintain the biggest farm size, whereas greenhouse areas have the smallest farm size. However, it may be said that large-scaled farmers do not reach the viable farm size. The mean and standard deviation of farm size implies that most large-scaled farmers in rice farming areas cultivate farmland less than 3.5 ha. On the contrary, former researches show that optimal farm size range from 10.0 to 16.4 ha (Cheong, 1994; Yoo, 1994).

TABLE 2 Size of Farmland by the Sample Area

Unit: 100 pyong

CLASSIFICATION	Frequency	Mean of farmland size	Standard Deviation
Suburban agriculture	95	51.3	28.24
Mountainous vegetables	106	37.7	26.27
Greenhouse	126	25.0	11.07
Rice-greenhouse complex	90	47.8	43.87
Rice	76	63.5	43.79
TOTAL	493	42.8	35.63

Note: One Pyong is equal to 3.3m².

Source: Survey data from the interview of village heads.

3.1.2. By Labor Force

Labor is one of the most important factors to determine agricultural productivity. With capital and land, labor force plays a pivotal role in producing farm products. (Table 3) shows that the number of farmers per household ranges from 1 to 4. The more the farm household has the number of farmers, the bigger the farm size. Statistical analysis shows that labor is a significant determinant of farmland size.

TABLE 3 Size of Farmland by the Number of Farmers

Unit: 100 pyong

CLASSIFICATION	Frequency	Mean of Farmland Size	Standard Deviation	F	LSD Multiple Rang Test	
(1) 1	78	26.0	34.35	14.774	(1) (2) (3)	
(2) 2	354	44.1	34.99		*	(1)
(3) 3-4	61	57.3	33.16		(2)	*
TOTAL	493	42.8	35.63		(3)	* *

* : $p < 0.05$

Note: One pyong is equal to 3.3m²

Source: Survey data from the interview of village heads.

According to the farm management theory, labor can be substituted for capital. In this case, the farm households with less farm labor will cultivate bigger size of farmland with agricultural machinery. However, (Table 3) shows the reversed result that farm households with less farmers cultivate smaller size of farmland. (Table 4) also shows that the quantity and quality of farm labor determine the farmland size of farm households.

TABLE 4 Size of Farmland by Farmer's Age Composition

Unit: 100 pyong

CLASSIFICATION	Frequency	Mean of Farmland Size	Standard Deviation	F	LSD Multiple Range Test	
(1) Household head aged 55 or more without young farmers	219	36.5	34.62	8.084	(1) (2) (3)	
(2) Household head aged 55 or more with young farmers	36	57.9	40.19		*	(1)
(3) Household head aged 54 or less	238	46.5	34.79		(2)	*
TOTAL	493	42.9	35.63		(3)	*

* : $p < 0.05$

Source: Survey data from the interview of village heads.

TABLE 5 Size of Farmland by Retained Machinery

Unit: 100 pyong

CLASSIFICATION		Frequency	Mean of Farmland Size	Standard Deviation	t
Cultivator	Retain	308	52.2	38.30	*
	No retain	185	27.4	23.68	7.95
Tractor	Retain	46	91.2	50.11	*
	No retain	447	37.9	29.70	10.71
Combine	Retain	38	88.1	48.63	*
	No retain	455	39.1	31.59	8.74
Transplanter	Retain	105	75.0	47.49	*
	No retain	388	34.2	25.53	11.79
TOTAL		493	42.9	35.63	

* : $p < 0.05$

Source: Survey data from the interview of village heads.

3.1.3. By Retained Machinery

Agricultural machinery, as a major capital component, plays an important role to determine productivity. As the number of farmers decreases and their average age increases, agricultural mechanization has substituted for labor. The question, here, is whether the machinery is being used efficiently. According to (Table 5), average farmland size by the farmhouseholds with agricultural machinery ranges from 5,220 to 9,120 pyong. It shows that the retention of each machinery selected is related with farm size. Combine, tractor, and transplanter possessors have bigger farm sizes in order.

3.1.4. By Cropping System

Farmland sizes may differ by cropping system. Labor force and labor-machinery substitution rate of farmhouseholds are different by crops. (Table 6) shows that cropping system affects farmland size. Rice farmers have the biggest farm size. The farmers adopting both rice and bare ground crops are next in farm size. Rice-greenhouse farmers are third. And non-rice farmers are last. The major issue, here, is whether rice farmers attain the scale of economy. The size of farm in rice

farming is regarded as very important because it requires quite a big size to gain efficiency. According to other research, the economy scale of rice farm households is 5 to 10 ha in current situation. With regard to this, it may be said that many rice farmers have not attained efficient size, yet, because their average farm size is only 7,380 pyong.

TABLE 6 Size of Farmland by Cropping System

Unit: 100 pyong

CLASSIFICATION	Frequency	Mean of Farmland Size	Standard Deviation	F	LSD Multiple Range Test		
					(1)	(2)	(3)
(1) Rice	28	73.8	51.12				
(2) Rice-greenhouse	48	48.8	32.82	*	(1)		
(3) Rice-bare ground crop	58	85.8	41.23	5.000	(2)	*	
(4) Non-rice	18	35.4	22.01		(3)		*
TOTAL	151	58.8	40.70		(4)	*	*

* : $p < 0.05$

Note: Eight respondents who did not belong to the classification of cropping system were omitted in the analysis.

Source: Survey data from the interview of household heads.

3.2. Ratio of Lease and Purchase in Expanding Farm Size

3.2.1. Distribution of Households Leasing and Purchasing Farmland

In the previous analyses, farm size was varied by labor force, cropping system, and retained machinery. Thus, if farmers' leasing and purchasing behaviors are different by farm size, it can be said that lease and purchase are varied by such factors as labor force, cropping system, and retained machinery. (Table 7) shows that the ratio of farm households leasing or purchasing farmland increases as farm size increases. Such relationship is very clear in the case of the households leasing farmland. On the contrary, the ratio of the farmland purchasing households is higher in only those farming more than 3 ha, which is 20.5 percent. It means that lease is a popular method for the farmers to attain the increase of farm size. Purchasing method is mainly used by the farmers with relatively big farm sizes.

TABLE 7 Ratio of Households Leasing and Purchasing by Size of Farmland

CLASSIFICATION	Total Farm Household(A)	Leasing Farm Household(B)	B/A (%)	Purchasing Farm Household(C)	C/A (%)
Less than 1 ha	208	71	34.1	20	9.6
1 - 2 ha	156	83	53.2	20	12.8
2 - 3 ha	85	53	62.4	10	11.8
3 ha or more	44	32	72.7	9	20.5
TOTAL	493	239	48.5	59	12.0

Source: Survey data from the interview of village heads.

TABLE 8 Size of Land Leased and Purchased by Farmland Size

Unit: 100 pyong

CLASSIFICATION		Frequency	Mean of Land Size Increased	Standard Deviation	F	LSD Multiple Range Test			
Lease	(1) Less than 1 ha	71	12.3	5.99	79.429	(1)	(2)	(3)	
	(2) 1 - 2 ha	83	20.1	11.57		*	(1)		
	(3) 2 - 3 ha	53	38.6	21.65		(2)	*		
	(4) 3 ha or more	32	80.3	49.47		(3)	*	*	
	Total	239	30.0	31.02		(4)	*	*	
Purchase	Less than 1 ha	20	12.9	23.25	2.576 (n.s.)				
	1 - 2 ha	20	14.2	9.74					
	2 - 3 ha	10	19.7	12.28					
	3 ha or more	9	34.9	36.84					
	Total	59	17.8	21.86					

* : $p < 0.05$

Source: Survey data from the interview of village heads.

3. 2. 2. Size of Leasing and Purchasing Farmland

(Table 8) shows the sizes of land leased and purchased by the group of total farm size. It can be interpreted that leasing size becomes bigger

as farm size increases. In case of purchasing size, it was not significantly different according to total farm size. Only the household with 3 ha or more showed the trend of purchasing big farm size.

3.3. Future Farm Size Desired

3.3.1. By Age Composition and Cropping System

It may be hypothesized that if agricultural labors in a farmhousehold are aged or few they will be reluctant to adopt greenhouse farming which requires both capital and labor intensity. Another hypothesis is that those farmers who are aged or adopt greenhouse farming will be reluctant to increase their farm sizes.

(Table 9) shows that those farmers adopting rice-greenhouse or non-rice cropping system are reluctant to increase their farm sizes. In the case of rice-greenhouse or non-rice cropping system, the ratio of households with low-aged farmers who desire to increase farm size is less than 50 percent, although the ratio was higher than those without low-aged farmers. On the contrary, in the case of adopting rice or rice-bare ground cropping system, the households with low-aged farmers who desire to increase farm size is more than 50 percent. Thus, it may be said that future farm size is dependent on farm labor and cropping system.

However, the problem is why the farm size increase rarely happened. It is resulted from the fact that few farmers want to decrease their farm sizes. (Table 9) shows that majority of the farmers who do not want to increase farm sizes belong to 'maintain group' rather than 'decrease group'.

3.3.2. By Retained Machinery

Agricultural machinery as a substitute good for labor plays an important role to determine farmer's future farm size. (Table 10) shows that the agricultural machinery selected, except cultivator, affects farmer's future farm size. The farmers with tractor, combine, or rice transplanter want more to increase their farm sizes. It implies that in many cases there are needs for more farmland for the farmers with such agricultural machinery to gain high efficiency. And it may be considered that cultivator becomes a convenient tool for farming rather than an investing good for large farming.

TABLE 9 Future Farm Size Desired by Cropping System and Age Composition

CLASSIFICATION		Increase		Non-Increase		TOTAL	
		f	%	f	%	f	%
RICE	High age	5	35.7	9	64.3	14	100.0
	Low age	10	66.7	5	33.3	15	100.0
RICE-GREENHOUSE	High age	3	23.1	10	76.9	13	100.0
	Low age	15	42.8	20	57.1	35	100.0
RICE-BARE	High age	4	14.3	24	85.7	28	100.0
GROUND CROP	Low age	15	53.8	13	48.4	28	100.0
NON-RICE	High age	1	18.7	5	83.3	6	100.0
	Low age	5	41.7	7	58.3	12	100.0
TOTAL		58	38.4	93	81.8	151	100.0

$\chi^2 = 17.552$ df = 7 p < 0.05

Note : 1. "High age" is the household head aged 55 or more, without a farmer of 44 years old or less.

2. "Low age" is the household head aged 54 or less, or those aged 55 or more with farmers of 44 years old or less.

3. Eight respondents who did not belong to the cropping system classification were missed in the analysis.

4. "f" stands for frequency.

Source: Survey data from the interview of household heads.

TABLE 10 Future Farm Size Desired by Retained Machinery

CLASSIFICATION		Increase		Non-Increase		TOTAL	
		f	%	f	%	f	%
Cultivator	Retain	50	40.7	47	38.2	123	100.0
	No retain	11	30.6	20	55.6	36	100.0
Tractor	Retain	16	64.0	6	24.0	25	100.0
	No retain	45	33.6	61	45.5	134	100.0
Combine	Retain	15	62.5	6	25.0	24	100.0
	No retain	46	34.1	61	45.2	135	100.0
Transplanter	Retain	38	54.3	18	27.1	70	100.0
	No retain	23	25.8	48	53.9	88	100.0
TOTAL		61	38.4	67	42.1	159	100.0

Source: Survey data from the interview of household heads.

Note : As a result of chi-square test, tractor, combine, and transplanter have significant differences in future farm size at 0.05 level.

4. Policy Implications

The above results of the survey data analysis show that most farmers have not reached optimal farm sizes and there is a need for improvement in the farm size optimization program under the situation of land supply limitation. Based on the results, some policy implications may be suggested as follows.

4.1. Issue of Land Purchase and Lease

There may be a need to differentiate the goals of purchase and lease assistances. According to the productivity theory, there is no difference between land purchase and lease. In this point of view, market interest rate of land price must be the same as lease cost. However, in reality, the former is higher than the latter. It implies that land ownership is sociologically more meaningful than lease. Stabilization of management base and expectation of land price increase may be the cases. Self-owned farmland gives farmers production base continuously, and increase of farmland price is expected from the change of land use(Kim, et al, 1992).

Therefore, it may be desirable to differentiate the criteria to assist land purchase and lease. It seems that it is effective to focus on lease for those who are rapidly enlarging their farm size.

4.2. Effects of Land Supply Support Policy

Direct payment for retiring aged farmers must cover net income from farming. This may be realized by either lowering market prices of rice or raising direct payment subsidy. It would be more practical to raise the subsidy because rice price is not rapidly decreasing. Especially, the subsidy for those who sell their land must be much higher than that for those who lease their land. Moreover, the criteria of target group to get the subsidy must be lessened. Currently, it is limited to those who are aged 65 or more and have given farming.

4.3. Adoption of Ecological Perspective

Ecological perspective leads to consideration of rural communities in

terms of organism and environment. It helps to adopt systems approach. Thus, it leads to seeing a community⁸ as one management unit. In this case, composition of farmers and cropping system in a community is more important than criteria of individual farmhouseholds.

Ultimately, it might be desirable for key farmers to cultivate rice in large scale. However, in current situation, it is rational to find the best way for effective rice farm management through role sharing between key farmers and aged ones. In this point of view, topographical characteristics of community have significance for regional agriculture development policy. And optimal solutions for effective farming must be based on the rural community people's agreement.

4.4. Issue of Agricultural Machinery Utilization

It seems that there is a lack of concern on agricultural machinery utilization although the portion of machinery cost in farming is high. Current policy is susceptible to excessive supply of agricultural machinery because the subsidy criteria is based on the household unit. And anyone who is a major rice farmer gets a privilege to purchase the machinery with subsidy. As a result, it seems that agricultural machinery have been excessively supplied in that many people who have the machinery express their need to enlarge farm size. Thus, agricultural machinery subsidy policy should be revised to limit supply because there is limited land expansion.

However, it is unrealistic to directly control the number of agricultural machinery in a community unit. To make it reasonable, the subsidy for agricultural machinery purchase will have to be substituted for loan. If the existing subsidy is used for lowering the prices of the machinery, the government budget may be more effectively utilized.

4.5. Creation of Viable Farm Management Unit

In the situation with limitation on land expansion, it seems that there

⁸ In this study, community is defined as a village or several villages in which agricultural machinery and farm labor are exchanged.

may be systematic process to create viable farm units. At the household level, the farmers who have limits to enlarge farmland try to increase farm income through the change of cropping system. This is a kind of farm management strategy with labor and capital intensive farming through adoption of cash crops.

Thus, viable farm creation is related to strengthening farmers' management abilities as well as expanding farmland sizes. For this, there will be need for the creation of organizations as viable management units, and the increase of participation in marketing process.

IV. Conclusions

In the process of policy implementation, it is often assumed by policymakers or people who implement policies that policies are right and farmers are wrong. The results of the study, however, show that both are needed to adapt to the changing situations. The process of viable farm unit creation is limited in current farm size optimization program. Farmland supply is limited whereas there are many farmers who want to purchase or lease farmland and most farmers have not found the solutions for sizable farming.

First of all, in order to solve the problems, the farm size optimization program must be changed from household to community unit. In the program, such uniformed criteria as age, schooling, rice farm size, and land price should be flexible according to community situations. Direct payment project for fostering sizable farming must be strengthened to increase the supply of rice farmland.

The criteria to select beneficiaries for agricultural machinery need to be amended. Current policy does not consider such agricultural situation as labor, cropping system, and the number of agricultural machinery within a community unit as in villages. In order to solve this problem, the subsidy must be decreased and it must be transferred to loan.

It would be useful to make agricultural development planning on the village level in cooperation with farmers and government agents. It seems that community-based (village unit) agricultural development planning will help farmers to cope with agricultural

product trade liberalization. Major contents of the planning will be the adoption of locally specialized innovative cropping systems. Farmland use improvement project regulated in Land Act may also help this planning process. It is expected that the project will lead to community-level land utilization based on the cropping systems.

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