

OPERATIONAL STRATEGIES FOR IRRIGATION ASSOCIATIONS IN KOREA : FINANCIAL ASPECTS *

SHIM YOUNG-KUN **

EDWARD MARTIN ***

I. Introduction

Agriculture in South Korea is characterized by its heavy emphasis on production of food crops rather than on feed grains and pasture since arable land is limited. Food crops including rice, barley, wheat, pulses, potatoes, and other crops accounted for 68.3 percent of the total agricultural land utilization in 1987. Among food crops, rice is the most important and accounted for 71.1 percent of the total area planted. Pulses and barley accounted for 11.9 percent and 11.7 percent respectively.

Korea has had a long history of rice cultivation. Although no concrete records exist to show its beginning, there is evidence of the embankment of Byeok-Gol-Jae to use river water for irrigated farming in A.D. 330 (The Union of National Farmland Development Association 1967). For stable production of rice, irrigation is required because of a somewhat erratic distribution of rainfall during the three months of June through August, when 60-70 percent of the approximately 1,300 millimeters of annual precipitation falls. In addition, winter is cold leaving a frost-free period of only about 7 months suitable for cropping. Under such natural conditions, seed-beds for rice cultivation should be prepared in April with

* This research was supported by the International Irrigation Management Institute, Sri Lanka.

** Professor of Agricultural Economics, College of Agriculture, Seoul National University, Suweon, Korea.

*** Agricultural Economist, International Irrigation Management Institute, Digana via Kandy, Sri Lanka.

transplanting done mostly in late May. The rice transplanting season requires the most use of water, but the heavy rainfall usually comes later than this period. The timing and amount of rainfall usually does not match the water requirement at the different growth stages of rice cultivation. Since water is a crucial factor affecting the quantity and quality of rice production, irrigation has been a most important concern of policy makers from ancient times.

During the ancient feudal dynasty, most of the kings were concerned about facilitating irrigation in some way. However, no significant construction of irrigation facilities was initiated by them due to the lack of capital and technology. Their activities were limited to encouraging farmers to build weirs, embankments and reservoirs by themselves without any financial support from the Kingdom. In addition, all land belonged to the state — ownership by the people was not allowed. Thus any improvements of arable land and farming conditions were not beneficial to the farmers, but only to the king. Under this situation, most farmers were not concerned with building irrigation facilities, even simple ones.

Rice farming without sufficient irrigation facilities but relying heavily on rainfall is subject to natural disasters. Such disasters occurred quite often in ancient years. Chosen Dynasty (1392–1909 A.D.) records show that there were 89 major droughts in 482 years, 89 floods in 492 years, 20 major damaging storms in 339 years, 22 major damaging frosts in 354 years, and 18 major damaging snows in 474 years (Japanese Government General in Korea 1928).

Such disasters, of course, were not suffered uniformly country-wide, nor were they confined to specific areas all the time. However, when we simply add up all such natural disasters, it can be said that rice production was damaged once every three years throughout the 500 years of the Chosen period. Under these circumstances, it was difficult to achieve a stable yield and to increase agricultural productivity.

It is reported that there were only some 6,000 embankments and 20,000 weirs built by kings during the Chosen Dynasty (Japanese Government General in Korea 1937). However toward the close of the dynasty, more than a half were not very effective. Most of them were old and not well maintained. Irrigation development in Korea has a long history, but the early facilities were small, covering only specific areas and serving a small number of farmers. With such simple and small irrigation systems, farmers did not have a formal organization to maintain irrigation facilities and distribute water effectively. In 1906, the first water office was set up at the ministry level, and it started to establish irrigation associations.

II. Brief History of Irrigation Associations

1. Developments Prior to 1945

The first irrigation decree entitled "Ordinance of Irrigation Association" was proclaimed by the Ministry of Finance in March 1906 (Korean Farm Association 1944b). In July 1907, guidelines for the establishment of and model regulations for irrigation associations were announced. The guidelines enabled farmers to organize associations for the purposes of maintaining and improving irrigation facilities and ensuring effective distribution of water.

The ordinance was composed of only 13 articles (Annex 1), but it represented a milestone in the organization of irrigation associations.

In particular, the ordinance authorized all irrigation associations to maintain irrigation facilities and reclaim arable lands by imposing fees on member farmers and requiring labor contributions from them. After enactment of this ordinance, the Ok-ku West Association with a service area of only 490 ha, was the first to be organized in August 1909. An additional five associations with a total service area of 7,340 ha, were formed over the next two years.

In 1910, the Japanese government took over the whole of Korea. They abolished the kingdom system and enacted private ownership of land in order to pursue a capitalistic economy. This system provided an incentive to accumulate wealth through increased production in farming. However, the number of irrigation associations was not increased significantly. Only six additional associations were organized, including Taejong Irrigation Association having the largest service area of 11,093 ha. By 1917, there were a total of 12 associations covering about 24,750 ha of service area.

The government believed that slow action of organizing new associations was due to shortcomings in the previous ordinance, and, thus, it promulgated another Act on Korea Irrigation Association in July 1917. This consisted of 42 articles (Korean Farm Association 1917) and set forth details on the establishment, abolishment, merger or division of irrigation associations, as well as on change in the service areas covered, finance, and the operation of the associations. In particular, these legal measures provided a basis for the collection of association fees, needed for the operation of the association, by methods comparable to those used for the collection of other taxes. In addition to this Act, other supplementary regulations were adopted in the same year.

In the years following the setting up of the act and regulations, rice prices tended to increase continuously. To supply an increased amount of rice to market, the government, in 1920, launched a policy program for increasing rice production. Eventually the number of irrigation associations increased substantially, in the drive for more production and higher income. However, many of the associations encountered difficulties in collecting association fees from farmers.

In order to supplement the financial shortage of these associations, the government promulgated another act on Korean Land Improvement in 1927. This act was amended in 1928 and provided the basis for a government subsidy to support the maintenance of associations. In consequence, the existence of irrigation associations was made more feasible, as was the establishment of new associations. In 1933, there were 196 associations with an area of 226,793ha under irrigation (Annex 3). However, many associations failed to attain their original targeted service areas and number of member farmers because of the continuing decline in rice prices during the worldwide depression in the 1930's as well as unreliable management by the association staff.

To identify the financial status of each association, in 1930 the government undertook to group irrigation associations into three classes (Japanese Government General in Korea 1936). Five associations were classified as "C". These needed to be abolished because the member farmers lacked the ability to pay for the annual operation expense of their associations. The outstanding managerial debts of these associations, excepting a limited portion payable by the members, were paid by the government to the lenders and lending institutions in lieu of the associations.

Another 35 associations that had financial difficulties, but with the potential for members themselves to improve to some extent the financial status were classified as "B". The government made arrangements for these that involved a reduction in the rate of interest to be paid on their loan from the government and a lengthening of the period of amortization. In addition, a portion of the annual installment which was deemed to be beyond the capability of farmers' repayment was financed by the government as a new loan with a low interest rate. In short, these associations were not exempt from the repayment of loans, but had their pay-back period for the amount loaned by the government prolonged an additional 20 years following the end of the 30 original annual installments. The government also appointed the heads of most of these associations, for reasons of promoting effective operation, and covered a part of their salaries.

Another 28 associations, classified as "A", were judged to have relatively sound operations and the ability to continue the functions of associations. For better operation, the government decided to extend the period of loan amortization in order to lighten the burden of annual repayments by the member farmers.

Along with these measures, which applied to 68 associations, another policy was implemented for merging small associations with less than 200 ha. of service area. The purpose of this measure was to reduce the burden of member farmers to cover the operating expenses of these small associations that have a similar number of staff as bigger associations. In fact, the government was not in a position to provide subsidies to all associations, but intended to make them self-financed units able to cover their operation costs. This program, however, did not have much effect.

The government attempted to solve the problem of successful operation of each association through the establishment of the Union of Irrigation Association in July, 1940. Following this, the number of irrigation associations increased rapidly. A total of 353 irrigation associations covering an area of 120,486 ha were organized in the six years from 1939 to 1945 (The Union of National Irrigation Association 1956). However, many of the associations built during this period were not properly based on the size of area served and number of members, and, thus, many of them did not function as originally planned.

2. The Period from 1945 through 1960

In August 1945, Korea was released from Japanese rule — the country, however, was divided into South Korea and North Korea. At the same time, the existing 583 irrigation associations were divided, and 425 associations covering 188,167 ha belonged to South Korea (the Union of National Farmland Irrigation Association 1956; Annex 4).

However, many of these associations faced financial difficulties and were not in a position to stand and operate on their own support. They suffered from a shortage of reliable staff members, due mainly to the political and economic disruptions in the late 1940s. In 1948, an independent Korean government was founded to replace the military government. The new government gave first priority to increasing rice production to feed the people sufficiently. It also took an action to solve the financial problem of the existing irrigation associations through the payment of salaries for the heads of associations and the provision of institutional loans. However, this kind of government support was not very effective in activating the operations of moribund associations. The financial status of

many of these associations was already very poor, due to the low rate of fees charged and the poor collection rate of even these small fees. Nevertheless, a total of fifteen new associations were organized during these three years, 1945–1948, covering a total service area of 25,427 ha.

In 1952, new legislation for the Special Account for Farmland Improvement Programs was passed, laying emphasis on provision of funds for the construction of new irrigation facilities by individual associations. In the following year, the Ministry of Agriculture and Forestry realized that the best way of revitalizing irrigation associations would be to pursue some new farmland improvement measures. Individual associations were allowed to recruit technical staff on their own, and they were also permitted to choose between collection of fees in cash or in paddy, rather than the strict cash payment requirement that had been in force.

Stimulated by the hope of receiving special funds from the government for construction of irrigation facilities and for covering a part of operation expenses, the number of irrigation associations increased greatly from 442 in 1951 to 587 in 1953. The collection rate of association fees increased as the years passed. However, because of the relatively high level of salaries paid to staff members and the increasing operating costs due to inflation for all materials, most of the associations were not rid of their financial problems. Nevertheless, the number of irrigation associations increased continuously between 1945 and 1960. However, the average service area of each association remained almost the same, with only a light increase from 443 ha in 1945 to 481 ha in 1960. Many associations could not cover their operation costs with the revenues from small service areas, and, eventually, many of them were closed down.

In order to ensure the continued operation of all associations already organized, the government recommended the merging of individual associations into ones with enlarged service areas. Whenever there was merging among associations, the government believed that they could be financially viable through savings from the reduction in the number of staff members and the expansion of service areas. The Ministry of Agriculture, thus, dispatched detailed guidelines for such mergers to all of the provincial governments in 1959. However, the mergers were not realized to the extent expected by the government because of differing interests among the associations. Only 52 out of the 308 associations organized during the period from 1950 to 1960 were merged with other associations. The total number of irrigation associations increased from 442 in 1950 with a total service area of 195,656 ha to

695 with a total service area of 334,578 ha by the end of 1960 (Annex 5).

3. The Period since 1960

The government enacted a new law on Temporary Measures in order to increase the viability of existing irrigations associations through merging small ones into larger organizations in 1961. Through this process, it was possible to exclude insolvent associations that had been formed during the later part of the 1950's without a sound economic basis for covering operation costs.

Following this legislation, the government promoted merging among associations, and this resulted in a reduction in the number of associations from 695 in 1960 to a total of 198 in 1963. This merging of associations resulted eventually in a decrease in the number of staff members from 3,373 in 1960 to 2,532 in 1963 (Agricultural Development Corporation 1976). However, the financial difficulties of associations were not easy to wipe out because of the shortage of available funds and poor management of the irrigation facilities.

As a further step to remedy financially difficult associations, another Law on Long-Term Disposition of Land Improvement Projects was legislated in March of 1963. Under this law, the repayment period for loans used for construction of irrigation facilities was extended from fifteen to thirty years, beginning at the end of a five-year grace period. In an effort to increase the collection rate of association fees, the service areas that could not receive enough water from the facility were exempted from payment of water fees. Furthermore, the government provided a special subsidy to the associations to cover the amount of uncollected water charges—a total of 1,914 million won.

The merging of a number of associations to achieve economically sound operations resulted in another problem of managing with a large service area. In some cases where the mergers led to just one association within two counties, the scattered locations of the service areas made it difficult to provide effective management services to the farmers. These problems led, in 1964, to the amendment to the Law of Land Improvement Projects to require more than one association in a county. Based on this amendment, twenty-four associations reverted back to their status prior to the merger. Thus, by the end of 1965, the number of associations stood at 222, serving a total area of 353,211 ha (Annex 5).

Both the Act on Korean Land Improvement legislated in 1927 and the Law of Land Improvement Projects enacted in 1961 were intended to promote the expansion of irrigation and drainage facili-

ties to increase rice production. With continued economic growth in Korea since 1962, the population and per capita consumption of rice increased. In order to supply enough rice, government endeavoured further to promote increased rice production.

In January 1970, the Law for Rural Modernization Promotion was legislated, replacing the 1961 Law of Land Improvement Projects. This new law, however, was concerned not only with land improvement and irrigation problems, but also with the adoption of new farming technology to save labor and increase productivity. Under the new law, the Agricultural Development Corporation (ADC) was established through a consolidation of the Union of Land Improvement Associations, originally organized in 1940, and the Groundwater Development Corporation. The ADC is a semi-autonomous, government-funded enterprise which functions under the auspices of the Ministry of Agriculture and Fisheries. As a special juridical entity, the ADC is involved in the design and construction of large irrigation, drainage, and flood control projects.

In September 1971, the Ministry of Agriculture changed the name of the Land Improvement Associations into Farmland Improvement Associations (FLIAs). Following this measure, the Ministry sent out additional guidelines designed to promote efficient operation and maintenance of the associations. The FLIAs were then linked with the Union of Farmland Improvement Associations. This union functions to assist the member associations in preparing various irrigation improvement projects in relation to maintenance and operation.

In spite of reducing the number of associations, many FLIAs continued to suffer from difficulties in financing their operation and maintenance expenses. To remove this problem, the Ministry decided to proceed with further mergers of small FLIAs. As was the case with earlier mergers, it was hoped that this would improve the financial status of the associations by reducing their operating expenditures per ha of service area. As a result, by 1973, 266 FLIAs were merged into 127, and the size of the staff of the associations was also reduced.

In April of 1978, the Union of Farmland Improvement Associations was replaced by a public corporation, the Federation of National Farmland Improvement Association (FNFLIA). The Federation also continued to merge small associations, reducing the total number to 103 by 1980. Merging of associations was then stopped, and the number has remained the same (Annex 6).

In summary, the necessity to supplement the rain water supply at critical times for rice cultivation has strongly influenced irrigation from the ancient times. In 1909, an irrigation association was orga-

nized, and thereafter the number of associations has continuously either increased or decreased. Many associations were set up whenever the government provided assistance, but such associations could not continue their functions without financial assistance from the government.

Within the limited service areas, there were too many associations servicing small areas. The government introduced a program to merge these small associations into rather large-sized ones that can be sustained as economically viable organizations. By 1960, the total number of irrigation associations had fallen to 103, and this number may not change in the near future.

III. Current Status of Irrigation Associations

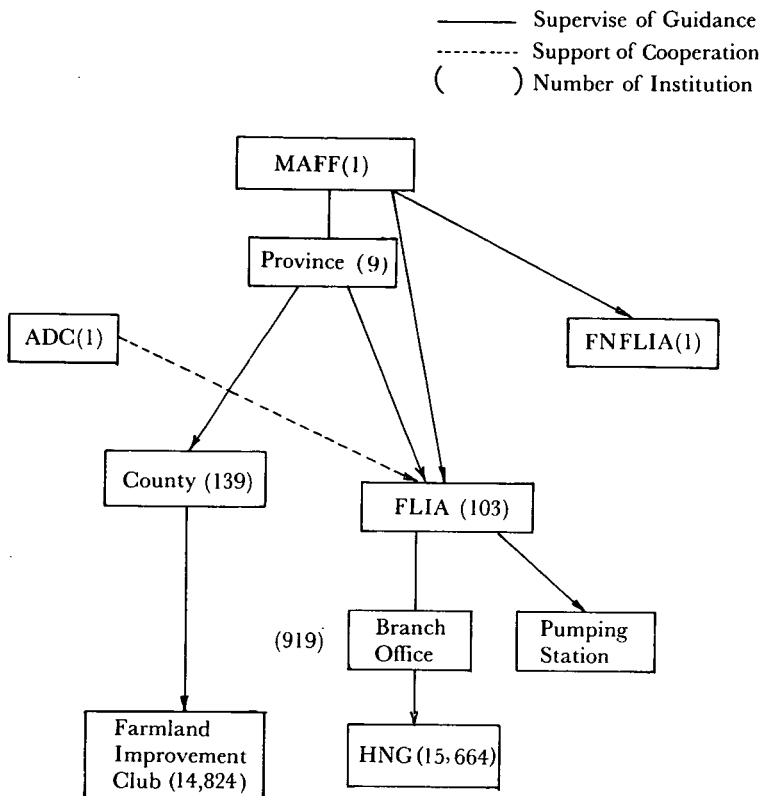
1. Types of Organization

Irrigation Associations are organized on a two level system. At the administrative county level, there are 103 farmland improvement associations. At the national level, there is a federation of all the 103 FLIAs. However, it is not a simple federation for pursuing only matters of common interest and functions of member FLIAs, but it also does some other business different from those of FLIAs. The federation, therefore, is not the supervising institution for the member FLIAs, but rather an organization interacting with FLIAs.

Besides such institutional organizations as FNFLIA and FLIAs, there are two kinds of informal farmer's groups which are organized by farmers to maintain irrigation facilities, namely the Heung-Nong-Gye (HNG) and the Farmland Improvement Club (FLIC). The difference between these two groups is that Heung-Nong-Gyes are organized under the guidance and on the request of farmland improvement associations, whereas the Farmland Improvement Clubs are autonomous organizations of farmers who are using water from small-sized and often old irrigation facilities that cover less than 50 hectares and do not belong to the service area of any FLIA.

As shown in Figure 1, both FLIAs and the FNFLIA are in a position to receive guidance and supervision from the government, but FNFLIA has only a supporting and cooperating relationship with FLIAs. The FLIAs are organized according to administrative zones, and each FLIA has about 9 branch offices in the service area based on the irrigation facilities or units. In connection with FLIAs, there are 14,915 HNGs which were organized in 1981. The major differences in the objectives and functions of FLIA and FNFLIA can be illustrated as follows.

FIGURE 1 Interrelationship between FLIA and HNG



A. Farmland Improvement Association (FLIA)

A total of 103 Farmland Improvement Associations actively functioned in 1983. The major objectives of the farmland improvement associations are to operate and maintain irrigation facilities in the service areas, to install additional facilities for improving farm land, and to supervise land consolidation work for increasing productivity (Federation of National Farmland Improvement Association 1988). In order to achieve these objectives the Law for Rural Modernization Promotion stipulates in detail that the following works should be undertaken in the service areas: implementation of small-sized irrigation and drainage facilities, operation and maintenance of existing facilities for farmland improvement, promoting land consolidation, possible reclamation of arable land, restoration of damaged facilities or farmland ruined by natural disasters, and other relevant actions required for the achievement of association goals.

B. The Federation of National Farmland Improvement Association(FNFLIA)

In 1978, all of the 103 FLIAs joined to organize the FNFLIA, and the functions of the Federation were illuminated by the law for Rural Modernization Promotion. These functions include research and guidance for the common benefit of the member associations, training of FLIAs' staff members, design and supervision of farmland consolidation projects at the request of member FLIAs, and the carrying out of projects entrusted to it by the member associations (Federation of National Farmland Improvement Association 1984).

In addition to these functions, FNFLIA provides loans to FLIAs for covering shortages of operating funds on a short-term basis. The source of these loans is reserve funds deposited with FNFLIA by the financially-strong FLIAs. Small-sized FLIAs could not easily borrow funds for their operation costs from a commercial bank without suitable mortgage. This kind of arrangement made by FNFLIA is, thus, quite helpful for both the associations which borrow money from FNFLIA and the associations that deposit money at a reasonable interest rate for an uncertain time period.

The FNFLIA is a large organization in terms of the number of member associations and staff members. The head office is organized with two board directors, three departments and 10 divisions. Under the federation, there are nine branch offices, one in each province, for facilitating their functions and the relationship between member associations and the central office.

2. Service Areas of FLIAs

In 1987, about 2,143 thousand hectares were cultivated, of which 63.1 percent was classified as paddy fields and 36.9 percent as upland. A total of 1,352 thousand hectares of paddy field can be categorized according to irrigation conditions; 72 percent is irrigated paddy and 28 percent is rain-fed. The service areas of FLIAs are all categorized as irrigated paddy, and they account for 50.2 percent of irrigated paddy. The remaining irrigated paddy belongs to other farmers' groups, such as Farmland Improvement Clubs.

This means that about half of the total irrigated paddy fields do not belong to service areas of FLIAs. Most of these paddy fields are located in either terraced hill-sides or valleys, and, thus, the irrigation systems are all of a small scale and at many different locations. As a matter of fact, FLIAs do not control irrigation facilities that cover less than 50 hectares since it is costly to manage such small, widely dispersed systems.

The total irrigated area has increased from 538 thousand hectares in 1965 to 976 thousand hectares in 1987. The government

has recently initiated a long-term plan for increasing the irrigated area by about one percent of the total paddy fields each year, and it seems that the plan has been to increase the rate to some extent. However, the proportion of the service area of FLIAs has remained at more or less 50 percent of the total irrigated areas as shown in Table 1.

The country is mountainous and does not have large plain paddy fields, and, thus, there are many small associations having a service area of less than 3,000 ha. In 1965, 201 out of the total 222 associations had service areas of less than 3,000 ha. Thereafter the number of such small associations has continuously decreased to 79 out of 126 in 1975, and further decreased to only 38 in 1987 through the merging of small-sized associations (Table 2). Yet, four very small associations with service areas of less than 2,000 hectares each still exist. These small associations could not be merged further because each is located a long distance from other associations.

In Table 2, it is shown that the number of associations which had service areas of less than 3,000 hectares constituted 90.6 percent of the total of FLIAs in 1965. This percentage decreased to 62.7 percent in 1975, and it further decreased to 36.9 percent in 1987. The area covered by these associations also decreased from 55.3 to 12.4 percent during the same period.

Among the several types of irrigation facilities owned by the 103 FLIAs, reservoirs are the most important, supplying about 73.0 percent of the total irrigated area. Next to reservoirs, pumping stations accounted for about 17 percent of the total irrigated land as shown in Table 3. The other facilities are very minor in terms of the amount of irrigated land covered.

By contrast, the irrigated area belonging to non-FLIAs shows differences in the relative importance of irrigation facilities. Reservoirs are the most important, but the relative percentage of 32.9 is

TABLE 1 Service Area of FLIAs in Relation to Irrigated Paddy Fields

Unit : Area, 1,000 ha

Year	Total Area of Paddy (A)	Total Irrigated Area (B)	Service Area of FLIAs (C)	Percent	
				C / B	C / A
1965	1,286	538	285	53.0	22.2
70	1,284	745	317	42.6	24.7
75	1,277	790	363	45.9	28.4
80	1,307	893	424	47.5	32.4
85	1,325	948	471	49.7	35.5
86	1,329	965	480	49.8	36.1
87	1,352	976	490	50.2	36.2

Source : MAFF and ADC.

TABLE 2 Distribution of FLIA by Planned Development Area

Year	Total		less than 3,000ha			
	Number (A)	Area (B)	Number (C)	Percent C / A	Area (D)	Percent D / B
1965	222	353,211	201	90.6	195,433	55.3
70	266	407,817	241	90.6	228,763	56.1
75	126	451,950	79	62.7	117,217	25.9
80	123	523,366	71	57.7	113,928	21.8
84	103	552,919	40	38.8	72,013	13.0
86	103	568,928	38	36.9	70,387	11.7
87	103	579,151	38	36.9	72,090	12.4

Source : Union of National Irrigation Association, 1956, and MAFF and ADC, 1988.

TABLE 3 Relative Importance of Irrigation Facilities Owned by FLIAs, 1987

Irrigation Facilities	FLIAs		Non-FLIAs	
	Total Area Irrigated ha	%	Total Area Irrigated ha	%
Reservoir	357,323	73.0	159,851	32.9
Pumping station	83,462	17.0	52,985	10.9
Pumping & drainage station	34,232	7.0	450	0.1
Drainage station	38	—	196	—
Weir	11,615	2.4	106,899	22.0
Infiltration gallery	2,967	0.6	20,399	4.2
Tube well	—	—	14,897	3.1
Other	—	—	130,437	26.8
Total	489,637	100.0	486,114	100.0

Source : ADC.

much lower than the 73.0 percent for FLIAs. The relative weight of weirs for the non-FLIA area was 22 percent, very high compared with 2.4 percent for FLIAs. The Table indicates that FLIAs supply irrigation water mostly from large-sized reservoirs and pumping stations that have been built recently, but non-FLIA systems rely heavily on reservoirs and weirs.

3. Groups of Member Farmers

A. Heung-Nong-Gye

The average size of farmland improvement associations has been increasing as a result of merging small-sized associations. Due to the increased service areas and number of member farmers, the work load of maintenance and operation has also increased. In order to foster communication for a better relationship between FLIA and member farmers, it was recommended by the government that a Heung-Nong-Gye(HNG) be organized in each farm village. The term Heung-Nong literally means promotion of farm-

ing activities, and Gye implies a self-help or mutual-helping group. The leader of an HNG is an agent of the FLIAs, and communication with farmers is facilitated through him.

HNG was initiated in 1974 at the Kumgang-Pyungtaek Farmland Improvement Association. At the time construction was completed, this association had the largest service area among FLIAs. Since the service area was large, the association initiated formation of HNG by the beneficiary farmers in each farm village. Farmers also felt that it would be good to have such an organization to help in transmitting information about what is happening in the association through the leader of HNG. With this idea in mind, many HNGs have been organized at the farm village level since then.

As shown in Table 4, the number of HNGs has greatly increased along with the increase in the number of FLIA members and the service area of each association. However, many of these HNGs are not as active as originally expected by the Government.

B. Farmland Improvement Clubs

Farmland improvement clubs are autonomous organizations of farmers and differ from the HNGs. The clubs are purely autonomous in that they repair and manage their irrigation systems by themselves. Most of the facilities are small-sized and of a traditional type. Farmers organized these clubs to meet their need for irrigation in small service areas. But, a weakness of the farmland improvement clubs is that if and when disputes occur regarding the allotment of expenses incurred in the repair of irrigation facilities or if some members are delinquent in the performance of the club's activities, there is no effective way to resolve these problems.

In short, farmland improvement clubs have no direct relationship with any FLIA. It has been a traditional type of organiza-

TABLE 4 Number of HNGs and FLIA Members

Year	Number of FLIAs	Number of Irrigation Units	Total Number of FLIA Members	Number of HNGs	Total Service Area
1971	268	—	647,998	—	318,597
72	266	—	647,469	—	327,250
73	127	1,093	656,881	—	333,699
74	127	1,283	657,311	11,642	339,591
75	126	1,329	656,262	12,030	358,591
80	123	1,464	813,377	14,377	419,910
84	103	912	853,339	14,915	453,059
85	103	915	861,705	15,056	462,223
86	103	912	848,931	15,341	475,428
87	103	919	863,180	15,664	480,792

Source : ADC and MAFF. 1980 and 1988.

tion in the farm village from old times. In addition, it is rare for them to receive financial grants from local governments unless they incur unexpected damages as a result of natural disasters. However, the club is a real organization, voluntarily initiated and operated by farmers themselves at the village level.

Traditionally in Korea, there have been various kinds of self-help units such as Due-re, Pum-ah-shi (exchange in farm work) and the like. For irrigation purposes, farmers have organized themselves under the names Irrigation-Gye, Bank Keeping-Gye and Weir-Gye. Even if the irrigation facilities were very simple and of a small size, an individual farmer would not gain much from his own weir. So it was desirable for village farmers to organize for using the water together.

The history of farmland improvement clubs extends over many years, but there are no data available regarding the actual time of initiation. A survey indicated that such clubs, designed to mobilize farmers and make them repair and maintain small reservoirs and weirs by themselves, existed as early as 1906. At present, the 1961 law on Acceleration of Rural Modernization requires them to register as farmers' groups.

In 1987, there were 14,824 farmland improvement clubs that had 541,237 member farmers and served a total area of 198,326 hectares. Considering the fact that the total irrigated area of non-FLIA was 486,114 hectares, 40.8 percent of it was managed by farmland improvement clubs. Table 5 shows the relative importance of different types of systems managed by FLICs.

Among the irrigation facilities owned by FLIC, reservoirs were the most important, covering 46.7 percent of the total area and 51.3 percent of the total farmers. Next in importance to reservoirs, were weirs, covering 26.4 percent of the total area irrigated and

TABLE 5 Status of Farmland Improvement Clubs, 1987.

Irrigation Facility	Number of FLIC Organized	Benefitted Area		Membership
		ha	%	
Reservoir	7,857	92,566	46.7	277,749
Pumping station	1,366	23,071	11.6	59,805
Pumping & drainage station	—			
Weir	3,708	52,371	26.4	148,729
Infiltration gallery	657	8,255	4.2	22,611
Tube well	659	2,299	1.2	7,491
Feed canal	29	422	0.2	1,924
Sea dike	526	18,899	9.5	21,905
Other	22	443	0.2	1,023
Total	14,824	198,326	100.0	541,237

Source: Agricultural Development Corporation, 1988.

27.5 percent of all the farmers in 1987.

4. Staff Members of FLIAs

The Ministry of Agriculture, Forestry and Fisheries has established a set of guidelines for staffing individual FLIAs in order to minimize the total staff salary expense. The guidelines specify the number of departments, divisions, and staff members permissible in each FLIA based on the size of service areas. As a result, associations that have similar service areas have the same number of departments and divisions, and about the same number of staff members as shown in Table 6.

For instance, the association that serves from 25,000 to 35,000 ha can set up four divisions and 13 sections, but a small association that has a service area of 5,000–8,000 ha should have only one division and five sections. Of the total, 67 percent of FLIAs have service areas of less than 5,000 ha and, thus, they can set up only 2 or 3 sections such as general affairs, finance, and development.

Since the guidelines stipulate a specific limit on the number of staff in each division and section, the number of divisions determines the total number of staff members permitted in an association. Because each association must have government approval for its budget every year, the associations have to set up what the government requests. As shown in Table 7, the number of regular

TABLE 6 Divisions in Number of FLIA by Benefitted Area, 1987

Benefitted Area	No. of FLIAs	% ^a	No. of Divisions	No. of Sections
Less than 3,000 ha	38	36.9	—	2
3,000 to 5,000	30	30.1	—	3
5,000 to 8,000	23	21.3	1	5
8,000 to 16,000	8	7.8	2	7
16,000 to 25,000	1	1.0	3	11
25,000 to 35,000	1	1.0	4	13
More than 35,000	2	1.9	4	16

Source : FNFLIA.

TABLE 7 Number of Personnel Engaged in FLIAs

Year	Regular Staff			Temporary Workers
	Administrators	Technicians	Total	
1970	1,954	3,022	4,976	2,653
76	1,365	2,799	4,164	2,035
80	1,259	3,298	4,577	—
85	1,253	2,602	3,856	4,632
86	1,257	2,615	3,872	4,697
87	1,217	2,671	3,888	4,306

Source : ADC, 1976 ; MAFF and ADC, 1986, 1988.

staff is fairly constant. The hired temporary workers supplement the regular work force.

The number of staff members set out by the ministry, based only on the service area, is not well suited for the work load in individual associations because each association has different irrigation facilities and number of distribution units. In order to correct this discrepancy, particularly in the rice transplanting season, the government allows FLIAs to hire temporary workers. The number of regular staff can be minimized by using such temporary workers, thus reducing the operation costs of the associations. For this reason, the total number of regular staff tended to decrease, from 4,976 in 1970 to 3,888 in 1987, but the temporary workers have increased in number during the last 17 years, from 2,653 in 1970 to 4,306 in 1987.

N. Finance of the 103 Farmland Improvement Associations

To increase production of food grains to achieve self-sufficiency, the government has strongly supported farmland improvement projects with various policies and programs. In particular, the government has put emphasis on the improvement of irrigation facilities. This is the only hope of substantially increasing production of rice, the most important crop in terms of being the major staple food and an income source for farmers.

1. Financial Sources of Project Costs

The government has invested a huge amount of capital in irrigation development. In the case of 1987, total investment amounted to 640 billion won (equivalent to about 915 million US dollars) as shown in the Appendix Table 1.

When we break down the sources of financing for the project costs, the government subsidy from both central and local governments was the most important, totaling 78.9 percent of the total capital investment for projects executed in 1987. Farmers must bear 6.7 percent of the total costs during the time of project implementation. On the whole, the subsidy by the government was the most important element of funding for constructing irrigation facilities regardless of the size of service areas.

Whenever the government decides to build a new irrigation project, there is a policy to assign the project to implementing institutions based on the size of the project areas. Simultaneously, the rates of project cost sharing between the central government, the local governments, and farmers is established.

Large-scale, new projects that cover over 3,000 ha are undertaken by the Agricultural Development Corporation. These large projects are mostly funded by the subsidy of the central government and by foreign loans arranged by the government. The level of subsidy rendered by the central government for project costs of new facilities varies from 50–85 percent, depending on the size of the project and the type of facility constructed.

In the case of reservoirs, the government covers 70 percent of the project costs, and it subsidizes 85 percent of the construction costs of pumping stations. However, land consolidation and land reclamation projects receive nominal subsidies of only 50–60 percent from the government. Upon completion of a project, the installed facilities are passed over to FLIAs. The farmers benefitting from the project need to pay about 15–30 percent of the total construction costs in the form of long-term loans under a 30 year amortization plan after a grace period of 5 years.

In addition to the subsidy from the central government, local governments also provide subsidies for the construction of small size reservoirs, pumping facilities, weirs, and land consolidation at 20 percent of the total cost required (Appendix Table 2).

Medium scale projects covering between 500–3,000 ha can be implemented by the FLIAs themselves. However, a FLIA can undertake such projects within its existing service area. Usually the project costs of this size of project are covered by subsidies and with loans from the government, with the subsidy rates the same as described above for large-scale projects. At any rate, farmers who are going to benefit from the facility are not required to cover any part of the construction costs until 5 years after construction has been completed. Of course, they are required to cover all of the O&M costs themselves after taking over the constructed facilities.

Small-scale projects, usually less than 50 ha, in the non-FLIA service areas are implemented by farmer groups, such as farmland improvement clubs, under the supervision of local county governments. These projects are largely financed with subsidies both from provincial and county governments which cover 70 percent and 20 percent of the project costs, respectively. Thus, farmers who benefit from these projects need to pay only 10 percent of the project costs by installments over 30 years. However, in the case of converting upland into paddy fields, the total costs are shared equally between the governmental subsidy and the farmers through loans.

As a result, the area of irrigated fields has steadily increased since the end of the Second World War in 1945. As of the end of 1987, 72.2 percent of all paddy fields had irrigation systems. The remaining 21.8 percent were still rainfed or only partially irrigated

fields. Looking at 1965 when the ratio of irrigated area to total paddy fields was only 41.9 percent, we see that the figure in 1987 represents an increase of 30.3 percent. By 1987, 437,387 more hectares of land were irrigated than in 1965 as shown in Table 8.

Major sources of funds for construction costs were the capital borrowed from external loans and the governmental subsidy. Previously, borrowed funds were more important than the subsidy, but this has recently changed in favor of the subsidy because consideration has been given to farmers' burden of repayment.

During the period from 1945 to 1987, the total amount of capital borrowed from outside of FLIAs for the construction and improvement of existing irrigation facilities reached 799,823 million won (equivalent to about US \$114 million) including principal and interest. Only 11.9 percent of the total amount borrowed has been paid back by farmers. Also, the government covered a part of the loan by writing off some loans or assisting with the additional costs that stemmed from devaluation of the Korean won in the 1970s. This subsidy has covered about 27.8 percent of the borrowed capital. There is, thus, still a huge amount of 482 billion won to be paid back (Table 9).

2. Financial Status of All FLIAs

A. Annual Revenues of Ordinary Budget

In principle, each association should cover its own budget for the entire O&M costs, plus some portion of the amount borrowed for construction. The total amount of association fees to be collected is the major source of funds for an association. As the assessment of association fees to be collected from individual farmers depends on their returns from the use of irrigation facilities each year and the implementation cost of irrigation facilities, a six grade basis for assessment has been established by the government. This is

TABLE 8 Status of Irrigated Paddy Fields by FLIAs

Year	Total Area	Percent of Irrigated Paddy	Unit: Area, 1,000 ha			
			FLIAs		Non-FLIAs	
			Area	Percent	Area	Percent
1965	1,286	41.9	285	22.2	253	19.7
70	1,284	58.0	317	24.7	428	38.3
75	1,277	61.9	363	28.5	426	33.4
80	1,307	68.4	424	32.5	469	35.9
85	1,325	71.6	471	35.6	477	36.0
87	1,352	72.2	490	36.2	486	36.0

Source: MAFF, 1981 and 1988.

TABLE 9 Long-Term Borrowing and Repayment by 103 FLIAs, 1945–1987

Item	Total Amount	%	Unit : Million Won	
			1946–1986	1987
Borrowings				
Principal	366,947		334,184	32,763
Interest	432,876		388,981	43,895
Sub-total	799,823	100.0	723,165	76,658
Repayments				
Principal	30,643		28,643	2,000
Interest	64,464		55,749	8,715
Sub-total	95,107	11.9	84,391	10,716
Government Subsidy				
Principal	101,602			
Interest	104,103			
Other	16,858			
Sub-total	222,563	27.8		
Outstanding				
Principal	234,702			
Interest	247,452			
Sub-total	482,154	60.3		

Source : MAFF.

based on the previous status of the land, and the grades are forest land, land for miscellaneous use, orchard land, dry lands, rainfed rice paddies and irrigated paddies.

Irrigation facilities provide benefits at different rates to the member farmers. When miscellaneous lands of dry lands, for instance, are converted into paddy fields by extensive irrigation facilities, the owner of such lands obtain more benefit than those who already owned paddy fields in the areas. Those who benefit more than others should shoulder more of the fees of an association. For such reasons, the amount of association fees varies greatly, according to the type of land before installation of irrigation facilities. For instance, the owner of land which was transformed from miscellaneous use land into paddy fields pays heavier fees than one who owned dry lands turned into paddy fields. The fees on original paddy fields are smallest because such a farmer benefits relatively less from the irrigation facilities.

The determination of the annual amount of association fees depends largely on the amounts necessary for operation and maintenance of irrigation facilities, reserves for depreciation of facilities, reserves for retirement pensions for staff members, payment of the principle and interest on short-term borrowed working capital, and repayment of long-term loans used in the project.

In contrast, some small irrigation units with separate management due to their location remote from other associations collect association fees only to cover the costs of damage caused by floods

to reservoirs. The farmers in such areas are usually paying lower water fees than farmers in other service areas. However, such associations are very small, both in terms of size of service area and number of member farmers.

Usually the water fees are the most important revenue of associations, accounting for 80.4 percent of the total annual revenue of ordinary budget in 1984 and 71 percent in 1987 (Table 10). The relative importance of water fees to the total annual revenue decreased between the years of 1984 and 1987, though the total amount has increased due mainly to the increase in the price of rice. Such water fees are intended to cover the annual operation and maintenance costs of FLIAs and the amount to be paid back to the government for borrowed capital used for building new facilities or improving existing facilities. The "other" item includes the revenue from selling water for non-agricultural purposes such as domestic water, factory use and the like.

Out of the "non-project incomes," the government subsidy is the most important, but the amount was relatively small compared with the total annual revenue, 4.7 percent in 1984 and 6.6 percent in 1987. There is a trend that the relative weight of government subsidy has been increasing as years pass, while the relative importance of water fees paid by member farmers has shown a decreasing trend. It appears that the government is beginning to be concerned with reducing the farmers' burden.

As a matter of fact, Korean farmers have been paying a high rate of water fees since the levying of water fees by the association was likened to the collection of ordinary taxes. If paid in kind, the average amount of water fees was as high as 409 kg of rice in 1982, and thereafter it gradually decreased to 298 kg in 1987.

TABLE 10 Itemized Annual Revenue of an Ordinary Budget (103 FLIAs)

Item	1984		1987	
	Amount	%	Amount	%
Association fees	73,132	80.4	83,777	71.0
O&M Costs	(52,249)	(57.5)	(60,293)	(51.2)
Capital repayment	(14,933)	(16.4)	(17,019)	(14.4)
Others	(5,890)	(6.5)	(6,465)	(5.4)
Non-project incomes	16,274	17.9	28,731	24.4
Subsidy	(4,300)	(4.7)	(7,806)	(6.6)
Mutual co-op	(837)	(0.9)	(786)	(0.7)
Transferred-in	(3,003)	(3.3)	(5,392)	(4.6)
Other	(8,134)	(9.0)	(14,747)	(12.5)
Special project incomes	1,585	1.7	5,402	4.6
Total	90,991	100	117,910	100.0

Source : ADC, 1988.

When we take into account the fact that the yield of paddy per hectare in 1987 was about 6.0 tons, the proportion of water fees was about 5 percent of the total annual rice production in these fields: The rate reached 8.3 percent in 1983, a bad crop year, and thereafter it has tended to decrease (Table 11).

Fortunately, the collection rate of water fees has been very high, as much as 98–99 percent of total water fees levied (Table 12).

The amount of water fees varies with the individual FLIA, because of the difference in type of water source, the age and condition of facilities, and the volume of long-term loans. In addition, there are differences in the other revenues such as non-project income, entry fees charged on persons who move into the service area of an association, and succession assessment fees imposed in a lump sum amount to meet the obligation of membership.

TABLE 11 Percentages of Water Charges to Production of Paddy Rice per Hectare, 1973–1987

Unit: kg (Paddy)

Year	Total Benefitted Area, ha	Total Assessed Area, ha	Production of Paddy Rice per ha(A)	Amount of Average Water Charge per ha(B)	% (B / A)
1973	333,699	316,574	4,890	231.4	4.7
75	358,838	325,605	5,540	221.7	4.0
79	413,783	400,033	6,410	303.0	4.7
80	419,910	361,945	4,330	358.3	8.3
82	432,980	421,259	6,180	409.2	6.6
84	453,059	433,311	6,490	304.0	4.7
85	462,223	442,531	6,360	301.3	4.7
86	481,763	440,751	6,380	237.4	3.7
87	481,556	436,939	6,020	298.1	5.0

Source: MAFF.

TABLE 12 Status of Water Charge Collected, 1973–1987

Unit: Million Won

Year	Total Amount Assessed(A)	Total Amount Collected(B)	% (B / A)	Method of Collection	
				Cash	in Kind
1975	12,680	12,543	98.9	19.6	80.4
76	16,927	16,794	99.2	25.3	74.7
77	22,938	22,744	99.2	50.9	49.1
78	27,152	26,669	98.2	54.0	46.0
80	42,775	42,124	98.5	79.6	20.4
81	59,910	59,044	98.6	90.2	9.8
82	64,210	63,388	98.7	98.9	1.1
83	67,735	66,556	98.3	99.1	0.9
84	68,478	67,212	98.2	100.0	0
85	73,205	71,981	98.3	100.0	0
87	80,697	76,451	94.7	100.0	0

Source: ADC.

In order to prevent the imposition of too high a rate of water fees by the FLIAs, the government has established a ceiling on the level of water fees to be levied on farmers. This level is expressed in terms of the quantity of paddy rice. At present, all farmers may pay the water fees either in kind or cash, but farmers prefer to pay in cash because it is easier than paying in kind. FLIAs may not levy water fees of more than 250 kg of paddy per ha from the farmers who are using water from reservoirs, 300 kg/ha for areas using pumping facilities, and 350 kg/ha for areas using water from pumping and drainage facilities.

B. Annual Expenditure of FLIAs' Ordinary Budget

The FLIAs' major items of expenditure consist of operation and maintenance costs, administrative costs, and non-project costs that are unrelated to the O&M costs. Among these, the operation and maintenance cost constitutes the largest outlay, 42.6 percent of the total expenditures in 1987. It includes two cost components, irrigation costs and repayment costs on capital borrowed, and such costs affect the association fees which differ among associations. A FLIA that has newly constructed facilities heavily funded by loans pays a relatively high rate because it must pay back the long-term loans.

As shown in the Table 13, the expenditure for the O&M costs as a percentage of the total decreased slightly due to lower spending on irrigation and other costs. However, the amount of repayment of principal and interest on borrowed capital has increased by 6.7 billion won, an increase from 15.1 percent of the total costs in

TABLE 13 Itemized Annual Expenditures of Ordinary Budget, 103 FLIAs

Item	Unit : Million Won			
	1984		1987	
	Amount	%	Amount	%
O&M Costs	39,502	43.4	49,939	42.6
Irrigation costs	(24,848)	(27.3)	(28,733)	(24.5)
Repayment to capital	(13,747)	(15.1)	(20,438)	(17.4)
Others	(907)	(1.0)	(768)	(0.7)
Administrative costs	35,113	38.6	46,423	39.6
Personnel costs	(21,236)	(23.3)	(27,464)	(23.4)
Office expenditures	(13,877)	(15.3)	(18,959)	(16.2)
Costs borne by FLIA	4,585	5.1	3,501	3.0
Non-project costs	11,634	12.8	17,316	14.8
Mutual activities	(1,048)	(1.2)	(2,747)	(2.4)
Reserve	(9,360)	(10.3)	(11,153)	(9.5)
Other	(1,226)	(1.3)	(3,416)	(2.9)
Special project loss	65	0.1	22	*
Carried over	92	0.1	8	*
Total	90,991		117,210	

1984 to 17.4 percent in 1987. Most probably this was due to the expanded irrigated areas undertaken with long-term loans. In order to maintain FLIAs in good financial conditions, the government recommends that the O&M costs should not exceed 40 percent of the total expenditure in a yearly budget.

Administrative costs were 38.6 percent in 1984 and increased to 39.6 percent in 1987. These costs include two major categories, personnel costs and office expenses. Non-project costs include mutual cooperative activities other than irrigation work such as organizing workshops or in-service training of HNG heads, reserve funds, and other items. The "other" item includes the interest payment on borrowings of working capital. Since most the annual budget is exhausted before the harvest season in the fall when association fees are collected, associations must borrow money from agricultural cooperatives on a short-term basis and pay it back after receiving water fees in the fall. Therefore an association must pay interest on the loan that it used for working capital.

In addition, there is the reserve fund that is part of the expenditures, though it is not used up in the fiscal year but reserved for future use. Regulations on the budgets and account of farm land improvement associations call for the establishment of a special account for the management of reserve funds. Interest at the rate of bank loans is collected for any use of the deposits by the FLIAs themselves. Those funds not in use must be deposited in an account at the FNFLIA to earn interest through lending out to other member FLIAs on a short-term loan basis.

Considering that FLIAs are non-profit-seeking public juridical entities, their expenses should be met by water fees collected from their members every year. Therefore, there is no need to accumulate property as private companies do. However, since the facilities set up by associations have a durability limit and inevitably are accompanied by the need for repair or replacement of worn-out parts and since the machinery and implements owned by the associations also have to be replaced over specific periods, it cannot be overlooked that there should be some measure to supply funds for a depreciation allowance for such facilities, machinery, and equipment.

It should also be taken into account that there could be an unexpected disbursement required because natural disasters are bound to occur and that there could be drops in revenues because of poor harvests. Since it is impossible for associations to meet the large fund requirements necessitated by such events out of their water fees collected in the single relevant year, a system of reserve funds exists to prepare for such unexpected occurrences. The purpose of

the accumulation of reserve funds is not to create assets but to meet special objectives. However, the reserve fund has not been well kept by many associations, due mainly to the limited revenues set aside as reserve and, also, the declining value of currency amidst a lingering inflationary trend. By contrast, a number of FLIAs have accumulated sizable revenue funds owing to the smooth management of such associations, proper actions taken by staff to acquire additional non-project earnings, and the stability of the domestic economy.

C. Special Budget

With the ordinary budget of individual FLIAs, it is almost impossible to improve the existing irrigation facilities. Moreover, FLIAs cannot execute large land and water development projects by themselves. All such large projects were designed and supported by the government with subsidies and long-term loans at a specially low rate of interest.

Whenever the government, including both central and provincial levels, decides to undertake a land and water development project in the service area of a FLIA, it allocates a certain amount of funds under the condition that such funds must be utilized for the building of the facilities indicated. Individual FLIAs are required to open a special account to handle the capital provided by such funds.

The funds provided by the government are designated for cer-

TABLE 14 Financial Statement of Project Budget, 103 FLIAs

Item	1984		1987	
	Amount	%	Amount	%
Unit : Million Won				
Annual Revenue				
New irrigation facilities	82,440	52.5	85,278	36.5
Facility improvement	18,007	11.4	23,602	10.1
Rehabilitation	9,274	5.9	17,440	7.5
Land consolidation	43,953	28.0	75,122	32.2
Farmland improvement	3,484	2.2	31,987	13.7
Sub-total	157,158	100.0	233,429	100.0
Annual Expenditure				
New irrigation facility	79,538	50.6	82,915	35.5
Facility improvement	17,665	11.2	23,271	10.0
Rehabilitation	9,058	5.8	14,625	6.3
Land consolidation	43,465	27.7	74,603	31.9
Farmland improvement	3,472	2.2	30,618	13.1
Sub-total	153,198	97.5	226,032	96.8
Carried over	3,960	2.5	7,397	3.2
Total	157,158	100.0	233,429	100.0

Source: MAFF and ADC, 1988.

tain work, and thus there is not much flexibility to reallocate funds for other purposes. As shown in Table 14, the revenue and expenses for each item were quite the same, the only differences being the relative importance of each construction work between years, 1984 and 1987.

Among various land and water development projects, expanding irrigation facilities was the most important one and accounted for 50.6 percent of the budget in 1984 and about 35.5 percent in 1987. Next to this in magnitude is land consolidation which can be implemented by FLIAs, with technical assistance at the planning stage. Of course due to a limitation of financial resources, the government cannot support all associations that desire additional improvements.

V. Financial Status of FLIAs Analyzed

In order to examine in detail the total extent of government and farmer contributions to the budget of irrigation associations and also to identify the perceptions and cooperation of member farmers in the O&M, a comparative study of 10 FLIAs was carried out. The 10 FLIAs were purposely chosen to represent differences in service areas, old and new facilities, and location.

1. Annual Revenues of 10 FLIAs

An association should meet its budget requirements independently, and the amount of the association budget should be based on the needs of that association. The budget includes the expenses necessary for operation and maintenance activities, reserve for the depreciation of facilities, severance pay for employees, payment of principle and interest on short-term borrowing for working capital, the repayment of long-term loans used in projects and contingencies.

The revenues of each association stem from several sources including water charges, amounts of capital loans written off by the government, assistance for cooperative activities by local government, and special project earnings. Among these revenue items, water fees paid by farmers was the most important source, providing 64.6 percent of the total annual revenues in 1987 (Table 15).

There are usually two kinds of water fees, regular and special. The regular fee is based on the amount of money required for covering the operation and maintenance cost of the association. Special fees are for repayment of long-term loans that were borrowed for implementation of projects executed in the association's

TABLE 15 Change in Revenues between 1984 and 1987 of 10 FLIAs

Item	Unit : Million Won			
	1984		1987	
	Amount	%	Amount	%
1. Project Revenue	11,859	77.2	13,736	70.4
1) Water charges	10,958	71.3	12,604	64.6
O&M cost	(8,519)	(55.4)	(10,043)	(51.5)
Repayment cost	(2,439)	(15.9)	(2,561)	(13.1)
2) Others	901	5.9	1,132	5.8
Water supply out of service area	(355)	(2.3)	(317)	(1.6)
Rent out equipment	(546)	(3.6)	(815)	(4.2)
2. Non-project earnings	3,340	21.8	5,528	28.3
Written-off amount of interest for capital borrowed	(1,147)	(7.5)	(1,226)	(6.3)
Assistance for repairing facilities	(184)	(1.2)	(217)	(1.1)
Transferred-in	(980)	(6.4)	(150)	(7.7)
Others	(1,029)	(6.7)	(2,585)	(13.2)
3. Special project incomes	156	1.0	260	1.3
4. Total	15,355	100.0	19,524	100.0

service area. The difference in revenues among FLIAs results mainly from the variation in the amount of the special fee items to be paid by farmers. In combination these two categories of water fees are called project revenue.

Water fees are imposed on farmers in two different ways. The regular water fee is based only on the size of the service area, and does not take into account the yield level of each parcel of paddy land. This is because the facilities installed are assumed to give benefits to all the members of an association at a similar rate.

The special fee, however, involves a six-grade system, meaning that farmers pay different rates. The grades are based on the status of the land before the installation of irrigation facilities and implementation of the land improvement project. Land is categorized as forest land, land for miscellaneous use, orchard land, dry fields, non-irrigated rice paddies, and rice paddies. For instance, the special fee on land which was transformed from miscellaneous-use land into paddy fields is higher than in the case of dryland turned into paddy fields. This is because owners of such idle land transformed into paddy fields by irrigation facilities obtain much more benefit than those who previously cultivated dryland in such areas. The principle is that those who benefit more should shoulder more of the repayment of the loan.

The ordinance of irrigation associations, originally set up in 1906, permitted not only the imposition of association fees on the

member farmers within the service areas, but also the collection of association fees by force in just the same way as in the case of national taxes. Since the budget of each association depends largely on the amount of the association fees imposed, the level of collection of fees is very important for the operation of FLIAs. Fortunately, the collection rate of association fees is very high and has reached nearly 99 percent of the assessed amount in recent years.

In 1987, the regular fee and the special fee accounted for 51.5 percent and 13.1 percent of the total revenue, respectively. The proportion of O&M costs in the association fees increased in 1987 by 2 percent over the 77.7 percent in 1984.

Non-project earnings accounted for 28.3 percent of the annual revenues of the 10 FLIAs in 1987. This item included the amount of interest on the long-term borrowed capital written off by the government, assistance funds provided by the local government to promote cooperative activities, and interest received from the deposit of reserve funds and from the deposit of the annual budget for several months until it is used up within a year.

The special project income refers to funds received for undertaking certain construction or repair work. This is funded by the local county or provincial government as a special project. In this case, the implementation work is undertaken by a private contractor under the supervision of a FLIA which receives a service charge from the implementing institution.

In the past, many associations suffered greatly from financial difficulties because farmers did not want to pay water fees as high as the amount imposed. Farmers did not feel that there were any gains after paying such amounts for water use. The government, considering the payment capability of member farmers, set a ceiling on the amount of water fees to be imposed by associations.

Because of this regulation, the amount of regular water fees per hectare is quite similar among associations regardless of the service areas, number of staff members, and nature of facilities installed. In addition, the government set up an organization chart stipulating the number of staff and issued guidelines regarding preparation of the annual budget of FLIAs. Because of ceilings on the amount of water fee charged per hectare and the number of staff members, it is difficult for staff members to impose higher water fees at will. As a matter of fact, whenever a FLIA prepares the yearly budget, it is required to submit it to the provincial government for its approval. This procedure limits the power of FLIA staff members to formulate programs by themselves. FLIA staff have complained against the rules enacted by the government. In particular, staff members alone are not able to collect fees the way

they would like to increase the yearly budget.

However, the total revenue of the 10 FLIAs has increased, on the average, by 27.2 percent over the last 3 years. Even if we compare this percentage with the increase in the price index which was 10.6 percent during the same period, the increase in the revenues of FLIAs was significant. The increased revenue was largely generated from non-project earnings. In particular, the amount of interest received from money on deposit greatly increased from 1,029 million won in 1984 to 2,585 million won in 1987. This is about 37.8 percent per year on the average, while the increase in project earnings was only 15.8 percent during the same period. This implies that the FLIAs are trying to get additional revenue from non-project sources, rather than depending on water fees that have a ceiling imposed on them.

2. Annual Expenditures of 10 FLIAs

In 1972, the government legislated the Law of Special Measures concerning the fostering of farmland improvement associations. One purpose of the law was to make the farmers' burden of association fees more reasonable. The law also set forth guidelines to be followed in the formulation of association budgets. These stipulate that administrative costs should not be more than 30 percent of the total disbursement while project expenses should be more than 40 percent of the total.

The annual expenditure of an association consists not only of the O&M costs, but also the amortizations for borrowed funds, including a part of the principal and interest on long-term loans spent for improvements to the project area. A number of associations are also required to pay interest on funds borrowed to cover the shortage of working capital in summer. Administrative costs and reserve funds for later use must be met as well.

Among these components, the project cost was the largest outlay, amounting to 35.8 percent of the total annual expenditures of the 10 FLIAs in 1987 (Table 16). It consists of irrigation costs, including operation and maintenance costs, wages of workers for water distribution, repairing costs of irrigation facilities, and costs for side-businesses undertaken by FLIAs.

Among these cost items, wages for workers amounted to 10.3 percent and the O&M costs of the irrigation facilities 8.1 percent. Repairing expenses includes two categories, small and large improvement works. The expenditures for these cost items in 1987 accounted for 5.0 percent and 7.5 percent, respectively.

The administrative cost was 29.8 percent of the total annual expenditures of FLIAs in 1987 as shown in Table 16. This cost item

TABLE 16 Change in Annual Expenditures of 10 FLIAs between 1984 and 1987
Unit : Million Won

Item	1984		1987	
	Amount	%	Amount	%
1. Project Costs	6,140	39.9	6,991	35.8
Irrigation costs	(4,310)	(28.1)	(4,619)	(23.7)
O&M costs	(1,617)	(10.5)	(1,578)	(8.1)
Wages of workers	(1,563)	(10.2)	(2,008)	(10.3)
Repairing costs	(1,109)	(7.2)	(979)	(5.0)
Others	(21)	(0.1)	(54)	(0.3)
Large repairing and improvement work	(113)	(0.7)	(1,468)	(7.5)
Costs borne by FLIA	(1,717)	(11.2)	(904)	(4.6)
2. Administrative Costs	4,013	26.1	5,815	29.8
Personnel costs	(2,879)	(18.7)	(4,022)	(20.6)
Office expenditures	(1,134)	(16.4)	(1,793)	(9.2)
3. Long-term Loan repayment	1,997	13.0	2,133	10.9
Principal	—	(2.5)	416	(2.1)
Interest	—	(10.5)	(1,717)	(8.8)
4. Reserve Fund	1,537	10.0	1,454	7.5
5. Others	1,668	11.0	3,131	16.0
6. Total	15,355	100.0	19,524	100.0

includes salaries for regular staff members and office expenses. These were 20.6 percent and 9.2 percent, respectively. Other major cost items included the repayment of the long-term loan and reserve funds, 10.9 percent and 7.5 percent respectively of the total annual expenditure of FLIAs in 1987.

Among the several major cost items, only the administrative cost has increased in terms of percentage during the last three years. This was due mainly to the hike in wage and salary rates as a result of increased job opportunities as the national economy has grown in recent years. When we take into account the fact that requests by staff for even better salaries will continue, then the proportion of this expenditure will be a growing burden to the budget of associations. Conversely, member farmers make every endeavor to reduce their water fees, including raising it as a political issue through the national congress.

3. Comparison of FLIA Budgets between 1984 and 1987

The general status of the 10 FLIAs studied varied in terms of the service areas covered by each association, number of member farmers, number of project units belonging to each FLIA, and the original year of FLIA establishment (Table 17). Most of the FLIAs were established more than 35 years ago, and each irrigation unit is rather small in size. The Pyongtaek FLIA, started in 1976, has the

largest service area and one source of irrigation water — a reservoir made from building a sea dike on a river. The average size of service area per member farmer is more or less 0.5 ha, with the exception of Pyongteak FLIA with an average of 0.9 ha per member.

Regarding the water sources of the 10 FLIAs, reservoirs and pumping stations are the most important, covering 66.1 percent and 30.5 percent of the total service area, respectively. The balance 3.4 percent of the total service area is irrigated by using weirs and infiltration galleries.

A comparison was made of the increments in water fees by FLIAs, and they ranged from 5 percent to 39.8 percent during the last 3 years, 1984–87 (Table 18). The magnitude of increase in wa-

TABLE 17 General Status of FLIAs Studied, 1987

Name of FLIA	No. of Project Units	No. of FLIA Members	Established (Initial) Year	Benefitted Area	Average Service Area per Member
Kwang-Ju	4	2,139	1927	1,093	0.51
Kong-Ju	9	6,130	1953	2,760	0.45
Borycong	8	8,632	1952	3,848	0.45
Su-hwa	6	7,857	1945	4,320	0.55
Sang-Ju	10	11,067	1944	5,548	0.50
Onyang	8	9,323	1926	6,364	0.68
Walsong	24	17,365	1921	7,845	0.45
Paju	3	16,004	1921	9,373	0.59
Hangang	3	16,237	1923	10,915	0.67
Pyongtack	1	17,726	1976	16,168	0.91

TABLE 18 Area Covered by Major Irrigation Facilities and Increments of Water Fees Collected from 1984 to 1987

FLIA	Total Service Area, ha	Area Covered by Irrigation Facilities		Water Fees Collected (Million Won)		
		Reservoir	Pumping	1984	1987	%
Kwang-Ju	1,093	332	175	188	212	12.8
Kong-Ju	2,760	2,059	368	371	430	15.9
Borycong	3,848	3,766	—	534	603	12.9
Su-hwa	4,320	4,246	—	597	741	24.1
Sang-Ju	5,548	3,624	1,766	641	896	39.8
Onyang	6,364	5,695	71	951	1,164	22.4
Walsong	7,845	7,061	636	1,088	1,179	8.4
Paju	9,373	2,101	6,380	1,604	2,000	24.7
Hangang	10,915	20	10,895	1,911	2,153	12.7
Pyongtack	16,168	16,168	—	3,074	3,229	5.0
All	6,283	4,507	2,083	10,959	12,607	15.0

ter fees was, thus, quite different between FLIAs, as were both the revenues and expenditures. When we broke down the budget items to identify the degree of changes in detail, it was found that the budgets of FLIAs are quite stable and there was not much change in the relative importance of each budget item as the years pass (Table 16).

In comparing the total revenues of 1987 to that of 1984, it was found to have increased by 27.2 percent. Among the revenue items, the water fee was the most important. However, the relative importance of water fees as a source of revenues has decreased from 71.3 percent in 1984 to 64.6 percent in 1987 (Table 15).

The total amount collected in water fees increased by 15 percent, from 10,959 million won to 12,607 million won during the same period. Compared with the total budget increase of 27.2 percent from 15,355 to 19,524 million won, the increase in revenue from water fees was relatively low. Revenues other than water fees have increased more than the water fees. In particular, the amount of interest received as non-project earnings increased considerably from 1,668 million won in 1984 to 3,131 million won in 1987. The interest accrued mostly from the deposit of reserve funds in savings accounts on a long-term basis. This increase in revenues which are from sources other than members' pockets is a desirable way to increase the budget without adding to the members' burden.

There were also changes in the annual expenditures of the 10 FLIAs. Project costs increased only 13.9 percent during the 3 years between 1984 and 1987, a period during which the increase in the price index was 10.7 percent. Administrative costs increased from 4,013 million won in 1984 to 5,815 million won in 1987, an increase of 45 percent. This was caused mostly by the increase in the salaries of regular staff members.

In order to achieve a sound financial status for FLIAs, most cost items need to be minimized. However, total expenditure increased by 27.2 percent during the 3 years. As a result, the increased annual revenues were mostly used up, and, thus, the reserve fund that is a residual of the budget each year decreased by 5.4 percent from 1,537 to 1,454 million won.

All 10 of the FLIAs owe long-term loans of different amounts. As usual, the loan should be repaid, after a 5 year grace period, over a 30 years amortization period. When the loan is made, the amount of the principal and interest are almost the same, and the amount to be paid by farmers is then established. But after loans were made for implementation of a project, the exchange rate between foreign currency and the Korean Won has unexpectedly hiked, and, thus, the member farmers have to pay higher water

fees. In order to help FLIAs with part of this extraordinary burden, the government has written off large portions of interest and paid it to the foreign lending institutions, instead of requiring FLIAs to pay it.

As a matter of fact, the total long-term loans owed by the 10 FLIAs amounted to 114.7 billion won. The member farmers have paid an amount equivalent to 13 percent of the total amount owed, and the government has borne 24.4 percent of the total. The government has, thus, paid an amount nearly two times that paid by the farmers. But still at the end of 1987 an outstanding amount of 62.6 percent of the total remained to be paid back.

In order to analyze any differences in the association fees among the 10 FLIAs, the associations were grouped into 4 categories based on the type of irrigation facilities. Group 1 includes 3 FLIAs that have service areas of less than 5,000 ha with the major irrigation facilities being reservoirs. Group 2 includes 3 FLIAs with service areas ranging from 5,000 to 8,000 ha and sharing reservoirs as sources of irrigation water. Group 3 includes 2 FLIAs which have service areas ranging from 9,000 to 11,000 ha, but the major sources of irrigation water are pumping facilities. The fourth group includes only one association, but it has a large service area of 16,168 ha and uses a reservoir as its major irrigation source.

Regarding the increase in the annual revenue between 1984 and 1987, the FLIAs in group 1 and those in group 2 increased by 24.9 and 26.8 percent, respectively. The larger FLIAs, thus, had a higher increase in their budget than the small-sized FLIAs. However, this increase mainly resulted from non-project earnings as a result of an increase in side businesses rather than from association fees. Because it is troublesome to get approval from the provincial government to increase the fee to be paid by farmers, the degree of increase in the association fees seem to be of quite the same level.

The FLIAs in group 3 are using pumping facilities for irrigating paddy fields. Since pumping of water requires a charge for electricity, usually the association fees are higher than for those using reservoirs. The percentage increase in the yearly budget was 37.4 percent between 1984 and 1987. Clearly this percentage increase is considerably larger than for groups 1 and 2.

By contrast, group 4 is using a large reservoir as the source of irrigation and has a service area of over 16,000 ha. The budget in this group increased by 18 percent during the same period, a much lower percentage than for the other three groups. In this connection, it can be said that large size service areas have less O&M costs per hectare because of the inherent economy of scale. In terms of

project earnings, including association fees, the FLIAs in group 4 increased their earnings by only 5.1 percent, but for those in group 3 earnings increased by 40 percent during the same period.

There were also differences in expenditures among the 4 groups. Irrigation costs were increased only in groups 2 and 3, while the total expenditure for irrigation was reduced in groups 1 and 4. In particular, the decrease in the irrigation costs in group 1 was dramatic, 34.2 percent during the three years. FLIAs in group 1 may be unable to increase the association fees much because most member farmers are small in terms of farm size. However, such a decrease in the O&M costs is eventually a desirable phenomenon.

The other distinguishing difference was the increase in administrative costs, including salary of staff members and office expenses. Groups 1 and 2 experienced increases of 22.1 percent and 36.6 percent, respectively. However, the increases in groups 3 and 4 were quite high, 53.2 percent and 54.6 percent, respectively. This is because the larger FLIAs have relatively more staff members as well as skilled personnel with a better education and, thus, higher salaries.

In short, the rate of increase in the yearly budgets of FLIAs is quite different depending on the size of the service areas and the sources of irrigation water. However, degrees of increase in association fees are quite similar, if the sources of irrigation are the same or of the same type. But the increase in the non-project earnings is very different depending on the size of the FLIAs. Usually large associations are in a better position to earn greater amounts than the smaller FLIAs.

VI. Operational Analysis of Irrigation Associations

1. Overview of the Associations Surveyed

In this part of the study, the aim is to compare the types and amount of resources mobilized for O&M by irrigation associations to understand farmers' views of the benefits in production and income as a result of the improvement of irrigation, and to evaluate the current status and practices of farmers' groups for maintaining irrigation facilities at the grassroots level.

Field surveys were conducted in three farmland improvement associations — namely Suhwa, Boryeong and Hangang associations — and two farmland improvement clubs. A total sample of 159 farms from the three associations and 51 farms from the two clubs included a good mix of all farm sizes.

Students were used as field surveyors. They were provided with appropriate training prior to conducting the survey. The students were grouped into three two-man teams, and each team visited one of the three associations and the two clubs to interview about 50 farmers.

The size of arable land cultivated by the sample farmers in the FLIA was quite large compared with the national average as shown in the Table 19. Of the total farmers interviewed, 30.8 percent cultivated less than one hectare, a percentage much lower than the national average of 63.8 percent. Moreover, farms of more than 2 hectares accounted for 18.2 percent of the farms, which is higher than the national average of 6.3 percent in 1987 for this size.

The types of irrigation facilities for the associations were two reservoirs and one pumping station as shown in Table 20.

TABLE 19 Distribution of Arable Land Size by Farms Surveyed

FLIAs	Less than 0.5 ha	0.5—1.0	1.0—2.0	Over 2.0	Total
Suhwa	2	9	30	11	52
Boryeong	5	20	26	6	57
Hangang	4	9	25	12	50
Total	11	38	81	29	159

TABLE 20 Irrigation Facility of FLIAs Surveyed, 1986

Associations	Number of Farms Surveyed	Year of Establishment	Benefitted Area (ha)	Major Type of Facility
Suhwa	52	1945	3,566	Reservoir
Boryeong	57	1952	4,069	Reservoir
Hangang	50	1923	10,503	Pump

A. Suhwa Farmland Improvement Association

The Suhwa Farmland Improvement Association originated with the Reowha Irrigation Association that was started in 1919 under Japanese rule. At the beginning, it irrigated only 245 hectares using water from the Suhho reservoir. This Reowha association merged with eight other small-sized irrigation associations to form the Suwon Irrigation Association in 1945 with a total area of 2,186 hectares. Again in 1961, it absorbed two other associations. In April 1981, this Suwon Association again merged with the Hwaseong Farmland Improvement Association to form today's Suhwa Association.

Presently, the Suhwa Association is managing 19 small reservoirs, one pumping station, and one weir. These facilities irrigate a

total of 4,320 hectares for rice cultivation. The service area of the association is divided into six units. Banwol is one of the units that was chosen for the study. The sample farmers were selected from the farmers served by two reservoirs, Euhcheon reservoir and Songra reservoir. Initially, both Euh and Cheon Reservoirs were held by the Euhcheon Irrigation Association which was founded in 1950 and later merged with the Suhwa Irrigation Association in 1961. The Songra reservoir was initiated later, and it began irrigation of rice in 1973.

The total number of member farmers was 7,775 at the end of 1987. Fifty-two farm households were randomly selected as the sample farms for comparison with the farmers of the other associations.

B. Boryeong Farmland Improvement Association

The Boryeong Farmland Improvement Association was originally founded as the Taechon Irrigation Association in 1952 with a service area of 1,279 hectares. In 1961, it merged with four other small-sized associations into the Boryeong irrigation association. It was renamed the Boryeong Farmland Improvement Association in 1970. The irrigation facilities managed by the Boryeong association include 18 reservoirs, 14 pumping stations, 36 weirs, and 7 dikes.

The service area of the association totals 3,848 hectares of rice paddies, but the service area is divided into eight units dispersed in different places. Of the total 8,640 farmers belonging to this association, 57 farmers were selected for this study.

C. Hangang Farmland Improvement Association

The Hangang Farmland Improvement Association was founded as the Bupyeong Irrigation Association in 1923 with a service area of 3,641 hectares. It was merged with other associations and renamed the Hangang Farmland Improvement Association in 1970. The irrigation facilities installed by the Hangang association include 18 pumping and drainage stations and one reservoir. Currently the service area totals 10,915 hectares of rice paddies, and is dispersed in three separate units. The total number of farmers in this association was 15,790 at the end of 1987. For this survey, we randomly selected 50 farmers who are using water from its main pumping station.

2. Analysis of Farmland Improvement Associations

An analysis was made in this study based on the responses of farmers to questions about the success of operation and maintenance of associations covered in the survey. All farmers who have

paddy fields in the service area of an irrigation association, automatically become association members regardless of their will. All farmers must pay association fees for covering the operation and maintenance costs, but members do not make a monetary investment for the operation of an association. They operate it at a cost basis. Thus a member farmer cannot expect dividends as the result of business, unlike other organizations such as agricultural cooperatives.

All of the irrigation associations are operated under the supervision of the provincial governments. A question was asked to find out who farmers believed to be responsible for association operations. Only nine, or 5.7 percent of the total replies, said that the associations were operated by member farmers (Table 21). The remainder responded that they were run either by association officials (52.2 percent) or the government (42.1 percent). Based on these responses, we can conclude that a FLIA is viewed by most farmers just like a governmental agency.

Asked what they thought about association fees, only 45 farmers, or 28.5 percent of the total surveyed, replied that the fees were for costs of operation and maintenance of the association (Table 22). Seventy-two farmers (25.9 percent) said that the fees were irrigation water charges, whereas 41 farmers (19.5 percent) replied that they believed the fees were a kind of tax.

Considering these answers, there is a wide discrepancy in the way the association fee is conceived. At the Suhwa association, those who thought the irrigation fees were costs of O&M topped the list,

TABLE 21 Proportion of Replies to the Question "Who is the operator of your FLIA"

FLIA	Total Farmers who Responded	Operator		
		Farmers	FLIA	Government
			%	
Suhwa	52	5.8	38.5	55.8
Boryeong	57	8.8	56.1	35.1
Hangang	50	2.0	30.0	68.0
Average	(159)	5.7	42.1	52.2

TABLE 22 Farmers Views on Nature of Association Fees

Association	Total Farmers who Responded	Costs of O&M	Costs of Water Supplied	
			A Kind of Tax	
			%	
Suhwa	52	44.2	23.1	32.7
Boryeong	57	22.8	31.6	45.6
Hangang	49	18.4	22.4	59.2
Average	(158)	28.5	25.9	45.6

while at Boryeong and Hangang associations, those who believed the fees were the costs of water supplied were a higher percentage.

Next, questions were posed to find out the views of farmers about the performance of the association in terms of the time of irrigation, amount of irrigation water, amount of association fees, delivering water on time, and the maintenance and management of irrigation facilities.

On the average, 65.4 percent of the total farmers complained that association fees were too high (Table 23). Another 57.3 percent of the total voiced dissatisfaction with irrigation facilities, and 15.1 percent with the insufficient supply of irrigation water. Though some complaints were unique to specific associations, in general, the inefficient management of irrigation facilities was voiced as a complaint in all associations.

Many farmers of the Boryeong Association complained about the timing of irrigation and that the amount of irrigation water was not sufficient, due mainly to the location of their fields far away (about 8 kilometers) from water sources. Their complaint about the maintenance and operation of irrigation facilities stemmed mostly from the unfair distribution of irrigation water, particularly because of the narrow canal facilities and the lack of enough water reserves. In the area served by the Hangang Association, many places were usually non-functional at a time of heavy showers because drainage facilities failed to perform properly.

Farmers made no particular complaint about the labor mobilization system for maintenance of irrigation facilities. The general system of labor contribution by member farmers is that all of them share the work of cleaning the channels for just one or two days before the farming season starts in spring. The village leader or head of farmers' group usually decides on the day and place for work. If a farmer is unable to join the group work, he is required to pay some amount of wage or penalty because of his absence on that day. With these payments leaders buy drinks for the workers who participates in the group activity.

TABLE 23 Percentage of Responses to the Question regarding "What do you think of the amount of association fees"

Association	Total Number of Farms Surveyed	Responses		
		Cheap	Moderate	High
	 %		
Suhwa	52	0	46.2	53.8
Boryeong	57	0	19.3	80.7
Hangang	50		40.0	60.0
Average		0	34.6	65.4

However, this type of group work is becoming less important for the operation of irrigation facilities because association officials are reluctant to mobilize farmers for such work. The reason is that the labor contributed by farmers is generally of low quality. Both women and old persons participate in this group work, as they are obliged to be there. In addition, it is difficult for the leader to request hard work, and many farmers prefer to pay the fee instead of working. Still, this type of labor contribution prevails in most irrigation associations for cleaning channels, repairing dikes, and so forth.

On the average, each of the association members contributed labor for 1.4 days in a year (Table 24). As already noted, if farmers are unable to join the group work on a specific day, they pay about 7,000 won per day, somewhat less than the wage of hired labor, 10,000 won. This labor contribution or charge for missing work is a burden in addition to the regular irrigation fee imposed by the association.

When we asked farmers what they would like to request from the association, they responded that associations should be able to supply sufficient amounts of water at the proper time. Water availability and timing for distribution are most important issues for farmers because they directly influence the yield levels of rice production. At all the associations, canal watchers or water distributors were employed as temporary workers for a period from April to September so as to deliver irrigation water evenly and in a timely fashion to all farmers. However, there are often conflicts stemming from some farmers securing more irrigation water than others during the period of short supply due to drought in spring. In the FLIA survey areas, none of the farmers made a complaint about the shortage of water supply, but they would all like to receive water earlier than others.

Farmers' responses regarding the operation of the associations revealed some negative attitudes, particularly in relation to water distribution. In this connection, a question was asked to identify whether farmers believed that they benefitted from the irrigation water or not.

TABLE 24 Days of Labor Contributed by Member Farmers

Association	Members Reporting Number of Days/Year				Total
	1	2	3	4	
Suhwa	44	4	—	2	60
Boryeong	16	31	6	2	104
Hangang	12	13	7	—	59
Total	72	48	13	4	223

The results showed that 130 farmers or 81.8 percent of total respondents agreed that the irrigation system led to better farming (Table 25). On the other hand, a small portion of farmers were dissatisfied with the way the associations were operated. They, nevertheless, seemed to recognize the necessity of the associations. At the Boryeong association, 68.4 percent of the farmers said that they have benefitted after project implementation. On the other hand, 26.3 percent of the farmers answered that the project implementation could not bring them any additional benefits. This was because some farmers in this association already had their own irrigation facilities before the association was formed. Hangang farmers said that they benefitted much through increased yields from the project, and, thus, they were willing to pay relatively higher irrigation fees and other association charges.

Lastly, farmers were asked whether it was better to have their farmlands covered by associations or not. The response was 130 farmers or 81.8 percent of the total said that it was better to have their farmlands covered by the associations, while 29 farmers or 18.2 percent replied that it was not so (Table 26). At the Boryeong association, in particular, 15 farmers or 26.3 percent of the total 57 farmers said that even though their farmlands belonged to the association, no great advantage had been realized.

One farmer complaint was that proper attention was not being

TABLE 25 Percentage of Responses to the Question "What is your evaluation of the irrigation facilities as compared with the period before implementation of the project"

Association	Total Farms Surveyed	Better After	Better Before	Not Much Difference
	 %		
Suhwa	52	82.7	3.8	13.5
Boryeong	57	68.4	5.3	26.3
Hangang	50	96.0	0	4.0
Average		81.8	3.1	15.1

TABLE 26 Percentage of Answers to the Question about "What is the production increase that has accrued from the implementation of irrigation projects"

Association	Farms Surveyed	Very Useful	Not Very Much	Same as Before
	 %		
Suhwa	52	82.7	13.5	3.8
Boryeong	57	73.7	17.5	8.8
Hangang	50	90.0	10.0	0
Average		81.8	13.8	4.4

paid to the yield level in the assessment of association fees. Some farmers said that the price of their farmlands decreased after they fell under the service area of the association. In fact, this is because their irrigated lands are now regulated by the law for use only for crop production. Lands in the service area can only be sold to farmers and not to other non-agricultural users. The prices for such land are relatively stable without much increase.

3. Analysis of Farmers Groups

A. Heungnonggye(HNG)

Heungnonggyes were organized under the instructions given by the Minister of Agriculture and Fisheries in August 1964 to increase food production. All farmers benefitting from irrigation facilities of the farmland improvement associations automatically became members of Heungnonggyes. In this study, the operation of Heungnonggyes was analyzed chiefly by means of farmers' responses to questions.

The associations surveyed have a number of HNGs in their serving areas as shown in Table 27.

In the mid-1950s, the boards of trustees of irrigation associations were formed through elections by member farmers. However, this method was soon abolished, and irrigation associations turned back to a bureaucratic mode of operation. In fact, the associations are regarded as a sort of coercive organization since by law every farmer who has farmland in project areas must join the association and also pay association fees. In addition, all of the FLIAs are under government influence, and farmers have, thus, come to regard their association as a government agency.

The FLIA are supposed to represent farmers' opinions and desires through steering committee members who are the leaders of HNGs in the service areas. However, farmers' opinions may not be accepted by the staff members of the FLIA in the course of decision-making concerning the operation and maintenance of the FLIA. As a result many farmers are less enthusiastic to participate

TABLE 27 Number of HNGs and Member Farmers

Association	Number of Association Members	Number of Service Area	Number of HNGs
Suhwa	7,222	6	169
Boryeong	8,640	8	69
Hangang	15,790	3	310

in the activities of HNG in the village. That is why most HNGs are not carrying out the functions for which they were created.

Presently, all beneficiary farmers in areas where a FLIA exists are required to join a HNG. In reality, however, a considerable number of such farmers are not aware of their membership. Regarding the question of whether they had joined HNG, 37 farmers or 23.3 percent of the total were not aware of their membership in a HNG. In the case of the Hangang Farmland Improvement Association, in particular, those who did not realize their HNG membership numbered 26 or 52 percent of those questioned.

In most cases, HNG were organized as a unit of FLIA's members at the grassroots level. A HNG is supposed to have a head and a guidance leader. But not a single HNG surveyed had a guidance leader. In addition, HNG heads are rarely separate from village heads. In fact, in the areas surveyed, the HNG head was separate from the village head only at Songra-ri of the Suhwa Farmland Improvement Association. In all other HNGs, the village head was the HNG head. Most of the beneficiary farmers said the duty of HNG heads was simply the distribution of fee bills issued by the association and urging farmers to pay the fees (Table 28).

With regard to the necessity of HNGs, answers differed widely depending on the farmland improvement associations. At the Suhwa and Hangang farmland improvement associations, most of the farmers who acknowledged being members of HNGs replied that they believed it was good to have the HNGs. At the Boryeong association, however, 20 farmers or 37.7 percent of those who said they were members of the HNGs replied that they did not see the need of such associations.

An analysis of the survey results discussed in the foregoing suggests that HNGs are beset with a number of problems. The success of an organization depends on the degree of participation by its members. But because HNGs, originally supposed to be formed among beneficiary farmers of a specific area and belonging to the same interest group, turned out to be nominal organizations

TABLE 28 Percentage of Responses by Farmers to the Question regarding "What is the duty of HNG head"

Association	Total Farm Surveyed	Distribution of Bills	Urge to Pay Bills	Unit : Percent	
				Advising on Farm Work	Other
Suhwa	52	80.8	40.4	17.3	1.9
Boryeong	57	75.4	78.9	—	—
Hangang	50	48.0	28.0	—	—
Average		81.8		5.8	0.6

formed heteronomously rather than spontaneously, it has been difficult for farmers to take an active part in their HNGs.

What is more important than emphasizing the HNG's nominal importance is actual field participation by farmers. Under the present conditions, HNGs can hardly function properly. To vitalize the HNGs, beneficiary farmers should be enabled to recognize their importance through campaigns to restore the intended original functions of the HNGs. To this end, HNG leaders should be elected persons separate from village heads so that they can do their assignment to the best degree possible. At the same time, the question about the need for guidance leaders should be reconsidered. Through these efforts, HNG can be vitalized in a way that best serves the common interest of member farmers.

Supporting funds provided by FLIA for the activities of a HNG were no more than 43,300 won per annum. No additional money is available for an allowance for the HNG head. With this meager budget, enthusiastic participation by HNG heads in association programs cannot be expected.

B. Farmland Improvement Clubs(FLIC)

Farmland improvement clubs (FLIC) were organized originally as autonomous irrigation groups to maintain old and small-sized irrigation facilities, with an objective of promoting the members' common interests. They are similar to HNGs, but the club consists of a smaller number of farmers and serves an area of less than 50 ha. If the original irrigated area has been merged into a FLIA, the clubs should be renamed as HNGs.

The implementation decree stipulates that a mayor or a county governor must help farmers who are using irrigation facilities to organize a farmland improvement club. Local governments have charge of supervising the operation and maintenance of FLIC through providing a cash subsidy or materials for repairs.

In this study, an analysis was made of the operation of both Shindae and Chukyo Farmland Improvement Clubs. The following discussion is based on the results obtained from the farmers benefitting from the irrigation facilities of these clubs.

The Shindae FLIC is believed to have a history of more than 100 years, though there is no way to determine the exact data of its founding. The Shindae Club had been an autonomous irrigation club before it registered itself with the authorities as the Shindae FLIC in October 1972, in accordance with the provisions of the Law on Acceleration of Rural Modernization. The irrigation facilities managed by the Shindae Club include 10 weirs, of which nine are concrete structures and the remaining one made with stones.

The irrigation area served by the club extends over 20 hectares. We interviewed 25 farmers out of a total of 50 members.

The Chukyo Club was founded around the mid-1950's, but its exact inaugural time is not known. The Chukyo Club is registered under the same registration procedure as the Shindae Club. The irrigation facilities managed by the Chukyo Club include a reservoir, a weir, and two small pumping units. A total of 53 hectares of rice paddies are irrigated by these facilities. We interviewed 26 farmers out of a total of 140 members of the club.

As for club organization, the Shindae Club has a head under whom there are ten staff members. Each of these is responsible for the management of one of the ten weirs. The Chukyo Club has a secretary and two irrigation canal watchers selected from member farmers by the club head.

FLIC staff are selected through direct elections among club members. At both clubs, the heads were elected from among those members whose farms are relatively large and who are considered quite trustworthy. Club heads represent their respective clubs and manage the overall operation of the clubs, taking into account the opinions of their members. At the Shindae Club, weir staff members take charge of the maintenance of their respective weirs as well as irrigation and drainage in the areas covered by their weirs. At the Chukyo Club, the secretary assists the club head in the running of the FLIC, while irrigation canal watchers have the duty of delivering and draining water and protecting irrigation facilities. Each staff member, representing a sub-group of club members, is assigned to report the progress of the club's work to the club members and to participate in club discussions.

To the question regarding the function of club heads, 48 percent of the farmers surveyed in the Shindae Club said that their club head did not make any particular contribution to the members and, thus, no allowance should be paid. At the Chukyo Club, in contrast, 64 percent of the 25 farmers questioned said that their club head did many good things including the maintenance and operation of irrigation facilities, the assessment of irrigation fees, and making arrangements for water distribution.

No payment was made to the club head and weir staff at the Shindae club. At the Chukyo Club, on the other hand, two bags of rice were paid each to the club head and the secretary, and six bags each to canal watchers per year. The canal watchers were paid more because they had more work, namely irrigating and draining water for some months.

Ten weirs were built along a river at about 150 to 300 meter intervals at the Shindae club. One of them was, however, damaged.

Of the ten weirs surveyed, nine were durable concrete structures while the remaining one was made of stones. Therefore, no particular maintenance work is required under normal weatehr conditions. However, canal cleaning work is done every March through labor contributed by club members. In case the existing weirs were washed away in summer floods, they are repaired immediately. One damaged weir was left unrepaired because of financial constraints. Since such work can be done only by skilled construction workers, cash is required either through a subsidy from the local government or fees collected from club members.

At the Chukyo Club, irrigation was done with a reservoir, a weir and two small water pumps. The reservoir was also leased for use as a fish pond, and the club received some income. With this extra income, it was possible to maintain and operate the irrigation facilities by hired labor and, thus, there was no labor contribution by members of the Chukyo Club.

By contrast, at the Shindae Club, members' labor contribution is mobilized based on the size of one's irrigated farmland. Farmers with more than 0.5 hectare of irrigated farmland each contributed more than two days of labor, while those with less than 0.5 hectare contributed one day per year. Some farmers complained that the labor contribution system was unfair. In general, farmers with more than one hectare of farmland did not voice any complaints against the fairness of the custom. However, many of those with less than one hectare of land said the custom was unfair.

Only one hectare out of Shindae's 20 hectare service area could be classified as sound irrigated paddies, that is, irrigated to an extent that rice suffered from drought not more than once in about ten years. The remainder was irrigated through weirs which almost every year could not offer sufficient irrigation water. Therefore, in times of drought, water from weirs was supplemented with that from other facilities. Of the 25 farmers questioned, 14 said they used small wells in 1985. At the Chukyo club, however, the entire service area of 53 hectares was irrigated exclusively with the club's irrigation facilities.

The conditions of these Clubs affected the assessment of irrigation fees. At Shindae, no irrigation fees were charged either for the operation of the club or for the maintenance and operation of irrigation facilities. This may be understandable in a situation where not enough irrigation water could be supplied. But the lack of revenue resulted in a damaged weir left unrepaired and led to the insolvency of the club operation itself.

At the Chukyo Club, irrigation fees are collected after harvest time every year. The fees were collected in cash and the amount

was based on the amount of total expenses incurred in club operations in the preceding year. In 1985, however, no irrigation fees were collected because club expenses could be met with rent collected from the lease of a reservoir as a fish pond.

A meeting of the members to discuss overall club operation was held at the Shindae Club in order to make arrangements for weir repairing. At Chukyo, a regular meeting was held once a year. The Club head also called in club staff for discussions of special matters whenever such a need arose. A wide variation was observed in the methods of operation of the two clubs. But all the club members, with the single exception of a farmer belonging to the Shindae Club, recognized the need for the existence of their clubs.

The two clubs, thus, showed highly contrasting natures in terms of overall conditions such as club organization, operation of irrigation facilities, and irrigation fees. The Shindae Club was superficially equipped with a type of FLIC organization. However, it was beset with many problems in its actual operations. The basic reason was that the club could not secure enough irrigation water. Also, the club failed to mobilize necessary operational funds and was unable to repair the damaged existing facilities. Club staff, too, did not show a commitment to improve the operations of the club, and it seems that it exists virtually in name only.

In order to resolve the problems, a firm basis should be laid for the operation of the club through the preparation of club rules and detailed operational procedures. In addition, joint efforts should be taken to explore new water sources to alleviate the shortage of irrigation water. Another pressing task at hand is to secure operational funds to support these tasks and other club activities.

The Chukyo Club was operated in a fairly healthy manner. The club was operated not according to formal rules, but on past practices and exchange of views to adjust for any conflicts. Even in this club, preparation of club rules might facilitate a healthier operation of the club.

4. Financial Analysis of Associations

To be able to compare irrigation expenses on the basis of irrigation facilities and operating organizations, the farmers interviewed were classified into groups on the basis of the type of irrigation facilities from which they benefitted. Irrigation expenses were calculated on the basis of cost per hectare for convenience of comparison.

In the case of farmers with access to irrigation facilities of farmland improvement associations, expenditures cited included the association fees borne and the labor contributed for the operation

and maintenance of the associations to which they belonged.

At the Shindae Club, irrigation expenses included primarily the cost of the labor contribution, because in this club no irrigation fees were imposed. Since adequate irrigation could not be assured with the system's weirs, the only available facilities at Shindae, the cost of the labor contribution alone cannot be regarded as the only irrigation expense borne by farmers. Farmers' irrigation expenditures also include the costs incurred in the use of wells. Of the 25 farmers questioned in the Shindae area, 14 used small wells. The farmlands served jointly by wells and weirs accounted for 66 percent of the total acreage of the farmlands with access to irrigation from the club weirs.

The total irrigation expenses associated with small wells were calculated and then divided into fixed expenses and variable expenses. The fixed expenses included the expense of digging, installation of electric facilities, and electric motors. Of the total development cost, the expenses of digging and electric equipment were subsidized. Therefore, the net fixed expenses borne by a well developer consisted of the balance obtained by deducting subsidies from the expenses of well digging and installation of electric facilities.

No depreciation was made against the cost of digging and electric facilities, whose durability makes it difficult to determine their life span. Depreciation was made only against electric motor expenses. Variable expenses included electricity charges and the cost of maintaining and managing the wells.

The irrigation charges per ha for irrigation facilities and operating clubs in the surveyed areas are shown in Table 29.

The results clearly show that farmers benefitting from the Songra Reservoir of the Suhwa FLIA bore the highest, expenses of 215,400 won per ha. The farmers of the Euhcheon Reservoir of the same FLIA bore the lower costs of 168,100 won per ha. One reason why the beneficiaries of the Songra Reservoir had to bear high expenses was that since the reservoir was built only recently in 1974, the burden of long-term debt amounted to 38,700 won per ha. On the other hand, at the Euhcheon Reservoir of the same association, the burden of long-term debt was no more than 5,450 won per ha. Association fees were also high at the Hangang FLIA. The reason is that its facilities include pumps and drainage facilities, and their maintenance and operation cost took a large share of the yearly expenditures of the FLIA. As clearly seen, operation and maintenance costs of facilities were the factors that cause higher association fees. The cost of labor contribution did not show much variation among FLIA.

TABLE 29 Comparison of Irrigation Charges per ha by Water Facility

Association and Farmers' Group	Water Source	Association Fees	Repairing by FLIC	Labor Contribution	Depreciation	O&M	Electricity	Total
Suhwa FLIA	Euhcheon Reser.	156,000	—	12,000	—	—	—	168,100
Suhwa FLIA	Songra Reser.	204,500	—	10,900	—	—	—	215,400
Hangang FLIA	Pumping	188,700	—	8,600	—	—	—	197,300
Boryeong FLIA	Reser.	156,500	—	14,400	—	—	—	170,900
Chukyo Club	Weir + Reser.	—	56,000	—	—	—	—	56,000
Shindae A	Weir	—	—	24,200	—	—	—	24,200
Shindae B	Weir & wells	—	—	22,000	7,900	14,400	21,100	65,400
Other	Well	—	—	—	8,100	7,900	37,400	53,400

The survey showed that the farmer's labor contribution valued at 24,200 won per ha at the Shindae Club was significantly lower than the repair cost at the Chukyo Club. However, in as much as weirs alone could not ensure the reliability of irrigation at Shindae, the maintenance cost of wells should be included in the assessment of the irrigation burden borne by farmers. When only the maintenance cost of wells was considered, the burden at Shindae was 10,000 won lower per ha than for maintenance of other wells.

When the cost of labor at Shindae farmers contributed in the maintenance of weirs was taken into account, Shindae farmers bore an expense of 12,000 won per ha more than farmers using wells in other areas. Details of the cost of wells show that depreciation was almost the same. With electricity charges, however, Shindae farmers paid 16,300 won less per ha for electricity than those farmers using wells in the other areas. This was because both weirs and wells were used at Shindae; hence wells were used for less hours than in other areas. The Shindae area farmers bore 6,500 won more per ha for O&M (excluding electricity) of wells than for wells in other areas.

In the foregoing discussion, the burden of irrigation costs borne by farmers located in the same area or having access to the same irrigation facilities was calculated and comparisons made based on irrigation facilities and operating organizations. A look at the overall burden of irrigation cost reveals that the burden of those benefitting from the Songra Reservoir was highest at 215,400 won per ha while those using only wells bore a lesser burden of only 53,400 won per ha. In general, the burden of those benefitting from facilities of FLIAs was 2.6 to four times higher than for

those using club facilities or wells. In the FLIAs, there were expenditures such as personnel costs, repayment of long-term debts and reserve funds in addition to direct operation and maintenance costs.

Of course, there may be disputes over the inclusion of long-term debt repayment and reserve fund in expenditures. It is important to realize that debt repayment constitutes a heavy burden in areas where facilities have been installed in recent years or in new project areas. And, since the repayment burden, is in reality, imposed on farmers together with water fees, the repayment cost becomes an expense as far as farmers are concerned. The reserve fund has a different nature from other expenditure items. In a sense, the reserve fund may be regarded as association members' asset.

In contrast, there were no long-term debt repayment or reserve fund requirements in areas served by clubs or wells. Also, since irrigation was confined within relatively limited service areas, personnel and other expenditures were accordingly small in those areas.

VII. Summary and Conclusions

In this study, the major objective was the analysis of the financial status of the operation of irrigation facilities and the burden of the cost of irrigation on farmers using such facilities. The course of historical changes in the management and utilization structure and policies of irrigation associations were also studied. To investigate the economy of the use of irrigation facilities through analysis of the operation costs of irrigation facilities and the sources of revenues, 10 farmland improvement associations out of the 103 nation-wide were selected purposely.

Implementation of large irrigation projects is mostly the responsibility of the government using long-term foreign loans and the financial budget of the nation. Upon completion of construction work, the project areas are returned to the FLIA that is located in the area. The FLIA takes over the operation and maintenance of the irrigation facilities, using the revenue collected as water fees from users.

Determination of the amount of water fees to be imposed on farmers is a sensitive matter between the operators of FLIAs and member farmers. The operators of associations would like to levy a high rate of water fees for covering all of their plans and other unexpected expenditures. On the other hand, the farmers prefer to

pay as little as possible for irrigation. Finally, the government intervened to set ceiling levels for water fees and helped to reduce the conflict of interests between the two different groups of persons.

The water fees collected is the major source of funds to cover the O&M costs of individual FLIA and for the repayment of borrowed capital. Although the total amount of revenue from water fees has increased by 15 percent during the last 4 years, the actual payment in paddy has not increased much.

Most FLIAs have made some improvement such as expanding the irrigation facilities using long-term loans at low interest rates. Upon completion of the project, farmers should pay back both principal and interest on an amortization basis. Such a fee is called a special fee in contrast with the regular fee for O&M costs. Many farmers have started to criticize the imposition of such fees for payback of the capital borrowed. They insist that the project should be paid for by the government, in view of its being a kind of national infrastructure. Hence it is regarded as a social-cost item that should be implemented using the national budget.

As a matter of fact, most of the new farmland development projects have been supported by the government through the provision of subsidy and making arrangements for long-term loans. The total amount of investment was 640 billion won in 1987. The major sources of this investment were subsidies from both central government and local governments, which amounted to 67.5 percent and 11.4 percent of the total investments, respectively. The share borne by farmers was only 6.7 percent of the total cost during the construction stage.

During the period from 1945 to 1987, the total amount of capital borrowed from outsiders of FLIAs reached 799,823 million won including the principal and interest. After taking over the developed areas, the FLIAs paid back 11.9 percent of the total debt and the government covered about 27.8 percent of the debt. Therefore, there is still a large amount of 482 billion won to be repaid.

At present, most FLIAs are able to cover their annual expenditures from the annual revenues that consist mainly of association fees collected from member farmers. However, whenever they need to further improve the existing facilities or implement a new farmland development project, they need to receive a subsidy from the government and a long-term loan at a low rate of interest. In such cases, they are required to open a separate special account to manage these project funds.

The proportion of association fees to the total annual revenues was 80.4 percent in 1984 and 71.0 in 1987. In relative terms, asso-

ciation fees have tended to be less important than before, but they are still a major source of the budget of FLIAs.

In the past, the association fees were set at relatively high levels in order to cover all expenditures, including the repayment of the capital borrowed for improving water sources of FLIAs. Since 1988, as a result of liberalism following the election of a democratic government, the farmers have tended to have their voice heard through group actions or lobbying through congressmen. As a matter of fact, the candidates of the opposition party promised to reduce the water fees if they were elected. Thus, they are obliged to act to fulfil their promises to farmers.

As the first stage, the Government has finally decided to exempt farmers from repayment of the capital borrowed from domestic banks and foreign loans under the arrangements made by the government. As a result, the amount of the annual association fees has been reduced by about 20 percent on the average. Farmers may not be fully satisfied with this percentage reduction, and, hence, the government may need to cover a larger amount out of its annual budget in the near future.

A sample of farmers were questioned on the farm to obtain information concerning their payment for irrigation and their view of the irrigation system. The results of the analysis carried out on the basis of such information can be briefly stated as follows.

With regard to the activities of farmers' groups, the Shindae farmland improvement club, one of the two such clubs surveyed, had a general representative structure of a farmers' group. However, the weirs which are Shindae's only available irrigation facilities failed to supply sufficient irrigation water due to the inadequate size of such facilities. This tends to discourage member farmers. The Shindae club was, thus, quite insolvent. In contrast, the Chukyo club had irrigation facilities which had a decisive effect on the irrigation requirements of club members' rice paddies, and club operations were carried out cooperatively by the members.

Second, the Heungnonggyes (HNG) do not work as originally intended, and exist only in name in many cases. About 23 percent of the farmers questioned were not even aware of their membership in a HNG. In the area of the Hangang Farmland Improvement Association, up to 52 percent of farmers were unaware of their HNG membership. In fact, in the areas surveyed, only one had a separate individual named as the head of the HNG heads. Most farmers who replied that they are members of Heungnonggye believed that the major duty of Heungnonggye heads is only to distribute association fee bills that are issued by FLIA and request them to pay the water fees as early as possible. This suggests that

the HNG have not lived up to their intended irrigation management function properly.

Third, 68 percent of the farmers questioned said the farmland improvement association fees were too high. Another 57 percent of responses expressed their dissatisfaction with the methods of water distribution and maintenance of the existing irrigation facilities. In addition, about 26 percent of the total regard the water fees as a tax. But 83 percent of the farmers questioned replied that it is good to have their paddies in the service area of associations. All of the farmers recognized the need for farmland improvement associations.

The results of analyzing irrigation costs showed that the farmers' costs are quite different based on the type of irrigation facilities. That is, those who used small wells for irrigation bore the least cost of 53,400 won per ha, while those using irrigated water from the Songra Reservoir of the Suhwa farmland improvement association paid the highest amount of 215,400 won per ha because the reservoir has been constructed recently using external loans. These farmers are required to pay a high rate of interest for the long-term loans. The Boryeong farmland improvement association and the Euhcheon Reservoir of the Suhwa association are using reservoirs that are more than 20 years old. Their water fees per ha were respectively 26,400 and 29,200 won lower than that of Hangan association which relies heavily on pumping water.

Fourth, the farmers of the farmland improvement associations bore costs of 102,700 to 159,400 won per ha more than those of farmland improvement clubs. This was due to the fact that associations had more expenditures than FLIC in personnel costs, repayment of long-term loans, reserve funds, and maintenance and operation costs of existing facilities.

The above results suggest the following conclusions:

1. For the purposes of the efficient operation of farmland improvement clubs, those clubs which are operated by farmers according to past ineffective practices should adopt a guideline for improving operations. At the same time, ways to secure the minimum necessary funds for club operations should be supported to some extent by the government. For one thing the area of the Shindae Club has insufficient irrigation facilities, and it is impossible to supply adequate water at the right time. Hence, additional water sources should be explored in order to supplement the water shortage. Public offices having jurisdictional control over farmland improvement clubs should check the condition of irrigation facilities often to understand the operational status of the clubs and to be

able to give them necessary help to ensure their smooth operation.

2. Heungnonggye should have exclusive heads of their own so that they can perform their unique duties effectively. Their substructure, too, should be bolstered and improved in a way to ensure mutual cooperation among beneficiary farmers and to increase efficiency in the utilization of irrigation facilities.

3. The Farmland Improvement Associations, organized and operated under the Law on Acceleration of Rural Modernization, show stiffness in their operation. Article 30 of the law stipulates that association officials are to be selected at members' meetings. But, under the provisions of Article 9 and 10 of the addenda to the law, regarding interim measures on members' meetings and selection of association officials, selection of association officials at members' meeting is being withheld. Association heads are appointed by either provincial governors or the Minister of Agriculture and Fisheries depending on the size of the area of an association. No general meetings or representative meetings that would provide opportunities for exchange of views among association members have been held. Under the circumstances, there is no way to expect close cooperation between the associations and their members for the effective operation of FLIA. To foster a better relationship, measures providing for the election of association officials and HNG heads and general meetings should be implemented at an early date so that the farmland improvement associations can become genuine autonomous organizations of beneficiary farmers. Since farmland associations show strong regional peculiarities, compared with other associations, rules and guidance should be designed to allow for flexibility in the operation of associations.

4. Judging from the analysis of the burden of water fees, irrigation facilities should be installed in a way that conforms to natural or regional characteristics. Since the benefit of small wells as an irrigation facility was found to be quite high, additional wells should be constructed in areas that cover small fields.

5. In order to collect more revenue to reduce the burden of water fees, multi-purpose facilities should be sought without additional contributions from farmers. Providing water for non-irrigation use during off-seasons, would be a way to expand the associations' income sources. There should be policy steps to ensure the balanced burden of the investment in irrigation facilities and management expenditures, taking into account external economic effects. For, though the benefits from irrigation facilities ostensibly seem to belong to beneficiary farmers, such benefits, have a lot of

other external economic effects. One way to realize such a balance could be to have the national treasury bear, in the form of subsidy, the entire costs of creating irrigation facilities. Another idea is to write off the interest on long-term loans arranged by the government. Meanwhile, the reserve fund and cash holding of farmland associations are supposed to be deposited at banking institutions designated by the Minister of Agriculture and Fisheries under Article 13 of the Implementation Decree of the Law on Acceleration of Rural Modernization. But, under the present circumstances where there are diverse banking institutions, farmland improvement associations should be allowed to manage their cash on a self-ruling basis so that increased interest revenue could help associations' financial conditions. In the long run, this could be one way to reduce the burden of the irrigation costs that is borne by association members.

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ANNEX 1 Ordinance of Irrigation Associations *

(Ministry of Finance Act No. 3, March 26, 1906)

- Article 1. Irrigation Associations shall be established to engage in projects related to the irrigaiton, draining, reclamation or conservation of lands.
- Article 2. In order to carry out their projects, associations shall have as their areas those lands where their projects can generate profits. The persons residing in such areas shall be the members of associations.
- Article 3. The establishment of an association shall be subject to approval of the Minister of Finance.
- Article 4. Associations shall be managed subject to control and supervision of a person designated by the Minister of Finance or the Minister of Agriculture.
- Article 5. The expenses of associations shall be shouldered by association members according to the acreage and grade of their lands.
- Article 6. Assocaitions may impose on their members such labor, goods and/or land as necessary for the implementation of their projects.

*Source : Japanese Government General in Korea.

- Article 7. When an association plans to conduct an appraisal required for the assessment prescribed in Article 5 and make the imposition prescribed in Article 6, it should obtain an approval of the Minister of Finance beforehand.
- Article 8. Collection of association fees and action against delinquents shall be in accordance with the method of collecting national taxes.
- Article 9. Associations should make deposits in amounts determined by the Minister of Finance.
- Article 10. Associations cannot incur debts without the approval of the Minister of Finance.
- Article 11. Managers should prepare budgets and settlement for reporting to the Minister of Finance. The Minister of Finance shall make them public to the associations.
- Article 12. The government may guarantee the payment of the principal and interest of debts incurred by associations.
- Article 13. Regulations on public officials shall be applied *mutatis mutandis* to the managers of associations and other persons engaged in the clerical works of the associations.

ANNEX 2 Historical Evolution of Farm Land Improvement Association

History

- Apr. 1906 Promulgated the Ordinance of Irrigation Association (in order to establish the basis for irrigation associations).
- Feb. 8, 1908 Firstly established the Ok-Gu West Irrigation Association.
- July 1909 Promulgated the Guideline on Establishment of Irrigation Associations and the Articles of Organization.
- July 1917 Promulgated the Korea Irrigation Association Act.
- Dec. 1927 Promulgated the Act on Korea Land Improvement.
- Dec. 2, 1942 Established the Korea Farm Land Development Corporation.
- Dec. 31, 1961 Renamed as the Land Improvement Association based on the law of Land Improvement Project.
- Jan. 12, 1970 Renamed as the Farmland Improvement Association based on the new Promulgated the Law for Rural Modernization Promotion.
- Mar. 31, 1981 Reorganized after merging local associations throughout the Country.

ANNEX 3 Number and Affected Area of Irrigation Association*,
1906–1945

Year	Number of Association	Affected Area	Year	Number of Association	Affected Area
1906	—	—	1927	107	145,638
1908	4	4,301	28	126	178,806
1909	6	7,980	29	149	206,016
1910	6	7,980	30	177	217,335
1911	7	10,766	31	193	223,577
12	8	12,763	32	194	225,349
13	—	—	33	196	226,793
14	7	16,094	34	192	226,052
15	7	16,621	35	192	229,512
16	9	22,751	36	190	227,913
17	12	24,747	37	190	229,035
18	12	24,747	38	189	230,184
19	15	40,863	39	245	236,192
20	25	43,379	40	300	252,727
21	37	49,889	41	373	294,192
22	49	67,787	42	432	305,527
23	54	78,020	43	483	321,544
24	60	84,072	44	595	349,498
25	72	112,934	45	598	356,678
26	90	136,059			

Source : Union of National Irrigation Association.

*The Table Included the Whole Korea before dividing into North and South, August 1945.

ANNEX 4 Number and Benefitted Area of Irrigation Association by Province in South Korea, August 1945

Province	Less than 300 ha		300–2000 ha		More than 2,000 ha		Total	
	No	Area	No	Area	No	Area	No	Area
Kyonggi	22	3,273	7	4,044	2	6,130	31	13,457
Chungbuk	25	3,648	3	2,777	—	—	28	6,424
Chungnam	37	5,576	9	6,069	2	11,341	48	22,986
Jeonbuk	44	5,012	2	817	2	41,846	48	47,675
Jeonnam	109	14,848	11	6,810	1	2,600	121	24,258
Kyongbuk	47	7,189	11	8,737	—	—	58	15,925
Kyongnam	54	5,831	17	16,207	2	4,662	73	26,700
Kangwon	5	344	1	578	—	—	6	922
Whanghae	7	1,143	4	4,081	1	24,596	12	29,820
Total	350	46,862	65	50,120	10	91,184	425	188,167

Source : The Union of National Irrigation Association.

ANNEX 5 Number and Affected Areas of Farm Land Improvement Associations by Year, 1945–1965

Year	Number of Association	Affected Area (ha)
1945	425	188,167
46	438	206,762
47	440	208,762
48	440	213,594
49	458	224,399
50	442	195,656
51	489	211,777
52	570	262,333
53	587	273,175
54	596	284,073
55	668	312,396
56	—	—
58	683	325,045
59	699	334,605
60	695	334,578
61	198	341,227
62	198	343,730
63	198	346,058
64	199	347,775
65	222	353,211

Source : The Union of National Farm Land Development Association.

ANNEX 6 Distribution of FLIA by Planned Development Area

Year	Number of FLIA							Total
	Less than 500	500-1,000	1,000-3,000	3,000-5,000	5,000-10,000	10,000-20,000	More than 20,000	
1972	81	65	91	17	7	3	2	266
73	7	16	58	26	14	4	2	127
74	7	16	58	25	15	4	2	127
75	7	17	55	26	14	5	2	126
76	7	16	54	27	15	6	3	127
77	7	14	54	25	14	6	3	123
78	7	12	53	26	15	6	3	122
79	7	12	54	26	15	6	3	123
80	6	12	53	28	15	6	3	123
81	2	4	40	31	16	7	3	103
82	2	4	40	28	19	7	3	103
83	1	4	36	31	20	8	3	103
87	1	3	34	30	23	9	3	103

APPENDIX TABLE 1 Financial Source of Land and Water Development Projects Executed by Year

Unit : Million Won

Year	Total Area of Project Completed	Source of Project Costs							Total
		G. Subsidy	Longterm Loan	Foreign Loan	Local Subsidy	G. Farmers Burden	Other		
Before 1945	38,138	44	49	—	—	—	2	95	
1945-1966	428,683	12,966	8,929	—	414	3,959	3,555	29,823	
67	100,445	3,569	1,158	—	719	1,568	1,727	8,741	
68	89,391	3,397	1,886	—	714	1,121	2,067	9,184	
69	290,692	8,303	1,549	—	7,138	1,013	4,945	22,949	
70.	125,939	9,784	1,946	321	673	938	5,074	18,736	
71	80,383	7,439	3,547	1,237	612	750	1,182	14,766	
72	100,829	15,208	2,894	3,395	1,697	2,075	1,335	26,602	
73	145,474	17,192	1,613	7,120	3,464	3,064	1,888	34,340	
74	93,280	23,025	2,941	7,008	2,993	3,940	1,983	41,889	
75	78,294	52,168	5,908	10,691	3,809	3,916	2,686	79,178	
76	92,663	62,227	9,632	12,104	5,003	5,037	2,579	96,582	
77	64,560	78,439	11,154	12,067	7,012	6,546	2,190	117,407	
78	119,581	88,097	11,366	21,551	8,583	10,723	9,068	149,388	
79	72,087	122,672	16,467	19,622	13,716	12,945	4,295	189,717	
80	111,024	143,180	15,221	23,137	17,345	18,058	7,771	224,713	
81	43,632	208,201	27,049	38,780	22,245	22,285	26,475	345,051	
82	154,478	252,633	26,242	25,291	26,459	19,086	26,780	376,490	
83	146,897	269,305	30,454	26,568	19,838	16,241	12,435	374,841	
84	140,084	305,156	31,979	13,318	26,074	27,183	11,854	415,564	
85	143,968	290,077	28,580	3,506	23,180	15,137	13,424	373,905	
86	187,339	325,086	32,389	—	32,687	24,191	22,816	437,169	
87	241,595	432,398	33,182	—	73,356	43,202	58,644	640,782	

Source : ADC Yearbook, 1988, pp.526-527.

APPENDIX TABLE 2 The Proportion of Cost Sharing for Financial Sources of Project Cost by Source

Size of Project	Types of Investment	Subsidy			Shaving by Farmers		
		Central G	Local G	Total	Long-term	Within 1 Year	Total
Large Pumping station	Reservoir	70	—	70	30	—	30
		85	—	85	15	—	15
Medium Pumping station	Reservoir	70	—	70	30	—	30
		85	—	85	15	—	15
Small	Reservoir	70	20	90	—	10	10
	Pumping	70	20	90	—	10	10
	Weir	70	20	90	—	10	10
Tidal-land reclamation		80	—	80	20	—	20
Land consolidation	Large scale	50	20	70	—	20	20
	Medium Scale	60	20	80	13.3	6.7	20
Land reclamation		60	—	60	40	—	40
Converting upland		50	—	50	30	20	50

Source : ADC.

APPENDIX TABLE 3 Comparison of Annual Revenues between 1984 and 1987, Kwang-Ju FLIA

Item	Amount : Thousand Won			
	1984		1987	
	Amount	Percent	Amount	Percent
1. Water charges	<u>188,135</u>	<u>65.3</u>	<u>211,832</u>	<u>61.2</u>
O&M Cost	<u>146,508</u>	<u>50.8</u>	<u>160,610</u>	<u>46.4</u>
Repayment cost	<u>41,627</u>	<u>14.5</u>	<u>51,489</u>	<u>14.8</u>
2. Others	<u>24,993</u>	<u>8.7</u>	<u>54,489</u>	<u>15.8</u>
Water supply out of service area	2,771	1.0	16,588	4.8
Rent out equipment	22,222	7.7	37,901	11.0
3. Non-project earnings	<u>62,378</u>	<u>21.6</u>	<u>75,483</u>	<u>21.8</u>
Written off amount of interest for capital borrowed	27,746	9.6	10,856	3.1
Assistance for repairing facilities	—	—	—	—
Transferred-in	—	—	—	—
Others	34,632	12.0	64,627	18.7
4. Special project incomes	<u>12,837</u>	<u>4.5</u>	<u>4,284</u>	<u>1.2</u>
5. Total	<u>288,343</u>	<u>100.0</u>	<u>346,088</u>	<u>100.0</u>

APPENDIX TABLE 4 Comparison of Annual Revenue between 1984 and 1987, Kong-Ju FLIA

Item	Amount : Thousand Won			
	1984		1987	
	Amount	Percent	Amount	Percent
1. Water charges	370,454	92.5	429,674	64.5
O&M cost	300,599	75.1	368,112	55.3
Repayment cost	69,855	17.4	61,562	9.2
2. Others	27,681	6.9	8,337	1.3
Water supply out of service area	2,023	0.5	1,705	0.1
Rent out equipments	25,658	6.4	77,632	1.2
3. Non-project earnings	2,245	0.6	185,474	27.9
Written off amount of interest for capital borrowed	—	—	21,940	3.3
Assistance for mutual cooperation	—	—	18,333	2.8
Transferred-in	—	—	39,007	5.9
Others	—	0.6	106,197	16.0
4. Special project incomes	—	4.5	42,302	6.3
5. Total	400,380	100.0	665,790	100.0

APPENDIX TABLE 5 Change in Revenues between 1984 and 1987 Boryong FLIA

Item	Amount : Thousand Won			
	1984		1987	
	Amount	Percent	Amount	Percent
1. Water charges	533,910	61.5	602,825	51.3
O&M cost	449,048	51.7	541,836	46.1
Repayment cost	84,862	9.8	60,989	5.2
2. Others	59,669	6.9	136,716	11.6
Water supply out of service area	24,176	2.8	15,315	1.3
Rent out equipments	35,493	4.1	121,401	10.3
3. Non-project earnings	274,191	31.6	427,444	36.3
Written off amount of interest for capital borrowed	—	—	—	—
Assistance for mutual cooperation	52,123	6.0	—	—
Transferred-in	150,124	17.3	332,000	28.2
Others	71,944	8.3	95,444	8.1
4. Special project incomes	—	—	9,335	0.8
5. Total	867,770	100.0	1,176,320	100.0