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Nyamadi, Ben
The Irrigation Development Authority

Yokogawa, Hiroshi
Laboratory of Agricultural Economics, Faculty of Agriculture, Kyushu University

<https://doi.org/10.5109/24211>

出版情報 : 九州大学大学院農学研究院紀要. 42 (1/2), pp.249-264, 1997-12. Kyushu University
バージョン :
権利関係 :



Project Management Turnover to Farmers in Ghana: Results of a Farmer Survey

Ben Nyamadi* and Hiroshi Yokogawa

Laboratory of Agricultural Economics, Faculty of Agriculture,
Kyushu University, Fukuoka 812-81, Japan

(Received July 31, 1997 and accepted August 25, 1997)

This report discusses the results of a survey of farmers aimed at establishing a smooth and self-sustaining transfer in addition to attitudes to various aspects of operation and maintenance of irrigated projects in Ghana. The results of the survey suggest that farmers would be responsive to project turnover. However, a wide gap exists in the provision of farm support services essential to this project turnover. Investment in institutional development, availability of public credit, crop diversification as well as communication among farmers and government officials are outstanding issues to be addressed.

INTRODUCTION

The Ghana Irrigation Development Authority (GIDA) is the government department responsible for identification, design, implementation, operation and management of irrigation projects in Ghana. GIDA transformed into its present status by a decree in 1974, which stated that GIDA would receive subvention for a number of years and thereafter become self-financing. While international donors concentrated their activities in the south, GIDA's initial activities were concentrated in the northern part of the country which is characterised by long spell of a six-month drought period (the north receives an approximate annual rainfall of 1,500 mm) and has only one growing season. From October to April, this region receives almost no rainfall. During this dry season, many of the farmers migrate down south in search of work in the urban and cocoa-growing areas, while others have to contend with idleness of their land and labour or underemployment in cottage industries.¹⁾ Hence, the concentration of activities in the north was somewhat justified because it provides employment and supplementary irrigation to the farmers as well as supply of food for the country. While government was concerned about the need of farmers in food production and permanent agriculture, little attention was paid to the involvement of these farmers. As observed in many other countries, emphasis was on engineering designs with no attentions on distribution of water and maintenance of the system (Chambers, 1980).

At the time important social services such as education, health, water, extension, research and development were financed out of government general accounts, with households paying very little or were not charged for the services. To attract farmers to adopt irrigation practices, GIDA prepared the land, seeded the rice, and sometimes to the

* The Irrigation Development Authority, P. O. Box M 154, Accra Ghana.

1) In the northern areas, after harvest and storage of main staples, sorghum and millet, the household head would migrate to work in the urban areas or cocoa-growing areas in the south.

extent of irrigating and harvesting of crops for the farmers. Furthermore, some farmers were given free inputs as incentives to adoption of irrigation technology. But the worsening terms of trade for agriculture, the mainstay of the country's economy, and consequent budgetary constraints mean that the beneficiaries must pay for the services they enjoyed. Hence, government policy is moving steadily towards reduction in government financed services that are expected to be taken up by the private sector.

Organisation of farmers for operation and maintenance is stressed by donor agencies and host governments (Brown and Korten, 1989). As practised elsewhere in the far east, for example in Japan, the government believes that irrigation schemes should be operated and maintained by beneficiary farmers. As noted above, the infrastructure was provided by either government or international donors at the time it was easy to obtain cheap capital. This resulted in acquisition of capital intensive structures, which may be very expensive to maintain. Secondly, most of these projects were implemented in flood plains with little or no agricultural activity. Thus, by the nature of the projects farmers have no independent decision-making authority over what crop to grow.

Since the projects were implemented with little or no initial involvement of beneficiary farmers,²⁾ GIDA assumes management of the schemes. This is on the presumption that the beneficiary farmers lack the expertise for the management of the schemes. Farmers' responsibilities in the system management are documented in LI 1350. In that document farmers are responsible for cleaning and desilting of secondary and tertiary channels, which are enforced by GIDA staff.

Given this background, are the farmers willing to take over a project with capital intensive facilities, perceived to be a social service managed by GIDA? Besides, crops grown on the projects are more likely to be cash crops, leading to risk aversion and consumption smoothing. These conditions would result in reduced enthusiasm in participation because the farmer's risk management behaviour would lead to production of food crops even if its production is proved to be uneconomical. For example, in the north farmers devote much of their resources to the production of staple crops grown in the rainy season on their upland fields. In contrast, they would come around clamouring for land in the dry season because of no rains and no activities on their rain-fed fields.

This report looks at the complex of socio-political and economic factors influencing the turnover of projects to farmers in Ghana. In-depth interviews were completed with 82 farm household's located on six sample projects in four different agro-ecological zones in Ghana. The questions asked include households socio-economic characteristics, participation in operation and maintenance, awareness and perception of project ownership, attitudes to project turnover, the carrying capacity of the projects, perception of irrigation service charges, affordable cost recovery policies and farmers' willingness to mobilize resources towards operation and maintenance of irrigation projects.

The report presented below is what was learnt from the surveys and communication with farmer's association leaders, and the implication of the findings for project turnover to farmers in Ghana. After the description of the study area and field procedures, results and discussion are presented. Critical issues that constrain the activities of the farmers as

2) Jemenez (1994) refers to several studies which found that farmers are willing to pay for infrastructure services if their concerns are taken into the design of the service as well as their choice in the proper management.

well as smooth transfer of responsibilities are identified and discussed in line with the project turnover. The final section presents the conclusion and implications for policy from the study.

THE STUDY AREA AND FIELD PROCEDURES

The field work for the study was conducted from May to August of 1996 on six sample projects located in the four major agro-climatic zones of the country. The location of these projects is as follows. Dawhenya, a model project where European Economic Commission's (EEC) assistance completed farmer training towards project turnover, is in the coastal savannah zone. Asutsuare and Kpong, ongoing projects, are also located in the coastal savannah zone. Sataso, a pilot farmer-managed scheme, is located in the forest zone. Akumadan is in the transitional zone, while Bontanga is in the savannah zone. (Mark)

All the villages considered were located in the project area and respondents were involved in farming on the projects. Some socio-economic characteristics of the farmers are presented in Table 1. The average household size was 5.3 persons. The number of years in agriculture averaged 17.2 years. On average 8 per cent of the farmers completed primary school, while 51 per cent completed middle school. The lowest level of literacy on the projects was among farmers on the Bontanga project. On this project only 20 per cent complete either primary or middle school, while the rest 80 per cent were illiterates. The household questionnaire used was developed and tested on the project attached to the Irrigation Development Centre in Ashiaman. The questionnaires were administered by the author, three agronomists and one agro-economist. Members of the team participated in the final evaluation and pretesting of the questionnaires.

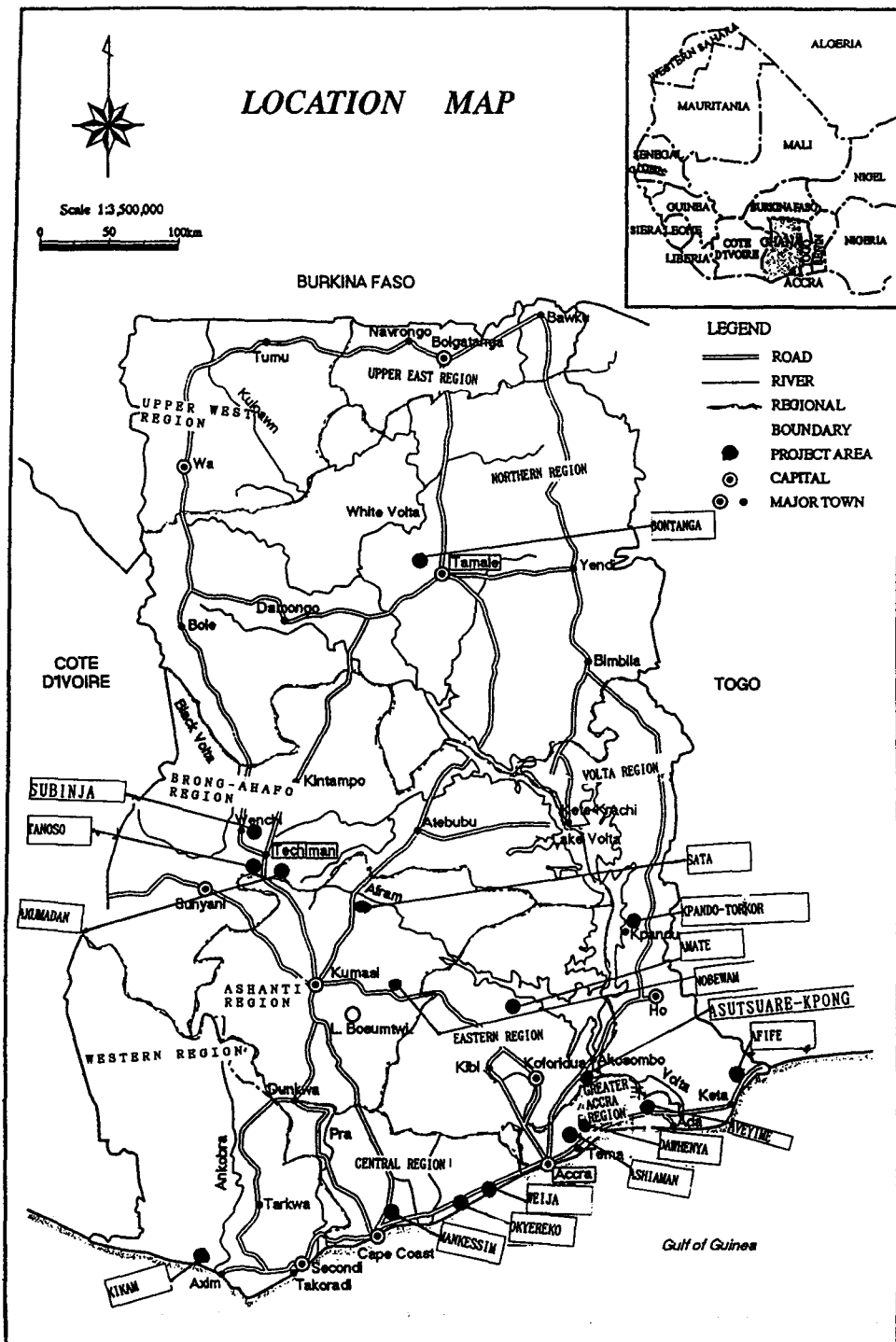
There was a well-defined sample frame, list of farmers, which was obtained from either GIDA head office or project offices. The sample units consist of villages within

Table 1. Socio-economic Characteristics of Sample Households and Projects Studied

Characteristics	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Sataso
Average persons per household	5.3	4.7	5.5	5.7	5.6	5.3	4.8
Male > 15yr. as % of household	51	47	50	52	57	42	58
Years in Agric. (years)	17.2	20.3	14.5	20.5	18.3	14.6	14.7
Primary School (%)	8	0	5	5	8	20	10
MSLC (%)	51.3	70	80	10	68	50	30
Commercial School (%)	4.2	0	0	5	0	0	20
Higher School Certificate (%)	11.3	10	0	0	8	30	20
Non (%)	25.2	20	15	80	16	0	20
Recovery (%)		100	70	70	90	NA	-
Cropping							
Major		Maize/ Vegetables	Rice	Rice	Rice	Rice/veg	Maize
Minor		Vegetables	Rice	Rice/ Vegetables.	Rice	Rice/ Vegetables.	Vege- tables.

Source: Field data and official sources. Note: MSLC is middle school leaving certificate.

Mark



each project area. The choice of villages was loosely stratified, which implied that a conscious effort was made to survey farmers living in villages located in the head-end, middle and tail-end of every project. Besides this criterion, the village's samples were random. Also, the questionnaires were non personalised. The open-ended questionnaire was not used, but respondents were given the chance to rank the problems in their perceived order of importance. Kendall's coefficient of concordance was used to evaluate the degree of perception of problems among the projects.

The interviews were conducted in the official language, English. On the other hand, if a respondent spoke only a local dialect that none of the team could understand an interpreter was engaged. For the smooth execution of the surveys, letters were sent to project managers, regional managers and farmers' associations seeking their co-operation during the surveys. Within the resource and time constraints, 82 farm households located in 36 villages were interviewed: Dawhenya-12 farm households, Asutsuare/Kpong-30 farm households, Akumadan-10 farm households, Sataso-10 farm households and Bontanga-20 farm households. Interviews were conducted in the early mornings, afternoon and evenings mainly at the common meeting places, on the field and in the farmers houses, respectively.

SCHEME OPERATION

The first section of the questionnaire was designed to ascertain the problems encountered by farmers on the projects. The questions asked covered all aspects of project management such as land preparation, credit and input supply, irrigation and drainage, crop husbandry and others as presented in Table 2. Land preparation is about

Table 2. Reported Problems Facing Farmers on Sample Projects (% rating index)

Problem	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Sataso
a. Low yield of crops	7	9	7	7	6	6	5
b. Levelling of plots	6	2	10	7	5	4	8
c. Drainage	5	0	10	3	3	2	14
d. Drought damages	2	5	0	0	1	8	0
e. Pests and diseases	4	6	5	5	3	6	0
f. Weed damages	2	2	3	2	4	3	0
g. Damages by cows/birds	2	0	2	3	4	1	2
h. Mechanical services	20	4	10	34	36	23	12
i. Labour shortages	3	0	3	2	4	4	3
j. High prices of inputs	13	10	12	10	18	20	5
k. Lack of farm roads	4	6	4	2	1	0	11
l. Marketing of products	5	8	9	8	2	3	0
m. Storage facilities	3	6	3	1	2	3	4
n. Credit problems	19	27	20	11	6	17	31
o. Indebtedness	2	1	1	4	4	0	3
p. Insufficient water	3	15	1	0	0	1	1
Total	100	100	100	100	100	100	100

Source: Field data. Note: Percentages are weighted rank of problems. The index is calculated by weighting the number of response given to the problem by all farmers (converting the number given to the problem by the farmer '1'=16, '2'=15, etc.) and dividing by the maximum possible score (16 multiplied by the number of farmers) and then finding the weighting percentage. By changing the table so that the row sums are equal, Kendall's $W=0.53$, significant at $\alpha=0.01$. This signifies that there is a correlation among the projects in the perception of the problems.

100 per cent mechanised. Although some projects owned tractors and power-tillers, farmers rely on private entrepreneurs for mechanical services. To this end, it is difficult to keep within the cropping programme of the project. In the study 90 per cent of farmers reckoned mechanical services as the principal constraint on their activities. Thus difficulty in obtaining mechanical services was given the highest rank of 20 per cent among problems encountered in farm management (Table 2).

Ploughing irrigated fields is different from upland fields, but the private tractors plough with less attention to land levelling. The farmer is at a disadvantage because he has no control over the tractor operator, who sees his services as a favour to the farmer. In the end the farmer is left with water management problems because of uneven water levels across the field. Due to this levelling problem, the farmer has to incur extra costs such as infilling and weeding. This mechanization problem will become apparent after the project turnover due to the following. First, the private entrepreneurs will not necessarily commit the tractors to the projects because the nature of the soil could be an important limiting factor. This can be inferred from Table 2 where rice projects with heavier soils scored the highest average rank for mechanical services. Second, the method of ploughing must be controlled by the farmer in order to control the field level. Third, the ageing fleet of tractors is a major problem in the rural communities.

Supply of inputs in Ghana has been liberalized in the early 1990s when government completely removed all subsidies on fertilisers and other agrochemicals. Since the privatisation of these inputs, there has been threefold increase in prices. For example, between 1994 and 1996 the price of compound fertiliser increased more than 3 times (10,400 to 33,000 cedis). Farmers have three main channels through which they can purchase these inputs: scheme management, private dealers and market *mammy* (market women). Since the farmers can hardly buy these inputs without credit facilities, buying from the project management on credit has been the usual practice on projects that have credit packages. Alternatively, the farmer takes inputs on credit or credit to purchase input from the market women in return for the sale of his produce. The farmer uses this method as last resort because it weakens his bargaining power.

The importance of timely purchase of inputs and services cannot be over emphasised because it leads to achievement of envisaged output and farmer co-operation. Many of these farmers indicated that they could hardly meet the seasonal cash demand for the purchase of these inputs and services. It can be seen that if project turnover is not accompanied by credit packages, farmers would find it very difficult to operate the project even at the transition phase. This problem was realised on the Dawhenya project, where the EEC provided a revolving loan fund administered to the farmers by the Agricultural Development Bank. The credit was advanced to farmers at a subsidised rate of 15 per cent throughout the training period. However, the question of sustenance of the revolving loan fund led to considerations being given to increasing the rate to the true level of 38 per cent (the rate charged by commercial banks on lending in the country). The low interest rate of 15 per cent charged throughout the transition period could be considered an error because the farmers were not exposed to the realities of the turnover. Great care should be exercised on other projects because farmers are conservative and somehow resistant to change. Also, this situation could result in lesser participation after

the turnover when the farmers have to pay the actual rate.

It is important to link the credit system with marketing to ensure high recovery. This condition will require provision of storage facilities for the society to take advantage of periods of high prices. While limited grain storage facilities are found on some projects, others do not have even a shed. It will be difficult to consider the construction of storage facilities for vegetables, but a basic infrastructure such as shed must be provided. The introduction of co-operative marketing system, under the management of the society, could be a remedy but the traditional market women system is a force to reckon with. Presently, almost all products at harvest are sold to market women who are well established in the system. In the interim, the preferred action will be to establish an efficient market information network to enhance co-operative negotiation of prices. Unlike the present individual price negotiations, this will strengthen the bargain position on farm gate prices of products.

In Table 2, high prices of inputs had the ranking of 13 per cent, reflecting its importance in current farm management problems. It can be argued that once farmers buy these inputs from private dealers for food crop cultivation, they can do so on the projects. In contrast, input requirements of crops grown on the projects, which are responsive to high level of inputs, are not comparable with upland crops. Also, on the uplands farmers adjust their risk by applying relatively low level of fertiliser so that marginal returns from fertiliser equal its marginal cost. Low yield of crops and levelling problems on the field were problems that received a ranking index above 5 percent. Except drainage problems, all other management problems had a ranking of less than 5 percent.

FARMERS' PERCEPTION OF MANAGEMENT

In the second section of the questionnaire an attempt was made to assess farmers' perception of management after the enumeration and ranking of problems facing them in project management. GIDA does not only implement the projects, but also provides management and agro-support services to the farmers. In this regard, farmers have no definite roles to perform than diversion of water and crop husbandry on their respective fields. Thus, besides Dawhenya, no farmers' association is concerned with project management in the country. Though farmers' group exists on all projects, they are only active when there is an input such as seed, fertiliser, credit and others to share. This client-patron relationship, which is being transformed into self-reliance and self-sustaining relationship should be assessed according to the farmers perception and expectation of management roles and capabilities. This would help GIDA to design self-sustaining strategies towards smooth transitions and eventual project turnovers. It is important to note that 85 per cent of farmers interviewed did not know the roles expected of them as documented in the LI 1350 of GIDA. Hence the recent dwindling of funds for operation and maintenance, led to systematic deterioration of major structures, low performance or complete standstill of some projects.

The perception of role performance by GIDA and farmers will affect the two parties in the management of the system. Also, the mutual trust of both parties as opposed to distrust and misconception will enhance farmers perception of their role in the system

management (Coleman, 1988).³⁾ Farmers as a group participated in either weekly or monthly community works in their various villages because it contributes directly to their welfare. They provided labour time for construction of school blocks, community toilets and other community improvement projects under the village leadership. This reinforces the availability of indigenous organizational capabilities in the villages, which can be readily tapped.

Resource mobilisation is crucial to the expected role perception and performance. The major resources to be mobilized are labour time and money. Lowdermilk (1985) maintains that these two resources can achieve efficiency or cost effectiveness in irrigation system management. The role of resource mobilisation is performed by the farmers' organisation in countries where irrigation evolved through the ages. In these organisations there is no question of farmer participation. As a result, farmers perform all management functions and pay for all operation and maintenance cost of the system (Hunt, 1990). In the Ghanaian context where irrigation is alien to the farmers, the important question that comes to the fore is what aspect of operation and maintenance should be handed over to the farmers' society?⁴⁾ It is argued that farmers are more motivated to project welfare than government officials who may be transferred from time to time. If farmers have full control over the project, it will increase their commitment, reduce the wanton destruction of irrigation facilities and subsequent increase in productivity. Furthermore, hiring and firing of project managers will increase commitment of managers and staff whose salaries are linked up with productivity, which is a necessary condition for participation.

Farmer participation should be consistent with available skills, village governance and organisational ability in the project area. In contrast, land allocation pattern on the projects was not consistent with the village governance in the participating villages. This means that participation in operation and maintenance of project may conflict with communal works in the villages. Besides, there are other technical problems facing farmers in the study areas. For example, at Akumadan where government has been trying to rehabilitate the pumphouse, morale of farmers was at its lowest because of long delays in supply of electricity to the site. The access road to the farm, for instance, could hardly be traced. Thus farmers will be willing to commit resources to operation and maintenance if they are sure of regular supply of water, less risk and high net returns from the project.

To test the farmers perception of role performance and expectation of GIDA, respondents were presented with six questions from which there were expected to select and rank activities they were capable of performing or otherwise. The result of the weighted ranking of choices of respondents is presented in Table 3. From the table, possibility of 100 per cent operation and maintenance (O & M) received only 10 per cent weighting by the farmers, while GIDA's technical advice and support (especially in major maintenance) to farmers efforts had 31 per cent. It is also clear from the table that none

3) Coleman (1988) states that a group within which extensive trustworthiness and extensive trust exist is able to accomplish much more than otherwise.

4) Wade (1976) states that the split in responsibility between farmers and government officials constrains the successful operation of farmers' societies.

Table 3. Role Performance and Expectations of the Farmers (% rating index)

Role Performance	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Satso
a. Farmers' organization can operate & maintain all the irrigation facilities	10	13	19	9	12	3	6
b. With GIDA's technical advice & support O & M of all facilities is possible	31	48	23	18	29	37	30
c. O & M is possible for only part of the facilities	23	23	26	21	15	25	30
d. O & M of all facilities is possible if service charges are used properly.	26	13	30	26	42	30	14
e. The O & M of facilities will be difficult even with GIDA's technical advice and support	6	2	2	17	2	3	9
f. GIDA should operate and maintain all the facilities because it is government's duty	4	2	0	9	0	2	11
Total	100	100	100	100	100	100	100

Source: Field data. Note: Percentages are weighted ranking of farmers' choice (see note to Table 2).
Kendall's W=0.79, significant at $\alpha = 0.01$.

of the respondents in Dawhenya and Asutsuare indicated that GIDA should continue with O & M. On the other hand, 11 per cent of respondent on the Satso scheme could be interpreted as emphasis on technical problems constraining the operation of the project. Thus, role expectations and performance by farmers and GIDA can be inferred from the above table. Clearly, GIDA should adequately define the role of farmers in the project area according to farmers' initial perception, which can be translated as their felt need. With guidance, farmers will increase identification of advanced form of needs consistent with GIDA's objectives.

FARMERS' PERCEPTION AND ATTITUDES TO OPERATION AND MAINTENANCE, OWNERSHIP, PROTECTION AND SAFETY OF PROJECT FACILITIES

The focus of this section is to test the sense of belonging or ownership of the project. All the irrigation projects' water impounding, lifting and conveyance structures are owned by the government. Unlike the two pilot schemes at Kikam and Satso, government owned the land on which farmers grow their crops as enshrined in the LI 1350 on all other projects.⁵⁾ If farmers perceive the project as an immovable property design to alleviate their poverty, they will be motivated to mobilise resources towards operation and maintenance as well as project success.⁶⁾ This is because government used the scarce resources or the tax payers' money for the implementation of these projects. This perception is demonstrated in participation in community works because they consider the contribution of these works to their total well being.

5) GIDA is to have leased the land to farmers on a three-year term but none of the farmers interviewed have ever renewed the agreement. However, they indicated uncertainty about the tenure and demanded between 15 years and indefinite tenure.

6) By contrast, a farmer who sees the project as governmental or with strong political power can lead to neglect of the system.

Table 4. Farmers' Perception of O & M Responsibility, Ownership and Safety of Infrastructure (% of respondents)

Item	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Sataso
I. Responsibility for O & M							
a. Project farmers	78	70	70	90	88	70	80
b. Government	22	30	30	10	12	30	20
c. GIDA	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100
II. Project Ownership							
a. Project farmers	46	10	60	80	44	40	40
b. Government	40	70	30	15	44	50	30
c. GIDA	14	20	10	5	12	10	30
Total	100	100	100	100	100	100	100
III. Safety of Infrastructure							
a. Project farmers	70	60	90	60	88	90	90
b. Government	8	10	10	5	0	10	10
c. GIDA	22	30	0	35	12	0	0
Total	100	100	100	100	100	100	100

Source: Field data

To this end, respondents were asked to indicate their opinion about the responsibility of operation and maintenance, project ownership, safety and protection of infrastructure on the projects. Table 4 shows the perception of respondents with regard to the three subjects. On average, 78 per cent of the respondents considered operation and maintenance as their sole responsibility, while the remaining 22 per cent perceived it to be the function of government. The latter three categories further explained that they already paid irrigation service charges that should be used for the maintenance of the system.⁷⁾ Dawhenya project was outstanding with 90 per cent, but after five years of education and training 12 per cent of the respondents still considered canal maintenance as government's duty. On the other projects, the perception was high, reflecting the acceptance of operation and maintenance of the projects.

Regarding project ownership, less than half of the respondents perceived the projects as a property of the farmers' association. The remaining 54 per cent were split between government and GIDA.⁸⁾ Also, apparent differences can be observed among projects. Respondent on Bontanga projects recorded the highest, 80 per cent, followed by Asutsuare with 60 per cent. The high percentages on the two projects may have been the result of experiences with government officials on these projects. Farmers who considered the project as government property indicated that government officials could refuse them land with no recourse. On the other hand, farmers on the former two projects considered the project as the property of the farmers' association because government cannot move the project to a desired location. Almost 100 per cent of these farmers demanded from 15 years to indefinite tenure as opposed to the present 3 year-

7) We will see later that many of the farmers said they did not know the use of irrigation service charge they paid to GIDA and the probe of this question.

8) GIDA was included because during the questionnaire pretesting it was realised that some farmers differentiated GIDA from government. Also it means that farmers who chose GIDA may be looking to GIDA as the direct beneficiary of the project.

tenure.

The perception of protection and safety of facilities on the project by respondents is similar to perception of operation and maintenance. Seventy per cent of the farmers perceived safety and protection of project infrastructure as their responsibility, with the rest split between government and GIDA. More than 70 per cent of farmers in Asutsuare, Kpong, Sataso and Dawhenya considered the safety of facilities on the projects as their responsibility.

Though the maintenance of distribution canals and field channels were perceived by 78 per cent of farmers as their duty, it is difficult to assume total commitment of the farmers. Evidence from Dawhenya, where a project turnover was completed, showed that many farmers do not voluntarily accept this task. During the survey in Dawhenya, executives of the co-operative after many times of appeal had to refuse farmers who failed to meet the deadline for bond weeding. Hence this role perception should be interpreted with care. In other words, transfer of operation and maintenance to farmers should start with least technically feasible tasks to more complex ones.

The attitude to operation and maintenance, ownership, protection and safety of the projects is presented in Table 5. This aspect was designed to test the hypothesis that the sense of belonging among the farmers will promote participation and project's success. To achieve this objective, farmers were provided with a number of statements against which they are requested to indicate the degree to which they agreed or disagreed. A five-point scale was used ranging from 'strongly agree' to 'strongly disagree'.

Table 5. Farmers' Attitude Towards Participation in O & M, Ownership and Safety of Facilities (% respondents)

Perception	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Sataso
I. Participation in O & M:							
Strongly agree	39	30	55	20	75	50	50
Agree	34	50	35	55	17	50	40
Cannot tell	7	0	0	10	8	0	0
Disagree	12	10	20	15	0	0	10
Strongly disagree	8	10	0	0	0	0	0
Total	100	100	100	100	100	100	100
II. Ownership of Project							
Strongly agree	32	0	40	30	68	40	30
Agree	23	10	40	50	0	30	20
Cannot tell	19	30	0	0	8	30	30
Disagree	17	40	15	20	16	0	20
Strongly disagree	9	20	5	0	8	0	0
Total	100	100	100	100	100	100	100
III. Safety and Protection of Infrastructure							
Strongly agree	38	20	45	25	68	50	60
Agree	43	70	55	65	32	50	30
Cannot tell	4	0	0	5	0	0	0
Disagree	6	0	0	5	0	0	10
Strongly disagree	9	10	0	0	0	0	0
Total	100	100	100	100	100	100	100

Source: Field data

'Farmers' society is responsible for operation and maintenance of project (e.g., cleaning and desilting of canals)' As can be seen from the table, over 60 percent of the farmers either strongly agreed or agreed with the statement and 20 percent of the respondents were undecided. The remainder, 20 per cent, was split between disagree and strongly disagree. Considering the difference among projects, it is obvious that Dawhenya project farmers showed the strongest tendency towards project maintenance as compared to other projects. On Sataso scheme, a world bank farmer-managed pilot scheme, 90 per cent of the farmers agreed with this statement, while at Kpong, a project in the implementation phase, 100 per cent of the potential farmers agreed with the statement. This shows that the farmers on the whole agreed with the maintenance of the project as their duty. This also confirms the high percentage of farmers perception of O & M reported in Table 4.

'Farmers' society owns the project'. On average, more than half of the respondents agreed to this statement because the projects were site specific. On the other hand, the rest 45 per cent were either undecided or disagreed with the statement because government officials could refuse them land or evict them from the project with no recourse. Again, a distinction with regard to projects can be observed from the table. On Bontanga project, farmers indicated that they had considered the project to be property of GIDA and would not care about the project's welfare. Recent developments on the project, for example, the flocking in of onion farmers from Bawku, had arouse the awareness that the project was implemented for them by government. Thus farmer awareness for ownership of project and subsequent participation is expected to rise with changes in the socio-economic environment of the farmers.

'Farmers' society is responsible for the protection and safety of project facilities'. There is a clear sense of responsibility for the safety and protection against wanton destruction and theft of facilities on the project. Almost 81 per cent of farmers either strongly agreed or agreed with this statement, while the rest 19 per cent of the respondents were undecided, disagreed or strongly disagreed. That is to say, on all projects almost 90 per cent of farmers agreed with the statement. The followings were given when asked about the major attributes to destruction of facilities on the project, old and unattended facilities (34%), insufficient water (20%), lack of education (14%), other reasons (13%), sabotage by others (11%), and ignorance (8%). The choice of old and unattended facilities in Akumadan was outstanding due to an overdue rehabilitation of the facilities.

Table 6. Rotated Factor Loadings (Varimax) of the Main Variables

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality	Pct of Var	Cum Pct
Age	-0.20	0.24	0.88	-0.01	0.87	26.50	26.50
Charge	0.02	0.06	-0.03	0.94	0.90	23.30	49.80
Crop	0.72	0.11	-0.12	0.38	0.69	16.30	66.10
Education	-0.88	0.05	-0.17	-0.03	0.81	10.10	76.20
Experience	0.27	-0.01	0.89	-0.05	0.87	7.10	83.30
Location	0.77	-0.27	-0.01	-0.27	0.74	6.00	89.30
O&M	-0.24	0.72	-0.03	0.01	0.57	4.60	93.90
Owner	0.23	0.78	0.17	0.13	0.71	3.30	97.30
Protection	-0.11	0.82	0.11	0.01	0.69	2.70	100.00
Eigenvalue	2.12	1.95	1.65	1.12	6.84	2.70	100.00

Besides the above explanations, an attempt was made to select different dimensions which when identified will promote participation in the project. As a result, a principal component analysis (PCA) was carried out using data in Tables 1, 4 and 7 with other ordinal variables such as location and principal crops under cultivation. The rotated factor loadings are presented in Table 6. The first factor can be said to represent agroecology. The second factor represents the sense of belonging, which is labelled Sentiment. The third factor is labelled Knowledge, while the fourth factor, Monetary, falls in a different category. Education was found to have a negative influence on factor one because of its high correlation with location. Although they contributed less variance in the data, it can be argued that the three items under factor 2 are necessary for the intended project turnover. It follows from the above that farmers who consider the project theirs, will be motivated to protect it and contribute resources to its operation and maintenance.

WHAT ARE FARMERS PAYING FOR OPERATION AND MAINTENANCE?

The major charging vehicle for irrigation services in Ghana is the cropped area. Two systems are used to price services on pump schemes differently from gravity schemes. Thus farmers were paying 100,000 cedis per hectare and 50,000 cedis per hectare on pump and gravity schemes, respectively. On Dawhenya project, farmers paid 50% more than the rest of the pump scheme's. On the other hand, farmers on the two pilot schemes, Sataso and Kikam, had not paid anything for irrigation service charges since the projects went into operation. At Sataso, for example, farmers paid their first service charges that were deposited in the schemes account. However, confusion over the signatory to the account and farmer's apparent agitation resulted in the reimbursement of the service charges. This decision of reimbursement was not a good precedent because it led to the defeat of the basic objective of the scheme. Bontanga project had introduced differential levies on high value crops such as onions.

Besides farmers on the Bontanga project, all other farmers paid their service charges after harvest. Apparently farmers on Bontanga project are achieving higher rates of recovery of service rates but to the disadvantage of cropping intensity. The introduction of this practice is due partly to the risk aversion of the farmers.⁹⁾ Farmers on other projects paid their service charges after harvest and sale of crops. In this respect, farmers' ability to pay is linked up with good harvest and moral of the farmer. That is to say, a farmer will have high yields but would not honour the payment because he uses the money for perceived higher-priority needs. To this end, farmers were asked the importance of the service charges, perception of the charges, reasons for default and factors they consider essential to higher rates of recovery of service charges.

PERCEPTION OF SERVICE CHARGES

In the study, 40 per cent of the farmers indicated that they were not sure of the

9) In the north farmers have lower tendencies to participation in the wet season. The farmers' preference for cropping calendar that will enable them accomplish cultural operations on the project before the first rains was 26%, communication and re-allocation of plots among members in the same village was 20%.

Table 7. Perception of Irrigation Service Charges (% of respondents)

Perception of Rate	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Satasa
Very Expensive	26	20	50	15	50	10	20
Expensive	37	30	20	70	34	40	40
Moderate	26	40	30	10	16	30	40
Cheap	11	10	0	5	0	20	0
Very Cheap	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100

Source: Field data

importance of service charges. To them the service charges were arbitrary, which did not take into account the carrying capacity of the project. Regarding the perception of current service charges, presented in Table 7, 63 per cent of the farmers considered the rates to be between very expensive and expensive. Out of the remainder, 26 per cent considered the current rates to be moderate, while 11 per cent said it was cheap. On Asutsuare, Bontanga and Dawhenya schemes, 70 per cent of the respondents indicated that the charges were either very expensive or expensive. While about 60 per cent of respondents on the other two projects of Satasa and Akumadan had similar perception, respondents in the Kpong project area skewed towards the cheap end. Although 40 per cent of the respondents had been using waste water from the Kpong Farms to irrigate their paddy fields, majority had not paid irrigation service charges before.

The differences in perception of respondents for Asutsuare and Dawhenya are apparent because they are the oldest schemes with similar characteristics of rice monoculture. Moreover, the two schemes are both pump schemes that had enjoyed government's paternalistic relationship of high rate of subsidy over the past years. It was found that the perception of service charges between very expensive and expensive was positively correlated with rice cultivation, reflecting lesser profits in the cultivation of the crop. Irrigation service charge as a percentage of gross output for rice was much higher; for example, on Dawhenya project it was 12 per cent. On the other hand, service charges as a percentage of gross output for vegetables were 1.8 per cent and 2 per cent¹¹⁾ for tomatoes and onions, respectively. Presumably this may confirm the 100 per cent recovery of service rates on Akumadan project, and thus reinforcing the need for crop diversification on other projects.

RECOVERY OF ASSESSED OPERATION AND MAINTENANCE COST

The present recovery situation is reported in Table 1. It is apparent from the table that there is a fairly high rate of recovery on all the projects, with highest rates in mainly vegetable-growing areas. For factors contributing to defaults on service charges, low harvest and lack of money received the highest rank of 41 percent; lack of farmers' knowledge in the determination and disbursement had 18 percent; rehabilitation of facilities was 12 percent; and lack of availability and timely supply of water was 11 percent. Incidentally, all respondents claimed to have paid their assessed rates.

11) At the proposed differential rate, the percentage is 3.3%.

Table 8. Preferences for Assessment and Recovery of Irrigation Service Charges (% rating index)

Perference	Average	Akumadan	Asutsuare	Bontanga	Dawhenya	Kpong	Satasa
a. Farmers must be involved in the determination of service charges	28	18	26	23	45	29	25
b. Farmers must be responsible for the collection of the charges	12	7	18	9	18	10	11
c. GIDA should continue with the collection of the charges	9	16	10	19	0	8	0
d. Project farmers must substitute their labour time for cash where possible	7	13	4	7	2	8	6
e. Farmers should appeal to defaulters	16	13	15	15	14	16	22
f. Project farmers must be involved in the disbursement of service charges	26	32	18	27	22	29	28
g. Other	3	0	10	0	0	0	9
Total	100	100	100	100	100	100	100

Source: Field data. Note: Percentages are weighted ranking of farmers' choices (see note to Table 2). Kendall's $W=0.78$, significant at $\alpha =0.01$.

The focus of the second part of the question was rating of methods of increasing the recovery of the assessed service rates. This is designed to secure farmers' perception of raising the recovery rate necessary for operation and maintenance. In this respect, emphasis was placed on farmers' participation as presented in Table 8. Farmers' involvement in the determination of service charges received the highest rank of 28 per cent followed by involvement in disbursement of service charges, 26 per cent. These high ratings show that majority of the farmers may be sceptical about the assessed rates. In a personal communication with the farmers, it was alleged that the accounting staff of GIDA were over invoicing. Furthermore, it was alleged that at times farmers had to pay twice because they can easily misplace their receipts. The third rating of 18 per cent, farmers must appeal to defaulters, confirms their belief in the use of social ties and peer pressure in the collection of the service charges. Perhaps the most significant result is that no farmer in Dawhenya and Satasa chose GIDA's continuation of rate collection, since they were fully informed. Finally, a high and statistically significant Kendalls W shows that farmers on the projects had an agreement in the use of these methods.

CONCLUDING REMARKS

Evidence suggests that the recent changes in policy to turnover irrigation projects to beneficiaries in the country will be well received by farmers. However, successful management of the projects by the farmers will be hindered by resource and institutional constraints. An attempt has been made to identify the constraints and the bottlenecks in the smooth running of the projects by the beneficiary farmers. Through the strengthening of the institutional framework on village basis farmers can gain greater communication, access to credit, physical inputs and product markets.

None of the farmers interviewed had seen the items constituting the irrigation service charges assessed on them. Rather than guessing the contents, 40% came out clearly that they did not know the use of the service charges. Knowledge about what amounted to the total service charges well before the beginning of the season would increase the

trustworthiness and consequently increase the recovery rates. Participation in the determination, collection and disbursement of the service charges as advocated by the farmer could play an important role in the system management.

Finally, majority of the farmers perceived maintenance and protection of infrastructure as their responsibility but are somewhat indifferent to collective ownership of the projects. As collective ownership is expected to raise participation and success of the projects, this finding suggests that special attention should be paid to this aspect from the outset.

(The survey on which this paper is based was sponsored by the Toyota Foundation)
and Ghana Irrigation Development Authority.)

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