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THE DEVELOPMENT PROBLEMS OF AGRICULTURAL PRODUCERS'COOPERATIVES IN ETHIOPIA: CASES FROM ARSI REGION

Wegenie Yirko*

ABSTRACT. This article is directed at (1) examining the performance of the cooperative sub-sector in Ethiopia both over time and relative to private peasant farms and state farms and (2) explaining the sub-sector's performance in terms of farm level resource management and macro-level policy parameters. Evaluating the overall performance of the sub-sector using data published by Government agencies, the paper then tries to explain its observed performance by examining the pattern of resource allocation in the cooperative farms using results of empirical linear programming models based on data collected from 26 Agricultural Producers' Cooperatives (APCs) in Arsi Region.

Results of the study indicate that the performance of the sub-sector has in general been less than satisfactory -- a performance explained by sub optimal allocation of resources and various problems faced by the cooperatives. The paper also makes specific policy recommendations.

1. INTRODUCTION

The Ethiopian economy is basically agricultural. Agriculture contributes a significant share to the GDP, employment and foreign exchange earnings of the country.[1] Because of this dominant role of the sector, much of the development policies of the country both in the past and the present have been agriculture led. Still, however, the development of agriculture has been far from being satisfactory and its

*Lecturer, Dept. of Economics, Asmara University.

growth has been much below the growth rate of the population[2] as a result of which the sector's capacity to feed the population has in the past been declining. This decline of the capacity to the sector is most obviously reflected in the rise of the import of food into the country.[3] A number of explanations were and are given for this unsatisfactory performance of the sector. One important explanation which occupied an important place both in the past and the present is the structure of the agricultural sector -- its dependence on fragmented individual holdings. In this respect, APCs have been recommended as means of overcoming the structural problem. A number of policy measures have been taken to promote producers' cooperatives. Their emergence and development has however been possible mainly in the post-1974 period. The Government, during this period, has made their emergence and development possible by issuing a directive [9] and by providing incentive grounds through its tax [8] credit and pricing policies. However, irrespective of the various favourable grounds provided to them, the performance of the cooperatives as indicated by fragmentary studies has been shown to be less than satisfactory [1, 4, 5, 16]. The anticipation that such institutions would effectively overcome the structural problem on the one hand, and the results of the various fragmentary studies on the other, justify not only a systematic and methodologically well founded evaluation of the performance of the cooperatives but also a close investigation into of the constraints of their development.

Hence, the specific objectives of our study are (i) to undertake a performance evaluation of the sub-sector (ii) to analyse the factors that have constrained their development, and (iii) to arrive at policy recommendations which may contribute to the development of agriculture in general and APCs in particular.

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1. INTRODUCTION

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2. METHODOLOGY

Towards the achievement of our objectives, various published documents were first examined and the sub-sectors' performance over time and relative to the other two sub-sectors assessed. A case study was then made to explain the relative performance of the sub-sector in terms of farm level management of resources and macro-level policy parameters. The case study was made in Arsi Region -- the region in which cooperatives have been developing faster and are performing better than any where else in the country. This case study is the source of data used in the LP model applied and in the study of the constraints of cooperative development. The data were collected using three sets of questionnaires designed to obtain information from the documents of the cooperatives, and through interviews with the executive committee members and individual members of the cooperatives.

2.1 Sampling Procedure

APCs in the region in *Welba* stage[4] were arranged into different strata on the basis of input factors. A list of cooperatives in the region in 1986/87, containing data on input factors and other social indicators, obtained from the Ministry of Agriculture were used for this purpose. Two important ratios, namely ox-man and land-man ratios were used in forming the strata. Ten percent of the total number of cooperatives, at that stage, was taken as an optimumsize and was divided into the various strata proportionately.[5] A simple random sampling was then applied to select 31 cooperatives in that stage.

2.2 Method of Analysis

2.2.1 Restratification and Selection of Representative Farms

As we have indicated above, a stratified proportionate sampling was applied in selecting the cooperatives included in our sample. The stratification which was made on the basis of land-man and ox-man ratios, formed on the basis of 1986/87 data, however, would be stable overtime if the land the cooperatives held, the draft animals they owned and the number of their members remained constant or changed proportionately. But this has not been the case in our study area as there has been a significant variation in resource availability to each of the cooperatives included in our sample in the three years for which data were collected. This variation has necessitated the restratification of the sampled cooperatives on the basis of 1987/88 data.

The basic rationale behind the stratification of the sampled cooperatives is to select representative or typical farms which may serve as a basis for the application of a Linear Programming (LP) model. The representative farm approach involves classifying the total sample into a number of sub-samples showing homogeneity in some respects and constructing a model for the representative farm in each group [2]. Since the LP approach involves the use of inputs and outputs, it was found meaningful to base the classification on the criteria of technical homogeneity, i.e., on the basis of similarity in input ratios and input-output coefficients. Taking this fact into consideration we have employed five criteria in classifying 26 of the sampled cooperatives[6] into six different groups. The criteria include, land-man ratio, land-ox ratio, output per hectare, output per man and the local conditions of the cooperatives.

In accordance with out classification criteria, the following cooperatives constitute each group:

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Upper Abo Ali	Kawa 01	Bekojji Chefa	Kemele	Bulad	Limu Mirt
Bore 02	Kawa 02	Habie Chora	Sirbo	Wenji Gora	Limu Area
Buco 01	Welkite 01	Jida Halila	Abosera Alko	Aleltu Mole	Limu Chemerie
Buco 02		Feje Feje			Huruta Hitosa
		Wajji			Hurutu Gbuse
		Gulele Odajila			
		Jida Askettu			
		Herota			

Once the classification was made, the representative farms were derived as the arithmetic mean farm calculated from each group. The specific characteristics of each of the representative farms so derived are provided in Table 2.2.

Table 2.2

The Specific Characteristics of the Representative Farms

	Representative Farms					
	1	2	3	4	5	6
Land-man ratio	3.36	3.09	2.01	1.98	1.47	1.78
Land-ox ratio (Ha)	1.85	2.06	1.07	1.49	0.78	1.56
Yield (average) (qui)	11.00	5.21	16.00	8.90	14.00	18.00
Output per man (qui)	38.00	16.4	33.80	17.30	21.00	31.00

2.2.2 Empirical Method of Analysis

LP models were constructed for each of the representative farms derived from each group to analyze their allocative efficiency. LP models make it possible to determine optimal values of a linear function subject to linear constraints [3, 6, 14]. Symbolically the model is given as:

$$\text{Optimize} \quad Z = CX$$

$$\text{Subject to} \quad AX \geq b$$

$$X > 0$$

C = vector of coefficients of objective function
X = vector of optimal level of activities
A = a matrix of input-output coefficients
b = input availability vector

LP models have had as their main purpose an analysis of the allocation of resources to different crops [13]. In employing LP models, in such analysis, first of all one defines the ideal output. Then, one comprises this optimal output with the actual output to estimate and evaluate the efficiency in the allocation of resources. LP models are defined in terms of their objective functions, activities and constraints:

A) Objective Function

Our farmers are assumed to maximize the total values of their net revenues defined as the values of their outputs minus their non-labour and land costs.[7]

B) Activities

In general five broad activities were specified in the model, including production, consumption, sale, use (hiring) of machinery and credit activities.

C) Constraints

Land, labour, ox-power, machinery, operating capital, subsistence requirements and crop production equilibrium (the production equilibrium condition which balances production to consumption and marketing activities) were taken as constraints in the model. To take seasonal peaks and troughs into account labour constraint is divided into plowing (February-June), weeding (July-September) harvesting (October-November) and threeshing (December-January) labour according to the

usual work schedule while ox-power constraint is divided into plowing and threshing ox-power constraint.

2.3 The Data Base

The data used in the LP model, in most cases, are those obtained from field survey. In some cases, however, results of experimental stations and previous established standards have also been used.

Labour Supply

Labour supply was estimated as an average of the total workdays worked by each member of the sampled cooperatives for three years. According to this estimate a member, on the average, has worked for about 195 working days in a year. Taking this as a basis, labour supply was derived by multiplying 195 days by 8 hours and their product by the total members of each of the representative farms. The same method was applied to eestimate seasonal labour supply. Accordingly while each member on the average has worked for 80 days during the plowing season and 43 days during the weeding season the number of days worked during the harvesting and threshing seasons were 36 days each.

Land

In all cases the area of total cultivated land available to the cooperatives was taken in the model. To assimilate the costs of hiring machinery into the model and to gauge the effects of using machinery on the utilization of other resources (labour, ox-power and operating capital) a minimum land limit for wheat was specified whose size was determined by the total machinery cost for all the representative farms except for Group 4 which was not involved in the hiring of machinery and Group 6 which has its own machinery.

Ox-power Supply

Ox-power supply was estimated taking the plowing and threshing seasons into consideration. While ox-power supply during the plowing season was derived by taking eighty ox-pair days (number of days worked on the average by the sampled cooperatives in three years, 1985/86-1987/88) of eight hours of each of their total ox pairs, ox-power supply during the threshing season was derived by taking thirty six ox-pair days of eight hours of their total ox-pairs.

Machine-power Supply

According to the information obtained from the agricultural Mechanisation Service Corporation, the total machine power hours available for hire for each representative farm was estimated by taking 70 percent of the total machine hours (over the six plowing months for tractors and two harvesting and threshing months for combines). To distribute the total to the different cooperatives, we divided the total machine power hours by their 1987/88 sale. Accordingly while there were 15.16 hours for each hectare of cultivated land for plowing, the corresponding figure for combines was 2.3 hours.

The total machine hours available for use by those who own tractors and combines was estimated by taking 70 percent of their total machine hours.

Operating Capital

The available working capital was arrived at by taking 55 percent of the net farm income. (30 percent assigned for working capital and an additional 25 percent which is put aside as a reserve fund, since the latter may also be used to cover variable costs). Net farm income in this case

is defined as gross income minus costs and consumption allowances made in kind for members of cooperatives.

Credit

In accordance with the credit policy of banks, the level of short-term credit available for the cooperatives was determined by the costs of fertilizer, improved seeds, and an amount equal to 50 percent of the cost of hiring machinery.

Consumption

Consumption requirements were calculated on the basis of calorie intake that is used by the Office of the National Committee for central Planning for target setting. The office uses an average per capita calorie intake of 2000 per day per man.

Prices, Yields, Variable Costs and Input Coefficients

For each crop while prices are calculated as weighted averages of the sales prices of the sampled cooperatives, yield and variable costs were calculated as arithmetic averages of the data obtained from the field. To take differences in local conditions into account, yield figures used for Groups 1 and 2, Groups 3, 4 and 5 and Group 6 were estimated separately.

The technical coefficients used in the constraint part of the LP model were determined by taking the averages of what our APCs have given us through interviews. The averages were checked against the coefficients established by the Ministry of Agriculture (MOA) in the region on eexperimental basis and is used in planning. The two fairly approximate each other and were used in the model.

3. EXISTING PATTERN OF RESOURCE ALLOCATION AND CROP PRODUCTION ACTIVITY OF THE SAMPLED APCs

Estimates of actual resource use, gross income and productivity of the cooperatives and of the representative farms are given in Anneex 1 and Table 3.1. The data provided in Table 3.1 will be compared with the optimal resource allocation patterns obtained from computer analysis to determine the degree of efficiency of the APCs.

The Annex and the Table illustrate that, on the average, in 1987/88, the cooperatives cultivated 331 hectares of land, out of which 87.9 percent was used for cereals, 6.8 percent for pulses and about 3 percent for oilseeds. To work on this land, a member on the average had expended about 1531 hours of labour power. The average cultivated land by a pair of oxen in that year was 3.7 hectares and the ox-man ratio was 1.25.

From their production activities, the cooperatives on the average had produced 3981 quintals. The average income derived by an APC from crop production activity was 148,629.25 birr. Costs constituted about 46.7 percent of the total farm income -- costs which in general are divided into variable costs (seeds, fertilizers, pesticides and herbicides costs) and overhead costs (administrative costs, per diem, taxes, and others). Of the total costs, variable costs are the main ones and account for about 80 percent of the total.

After allowance is made for costs, 85 percent of the income of the APCs is distributed among its members as labour income. The average labour income so distributed in 1987/88 varied from zero[7] in Kawa 01, Kawa 02 and Welkite 01 to 1184.45 birr in Huruta Hitossa. The average for all being 480.67 birr.

Table 3.1

Summary Data on Production of Representative Farms

	Representative Farms					
	1	2	3	4	5	6
1. Cropping Pattern:						
Area Under						
1.1 Wheat	184.32	325.10	181.66	49.70	20.17	129.11
1.2 Barley	291.24	294.80	104.56	70.70	70.80	143.52
1.3 Maize	--	--	19.84	1.67	--	10.57
1.4 Millet	--	--	0.88	3.30	1.30	--
1.5 Teff	--	--	8.00	--	--	16.22
1.6 Field peas	5.50	20.07	28.38	4.00	14.53	21.82
1.7 Horse beans	5.75	--	8.75	6.00	5.30	18.10
1.8 Linseeds	14.92	42.00	1.00	5.00	1.00	0.50
1.9 Fenugreek	0.75	3.58	2.56	3.30	0.67	10.30
1.10 Vegetables						
2. Resource Use:						
2.1 Area Cropped (Ha)	502.48	685.55	355.62	143.67	120.77	366.18
2.2 Annual labour used (hours/farm)	267555.00	378631.00	228411.00	145492.00	148846.00	313257.00
2.3 Machinery costs (Birr) farm	35794.00	54893.00	14464.00	--	3697.00	180035.00
2.4 Operating funds (variable costs/ha)	122.21	137.32	110.90	65.39	124.21	172.08

Con'd. Table 3.1

3. Returns:						
3.1 Total farm returns	150621.00	129889.00	195645.00	48723.00	59377.00	252761.00
3.2 Returns per hectare	300.00	189.00	550.00	339.00	492.00	690.00
3.3 Returns per hour	0.56	0.34	0.85	0.33	0.40	0.81
3.4 Returns per unit of operating capital	1.55	0.86	3.62	5.18	3.17	3.12

4. SUMMARY OF RESULTS

4.1 Macro Level Analysis

4.1.1 Temporal Analysis

From the very beginning, APCs grew steadily but slowly in number, membership and other material resources. This can be observed from Table 4.1.

In 1981/82, while the land holding by the APCs increased by 317 percent, their membership and animal resources rose by 73 and 9 percent respectively as the result of which both the land-man and land-oxen ratios increased. In the four years that followed, however, the rates of growth of manpower (10 percent on the average) and animal resources (13 percent per annum) exceeded that of hectarage (5.7 percent). This situation has steadily reduced the land-man and land- oxen ratios or has increased the intensity of the use of both manpower and bullock power in these farms. This is shown in Table 4.2.

Table 4.1
The Development of Agricultural Producers' Cooperatives [1980/81 - 1986/87]

				Resources			
	Number of Cooperatives		Number of Wolbas	Member-ship	Land		
Year	Malba	Wolba	Registered	(House-holds)	(Ha)	Oxen	Tractors
1980/81	405	139	32	34,533	36,387	39,041	29
1981/82	744	262	67	60,058	151,759	42,643	47
1982/83	799	397	129	79,835	139,261	61,176	66
1983/84	992	497	179	94,368	165,407	82,166	76
1984/85	1,255	601	191	132,872	201,280	120,372	86
1985/86	1,497	826	225	190,372	292,247	191,447	137
1986/87	1,953	969	317	239,450	397,271	230,997	262

Source: [11, 12].

Until 1985/86, with the exception of 1982/83, the tendency in the cooperative farms has been one of decreasing the intenssity of machine power. That is, in those years the rate of increase in hectarage has exceeded that of the increase in machines. In 1985/86 and 1986/87, however, cooperative farms have been relatively more machine intensive. In fact, in 1986/87, there seem to have been a substitution between the utilization of tractors on the one hand, and manpower and bullock power on the other. In that year, both the land-man and land-oxen ratios increased while the land-tractor ratio decreased (Table 4.2).

Table 4.2

Resource Intensity in Cooperative Farms in Ethiopia

	Ratios (Ha)		
Year	Land/Member	Land/Oxen	Land/Tractor
1981/82	2.52	3.50	3228.9
1982/83	1.74	2.30	2110.0
1983/84	1.74	2.00	2176.4
1984/85	1.51	1.67	2340.5
1985/86	1.51	1.52	2132.2
1986/87	1.65	1.72	1516.3

Unlike the input side, whose growth has been relatively steady, the production side is marked by fluctuations. This is indicated in Table 4.3. The low level of total production experienced in 1980/81 did not reach its 1979/80 level until 1983/84. That again was followed by the 1984/85 drought year during which production showed a decline. As a result, production grew at an annual average rate of only 2.18 percent.

Given the steady increase in resource use, and fluctuations in production, it is not difficult to observe a decline in the overall productivity of resources. The productivity of land (quintals/hectare) between 1979/80 and 1985/86 is given in Table 4.4.

Table 4.3

National Estimates of Production of Major Crops in Ethiopia for APCs 1979/80 - 1985/86

	Crop			Thousand Quintals
Year	Cereals	Pulses	Others	Total
1979/80	1034.45	103.02	13.58	1151.00
1980/81	614.77	49.50	9.81	674.08
1981/82	689.48	87.11	17.82	794.41
1982/83	799.32	127.62	21.97	998.91
1983/84	1086.82	133.00	23.09	1242.91
1984/85	946.87	89.42	29.54	1065.83
1985/86	1462.18	139.81	35.39	16637.38

Source: [10].

Between 1979/80 and 1985/86, yield on APC farms has declined by about 4.5 percent, implying an annual average rate of -0.65 percent.

The situation of productivity of labour appears to be more serious than that of land. On the basis of data provided in Table 4.1, labour force in the cooperative sector, between 1980/81 and 1985/86 was growing at annual average rate of 12.35 percent. During this period, however, production of the main crops was increasing at a rate of 6.42 percent per year. Assuming that no family labour and transfer labour is used in production, it means that productivity of labour during those years was declining at an annual rate of 5.93 percent. Had there been

the use of family and transfer labour, however, the rate of decline in productivity of labour would have been more.

Table 4.4

National Estimate of Yield of Major Crops in Ethiopia for APCs 1979/80 - 1985/86

	Quintals Per Hectare			
Year	Cereals	Pulses	Others	Total
1979/80	8.82	5.58	4.36	8.29
1980/81	8.98	4.88	2.41	8.15
1981/82	7.29	4.58	3.64	6.70
1982/83	8.62	9.43	2.89	8.33
1983/84	6.69	5.86	1.13	6.04
1984/85	7.09	3.87	2.29	6.29
1985/86	8.13	5.24	2.84	7.47

Source: [10].

4.1.2 Comparative Analysis

In Ethiopia today, aside from the cooperatives farm sub-sector, crop roduction is dominant in the individual farm sub-sector and also takes place in the state sub-sector. In 1985/86, while the individual farm sub-sector accounted for 91.6 percent of the total crop production, the state sector accounted for 5.12 percent of the total, the share of the

cooperative sector being 3.28 percent. How did the cooperative sub-sector perform relative to the two other sub-sectors?

Table 4.5 provides yield figures for the three different sub-sectors. As one may clearly see from that Table, in all the seven years, for which data are available, while state farms had the highest far, APCs had the lowest. The yield on peasant farms, in all the given years, have been less than those in the state farms and greater than those in the cooperative farm sub-sector. Further, if we take the averages for the seven years, we see that while yield in the APCs is less than the state farms by 52.6 percent, yield on private holdings was only 29.3 percent below that of the state farms. Moreover, a comparison of the APCs and private holdings indicate a yield for the cooperatives which is less by 33 percent than the individual peasant sub-sector.

Table 4.5
Estimates of Yield of Major Crops in Ethiopia For Private Holdings, Cooperatives and State Farms

Quintals/Hectare

Year	Cooperatives	Private Holdings	State Farms
1979/80	8.29	12.46	15.66
1980/81	8.15	11.61	13.77
1981/82	6.70	11.20	14.76
1982/83	8.33	12.96	14.78
1983/84	6.04	11.15	16.84
1984/85	6.29	8.23	16.32
1985/86	7.47	8.86	18.02

Source: [10].

To what extent does resource management at the farm level explain the observed performance of the cooperatives? This is discussed in detail in the next section (4.2).

4.2 Micro Level Analysis

Results of the LP run are provided in Table 4.6 out of which a number of important conclusions may be reached concerning the production pattern and resource use and the pattern of income of the APCs.

4.2.1 Production Pattern and Resource Use[10]

Land

Results provided in Table 4.6 indicate that, given the existing technological situation in which the APCs operate, there is no unused cultivated land in the optimal solution and land was found to be a limiting factor whose marginal value product varies inversely with the land-man ratios across the various groups of farms. This is provided in Table 4.7.

Even though land is in general a scarce resource, it is not optimally allocated among the different products and the pattern of production suggested by the optimal solution has been markedly different from the actual production pattern. This is shown in Table 4.8.

TABLE 4.6 A SUMMARY OF RESULTS OF THE LINEAR PROGRAMMING ANALYSIS

	REPRESENTATIVE FARMS					
	1	2	3	4	5	6
1. MAXIMUM VALUE	16009.67	11972.67	94018.20	44435.36	29764.97	12547.0
2. ACTIVITY LEVELS						
2.1. PRODUCTION (HECTARS)						
2.1.1. Wheat	139.000	213.000	56.000	70.332	21.000	134.00
2.1.2. Barley	159.875	257.000	137.054	18.750	30.772	46.732
2.1.3. Maize	-	-	114.945	25.647	73.074	10.526
2.1.4. Teff	-	-	-	-	-	77.027
2.1.5. Field Pea	20.000	29.529	-	-	-	85.714
2.1.6. Horse Beans	-	-	12.821	5.385	6.154	-
2.1.7. Fenu Greek	183.125	185.622	35.177	26.887	-	-
2.1.8. Vegetable and Root Crops	-	-	-	-	-	15.000
2.2. CONSUMPTION (QUINTALS)						
2.2.1. Wheat	726.471	1076.471	752.941	314.706	347.059	882.353
2.2.2. Barley	664.706	985.294	717.647	300.000	332.353	841.176
2.2.3. Maize	-	-	169.444	72.222	77.778	200.000
2.2.4. Field Pea	120.000	177.143	-	-	-	162.857
2.2.5. Broad Beans	-	-	166.667	70.000	80.000	-
2.3. MARKETING (QUINTALS)						
2.3.1. Wheat	802.529	1266.529	199.059	880.930	9.941	1529.647
2.3.2. Barley	774.169	1335.392	1475.218	-	-	-
2.3.3. Maize	-	-	2819.225	594.592	1822.149	-
2.3.4. Teff	-	-	-	-	-	1232.437
2.3.5. Field Pea	-	-	-	-	-	1208.572
2.3.6. Broad Beans	-	-	-	-	-	-
2.3.7. Fenu Greek	915.625	928.111	246.236	188.218	-	-
2.3.8. Vegetable and Root Crops	-	-	-	-	-	1035.000
2.4. HIRING (USE) ACTIVITY (HOURS)						
2.4.1. Tractor	834.000	1278.000	336.000	-	126.000	804. -
2.4.2. Combine	139.000	213.000	56.000	-	21.000	134. -
2.5. CREDIT ACTIVITY (BIRR)						
2.5.1. Borrowing Fund	37558.874	55154.711	16461.863	4243.489	5437.015	17503.479
3. RESOURCES USED (HOURS)						
3.1. LABOR						
3.1.1. Plowing Labor	35,699.992	46,355.250	36,486.672	16,066.489	14,187.521	24,928.72
3.1.2. Weeding Labor	51,256.000	74,038.65	60,887.998	28,854.873	26,786.005	55,080.24
3.1.3. Harvesting Labor	31,255.002	47,641.998	50,976.002	21,312.000	21,156.694	31,413.525
3.2. OX PAIRS						
3.2.1. Plowing	28347.999	38523.326	27264.000	16066.489	9403.073	19817.137
3.2.2. Threshing	20465.003	33832.000	31060.862	14112.000	11655.385	21600. -
3.3. Machine Power						
3.3.1. Tractor Hours	834.00	1278.000	336.000	-	126.000	804.000
3.3.2. Combine Hours	139.00	213.000	56.000	-	21.000	134.000

To what extent does resource management at the farm level explain the observed performance of the cooperatives? This is discussed in detail in the next section (4.2).

4.2 Micro Level Analysis

Results of the LP run are provided in Table 4.6 out of which a number of important conclusions may be reached concerning the production pattern and resource use and the pattern of income of the APCs.

4.2.1 Production Pattern and Resource Use[10]

Land

Results provided in Table 4.6 indicate that, given the existing technological situation in which the APCs operate, there is no unused cultivated land in the optimal solution and land was found to be a limiting factor whose marginal value product varies inversely with the land-man ratios across the various groups of farms. This is provided in Table 4.7.

Even though land is in general a scarce resource, it is not optimally allocated among the different products and the pattern of production suggested by the optimal solution has been markedly different from the actual production pattern. This is shown in Table 4.8.

Con'd. Table 4.6

	REPRESENTATIVE FARMS					
	1	2	3	4	5	6
4. MARGINAL VALUE PRODUCTION OF RESOURCES AT LIMIT						
4.1. Cultivated Land	171.350	188.500	241.508	254.670	581.450	255.657
4.2. Vegetable and Root Crops Land	-	-	-	-	-	2071.293
4.3. Weeding Labor	0.268	-	0.142	-	-	-
4.4. Harvesting Labor	-	-	1.246	1.076	-	-
4.5. Threshing Bullock Labor	-	0.071	-	0.285	-	1.537
4.6. Combine Hours	-	-	-	-	-	22.629
4.7. Operating Capital	0.050	0.050	0.050	0.050	0.050	0.050
5. GROSS VALUE OF PRODUCTION (BIRR)	154339.525	218598.577	202185.03	81262.498	73059.87	266216.6992
6. UNIT GROSS RETURNS						
6.1. Land (per hectare)	307.15	318.86	567.94	552.80	603.79	721.45
6.2. Labor (per hour)	0.57	0.58	0.88	0.55	0.49	0.84
6.3. Operating Capital	1.59	1.47	3.74	8.45	3.90	3.26
7. OPERATING COSTS	83426.28	125289.94	45638.676	13646.546	14329.45	67427.54
7.1. Variable cost	45408.38	67152.20	30256.586	13434.376	8597.604	42764.683
7.2. Machinery Cost	36140. -	55380.00	14560. -	-	5460.000	23787.680
7.3. Interest	1877.90	2757.74	822.09	212.17	271.85	875.1734
8. SUBSISTENCE CONSUMPTION	54898.54	81335.98	62527.83	26180.097	28965.50	73319.3077
9. TOTAL NET REVENUE	16009.67	11972.67	94018.20	41435.85	29764.91	125469.85
10. OVERHEAD COSTS[1]	10667.77	13741.24	3403.90	3080.61	4928.33	16001.32
11. NET INCOME OF THE COOPERATIVES	5341.89	-1768.57	90614.28	38355.24	24836.58	109468.53
12. UNIT NET RETURNS						
12.1. Land	10.64	-	254.53	326. -	205.26	296.67
12.2. Labor	0.02	-	0.32	0.33	0.19	0.34
12.3. Operating Capital	0.05	-	1.68	4.98	1.32	1.34
13. NET LABOR INCOME [0.85x11]	4540.60	-1768.57	77022.138	32601.95	21111.09	93048.25
14. PER CAPITA LABOR INCOME	30.47	- 8.00	435.15	440.56	257.45	449.51

[1] Actual

In all cases, millet and linseed should not be produced according to the optimal allocation of farm resources at the applicable Agricultural Marketing Corporation (AMC) prices. Optimality also requires, under prevailing conditions, smaller allocation of land to wheat and barley than is actually the case. In the actual cropping pattern, the percentage of the total hectarage allocated to wheat and barley has varied from 74.45 percent in Group 6 to 94.7 percent in Group 1. In the optimal solution, however, the percentage area allocated to those crops varied between 34.53 percent in Group 5 to 68.6 percent in Group 2. The reduction in the area allocated to wheat and barley in our optimal solution was suggested to be shifted to fenugreek and/or maize in all cases except Group 6 in which case a large area was suggested to be assigned to the production of *teff* and field pea.

Labour

As one might expect, the utilization of farm machinery under the condition of relative labour abundance would result in ineffective utilization of labour resource. Our optimal solution testifies to this fact. The relation between land-man ratio, land-man ratio cultivated by non-tractor inputs and the percentage of unutilized labour is provided in Table 4.9. While the land-man ratio is arrived at by dividing the total land by the total number of memberss of each representative farm, the land-man ratio ccultivated by non-tractor inputs makes an adjustment by substracting land cultivated by tractors from the total land.

In general, for those cooperatives who in the optimal solution have similar cropping patterns, the percentage of unutilized plowing labour increases from those groups of cooperatives in which the land-man ratio cultivated by non-tractor inputs is high to those groups of cooperatives where that rato is low. But where the yield differential (expressing the difference between natural conditions) forces a different cropping pattern the above general fact would need to be modified. In general, the

Table 4.7

The Relation Between Land-Labour Ratio and the Marginal Value Product of Land of the Representative Farms

	Representative Farms					
	1	2	3	4	5	6
Land-labour Ratio	3.36	3.09	2.01	1.98	1.47	1.78
Marginal Value Product of Land	171.35	188.50	241.51	254.67	581.45	255.66

percentage of unutilized labour, in the optimal solution increases in those groups of cooperatives where the cropping pattern favors the production of fenugreek. This is so because, the production of oil seeds, in the existing technological situation, requires a relatively small plowing labour per hectare than the production of other crops.

The LP solution shows that weeding labour, in the optimal solution is fully utilized in two Groups of cooperatives, Groups 2 and 3, is nearly fully utilized (95 percent and above) in Group 1 and 5 and has been fairly utilized (82 and 79 percent respectively) in Groups 4 and 6. Again it is the land-man ratio influenced by the production pattern which resulted in that pattern of the utilization of labour in that season. The pattern indicates that, if additional labour is not secured from other sources,[9] weeding labour would be one of the limiting resources determining the future expansion of production in all the cooperatives except Groups 4 and 6.

4.8 A Summary of Cropping Pattern of the Representative Farms Percentage Area Under Each Crop

Types of Crops	ACTUAL Cropping Pattern of the Representative Farms						OPTIMAL Cropping Pattern of the Representative Farms					
	1	2	3	4	5	6	1	2	3	4	5	6
Wheat	36.7	47.42	51.08	34.59	16.70	35.25	27.69	31.09	15.73	47.84	17.36	36.31
Barley	58.0	43.0	29.40	49.21	64.42	39.18	31.85	37.51	38.50	12.76	17.17	12.66
Maize	-	-	5.58	1.16	-	2.89	-	-	32.29	17.45	60.39	28.53
Millet	-	-	0.25	2.30	1.07	-	-	-	-	-	-	-
Teff	-	-	2.25	-	-	4.43	-	-	-	-	-	20.87
Field peas	1.09	2.93	7.98	2.78	12.04	5.96	3.98	4.31	-	-	-	23.23
Horse beans	1.14	-	2.46	4.18	4.39	4.94	-	-	3.60	3.66	50.9	-
Linseeds	2.97	6.13	0.61	3.48	1.38	0.14	-	-	-	-	-	-
Fenugreek	0.15	0.52	0.39	2.30	-	2.81	36.48	27.09	9.88	18.29	-	-
Vegetable & Root crops	-	-	-	-	-	4.40	-	-	-	-	-	4.06

Table 4.9

The Relation Between Land-Man Ratio and Utilization of Labour in the Optimal Solution

		Representative Farms					
		1	2	3	4	5	6
1	Land-Man Ratio	3.36	3.09	2.01	1.98	1.47	1.78
2	Land-Man Ratio cultivated by non-tractor inputs	1.85	2.06	1.69	1.98	1.35	1.14
3	Percentage of unused plowing labour	62.60	67.22	67.8	66.00	72.90	81.00
4	Percentage of unused weeding labour	2.60	FU*	FU	18.10	5.04	21.00
5	Percentage of unsed harvesting labour	25.12	27.16	FU	FU	10.41	47.00
6	Percentage of unused thresing labour	15.00	11.58	6.66	0.17	23.20	54.00

FU = Fully Utilised.

The same applies to the utilization of harvesting labour except that in this case in Groups 3 and 4 (which have utilized combine harvester on a limited land or have not used it at all, respectively) the percentages of unutilized labour have increased more than in the case of the weeding labour. Still, however, the ratio of unutilized labour is not as much as the plowing labour.

Except for farms in Group 4 which totally depend on their labour and ox-power resources, threshing labour is also in excess supply. But the percentage of unused labour is much smaller than the plowing labour and in some cases very small (Groups 3 and 4).

Ox-Power

The optimal solution also indicates under utilization of ox-power in the plowing season in all groups of cooperatives. The percentages of unutilized bullock power increases with the decrease in the land-ox ratio cultivated by bullock power. The relation between land-ox ratio and the percentage of unutilized bullock power is provided in Table 4.10.

Table 4.10
The Relation Between Land-ox Ratio of Unutilized Bullock Labour

		Representative Farms					
		1	2	3	4	5	6
1	Land-ox Ratio plowed by non-tractor inputs	1.85	2.06	1.07	1.49	0.78	1.56
2	Percentage of unused plowing Bullock Hours	54.80	47.10	69.30	58.20	77.00	58.00
3	Percentage of unused Threshing Bullock Hours	27.50	FU	24.20	FU	36.70	FU

With the exception of Group 1, threshing bullock power is a limiting factor for those groups of cooperatives whose land ox-ratio exceeds 1.49 As in the case of labour, the utilization of ox power depends upon the cropping pattern. The case in point is that of Groups 1 and 2 in which the optimal solution has favored the production of fenugreek. Irrespective of large land ox ratio, in these groups of APCs, there exists a considerable excess threshing bullock power (Group 1) or the marginal value product of bullock power of that period is very small (0.071) compared to the others (Group 2) which have a relatively small land-ox ratio. Threshing bullock power is not required by this crop.

4.2.2 The Pattern of Income of the Cooperatives

The main objective of the cooperatives contained in our LP model was one of maximizing total net revenue, after providing the minimum level of food requirements to members and their families in accordance with the existing pattern of consumption habits of the region. The last parts of Table 4.6 present the situation of optimum farm income of the representative farms.

Compared with the actual production pattern (Table 3.1), the optimal production pattern (Table 4.6) has an effect of increasing the gross income of the cooperatives. The percentage increases in the six representative farms, however, vary from a minimum of 2.46, 3.34 and 5.32 percent in Group 1, 3 and 6 respectively to as high as 68.2 percent in Group 2, the increases in Groups 4 and 5 being 67 and 27 percent respectively. Put differently, the results indicate that, measured in terms of gross income, the six representative farms operated with varying degrees of inefficiencies. Defining the level of efficiency of production pattern as the ratio of the actual farm income to the optimal farm income we see that while cooperatives in Group 1, 3 and 6, operated at 97, 96 and 95 percent of operational efficiencies respectively, cooperatives in Group 2, 4 and 5, on the other hand, operated at 59, 60 and 81 percent of their respective efficiency levels.

When operating costs subsistence consumption requirements and overhead costs are subtracted from the gross value of production we arrive at the net income of the cooperatives. If we allow 15 percent of this to be reserved to cover costs in the next crop year, the result would be the net labour income. The net labour income is an important figure indicating the level of returns to the co-owners and suppliers of labour. As far as this figure is concerned, interesting results emerge which actually tally with the existing technological situation in the APCs. Results in this respect indicate that, given the existing technological

situation, in the optimal solution, while Group 2 farms cannot supply their members and families with a minimum food intake (2000 calories), on an average, per day) Group 1 basically remains at food self-sufficiency level. This implies that, even if these two groups of cooperatives operated with 100 percent of their efficiencies their position would remain at best at the food self-sufficiency level.

For Groups 4 and 5, however, results indicate that optimum allocation of resources would bring a marked improvement in the level of incomes of their members, from the existing 112.95 and 108.36 birr to 440 and 257 birr respectively.

For Groups 3 and 6, the optimal production pattern brings only a marginal increase in the level of their incomes. Hence one may conclude that, measured in terms of farm returns, these two typical farms operated more efficiently.

Our study indicates that, to the extent that resource misallocation is a factor in the cooperative poor performance, the latter in turn is the outcome of a number of problems faced by the cooperatives and are briefly treated below.

4.3 Problems of Cooperatives Development

4.3.1 The Incentive System

4.3.1.1 The Input-Output Pricing System

The Ethiopian Government, as we have mentioned at the outset, has provided various incentives to attract farmers to form cooperatives. The input-output pricing system is one such means. On the input side, while cooperatives enjoy a price differential of 10 birr per quintal in the purchase of fertilizers, on the output side they enjoy a price differential

of 4 or 5 birr in selling their output to the AMC relative to the individual peasant sector.

Our field observation, on the other hand, indicated that while cooperatives sell all of their produce to the state purchasing agency, individual farmers have a possibility of selling their produce in open markets (after they hand in their quota to the AMC) at a price which in general is higher than the price paid to the APCs. Under this condition in which APCs are favored in one respect and are penalized in another, it would be difficult to judge whether the cooperatives are gaining or losing. In attempting to determine the net gain or loss by the APCs the following simple mathematical formula was developed and applied.

Let: Gs = the gain by the APCs from the sale of their products to the AMC relative to the individual peasant sector

L = the loss incurred by the APCs because they are unable to sell their products in an open market

N = net gains or net loss

X_j = the quantity of the jth product delivered by the cooperative to the AMC

P_{1j} = AMC price of the jth product on the market of individual peasant farms

P_{2j} = AMC price of the jth product on APCs market

P_{3j} = open market producers' price of the jth product

Y_j = the per capita delivery by members of PA of the jth product

m = total number of members of APCs

The gain, the loss and the net gain (implicit subsidy or tax) of the cooperatives relative to the individual peasant sector can then be given by the following.

$$G_s = \sum_{j=i}^{J} X_j (P_{2j} - P_{1j}) \text{ - - - - - - - - - - - - - - - - - } (4.1)$$

$$L = \Sigma X_j (P_{3j} - P_{2j}) \text{ - } (4.2)$$

$$NG = \Sigma Y_i m (P_{2j} - P_{1j}) - (X_j - Y_i m) (P_{3j} - P_{2j}) \text{ - - - - - - - - } (4.3)$$

But cooperatives also enjoy favourable prices in the purchase of inputs (i.e., fertilizer).[12] If we denote the price differential that they enjoy from the purchase of a quintal of fertilizer by ▲ p and the total fertilizer that the APCs purchased by Q, then the gain G_i, from the purchase of inputs is:

$$G_i = Q \blacktriangle p \text{ - } (4.4)$$

Adding 4.4 on 4.3 we obtain

$$NG = \Sigma Y_i m (P_{2j} - P_{1j}) - (X_j - Y_i m) (P_{3j} - P_{2j}) + Q \blacktriangle p \text{ -} (4.5)$$

Applying 4.5 on the data[13] obtained from our study area provides the following result.

- Fertilizer purchase by the sampled cooperatives = 7,923 quintals
- Price differential in the purchase of fertilizer = 10 birr/quintal
- Sale of output by the sampled APCs to AMC = 41,024 quintals
- Number of members of the APCs = 4,402
- Delivery to the AMC by PA members = 598 459 quintals
- Number of members of the PAs = 240 258
- Average quota of PA members = 2.49 quintals

Thus, the difference between the market and AMC price paid to the APCs which breaks even is:

$$2.49\ (4402)\ (P_{2j} - P_{1j}) - [41024 - 2.49\ (4402)]\ (P_{3j} - P_{2j}) + (7923x10) = 0$$

$$10960\ (P_{2j} - P1j) - [(41024 - 10960)\ (P_{3j} - P_{2j}) + 79230 = 0$$

As stated earlier, however, $P_{2j} - P_{2j}) = 4$ or 5 birr depending on the type of the product. Taking the average, 4.50 Birr and solving the above we arrive at the following:

$$10960\ (4.50) - 30064\ (P_{3j} - P_{2j}) + 79230 = 0$$

$$P_{3j} - P_{2j} = \frac{49320 + 79230}{30064}$$

$$= \underline{4.28}$$

The result indicates that, if on the average market prices have differed from AMC cooperative prices by 4.28 birr per quintals, our thirty cooperatives have neither gained subsidies nor have they paid taxes from their 1986/87 marketing activities. Had the price differential exceeded that level, which it did, the cooperatives have paid implicit taxes.

Thus, taking the actual situation prevailing in the country, it seems that the cooperatives are not favored in terms of the input-output pricing system. Rather, the indication is that the APCs are paying implicit taxes on the sale of their products to the AMC.

4.3.1.2 Distribution of Income

4.3.1.2.1 The System of Payments

The income which cooperative members derive from their labour activity influences their motivation to work and hence determines the economic result of the common enterprise. The income of the cooperative farmers depends primarily upon the total output produced by the cooperative and the way in which it is divided between farmers' income and other activities. The relative position of each member of the cooperative in the income distribution pattern, however, is a function of his labour input contributed to production -- labour input measured by accumulated points. Thus, given the total output, while accumulated points of each member of the cooperative determine his or her share of the pie, the size of the output, on the other hand, that is available for distribution determines the value of each point.

Given the above, therefore, an important issue in the operation of the cooperatives is the way in which work points are determined in the cooperative farms. From our field surveys we were able to distinguish four types of payment (distribution) systems derived from the way in which work points are determined. These include, payments based on working hours, working points, working norms and the contract system.

At their early stage of development, APCs apply the payment system which is based on working hours. Under this system, working hours rendered by members to their cooperative are recorded and provide the basis for distribution of farmers' income. If in their statutes it is established that the working day is to be composed of 8 hours, 8 points will be recorded for all members who participated in any agricultural operation. The time so recorded will be aggregated over the years. The total farmers income will then be divided to the aggregate points to determine the value of each point. Once this is determined, the income

of each member of the cooperative will be arrived at by multiplying the value of each point by their respective total points. Absenteeism and lateness are the only factors that bring about a relative difference in the incomes of members.

As APCs develop, the system of payment which is based on working points replaces the one which is based on working hours. Under this system working points are granted and written down, which reflect more or less also the working hours. Under this system, however, different points are granted for different types of agricultural operations. In nearly all the cooperatives, while 1.2 points are granted for an eight hour work in plowing, weeding, harvesting and threshing, 1.4 points are granted for an application of herbicides and insecticides.

In the more developed APCs, payments based on working norms are applied. Working norm reflects the quantity and quality of work, which can be performed in a definite period of time by one (or more) member(s) who has (have) average skills and abilities and average physical strength and who works (work) efficiently and reliably. Under this system of payment, working norms are established for each agricultural operation and the cooperative grants a certain quantity of work points for the fulfillment of each working norm. If a member (team) works more than what is stated by the norm, the work points recorded for him (team) would increase accordingly and vice versa.

In two of the sampled cooperatives, Limu Chemerie and Huruta Hitossa, a contract system of distribution is being practiced. While in Limu Chemerie family contract system is in effect, in Huruta Hitossa group contract system[14] has already been introduced. Under household contracts, the resources of the cooperatives are distributed among households that enter into production contracts. Each household is then responsible not only for meeting output quotas assigned by the leadership, but also for taxes and all other payments to the APC. Items

such as seed and fertilizers must be financed from the households' own resources and the families decide how the labour is utilized. Under this system, a household enjoys a considerable latitude and is allowed to retain all production in excess of the assigned quotas and mandatory payments, which provides a very powerful incentive for improving productivity[15] [17].

So far we have described the various distribution systems which are being applied in one or another cooperative in our study area. But when one sees the line of development of the systems as given above, it seems that it has been reversed from the pattern which would be expected in a "socialist system". A "socialist system" (a system in which payment is to be made according to abilities) must take into account the differences that exist between people and arrange distribution systems in such a way that it motivates people to increase their production. But payments based on working hours and work points do not take the difference in the quantity and quality of labour into account. Hence, they are payment systems which must be applied when the quantitative and qualitative difference between people are adequately narrowed down. Accordingly, therefore, at the present stage it seems appropriate to begin with the household (family) contractual system which gives a considerable chance for the household to decide on their human resources and to go down to group contractual system, to distribution based on working norms, working points, and working hours.

4.3.1.2.2 Income Distribution

The income that members of the cooperatives derive from their large organization is not encouraging. The result of our studies indicated that, on the average, a member of a cooperative in 1986/87 obtained 480.67 birr per annum and supported 4.9 people. This then gives a per capita income of 81.47 birr which is 66.3 percent below the 242 birr per capita of the country as a whole for that year.

Not only are the average and per capita income low, but most of the cooperative farmers also experienced a progressive decline in their income. Thus, among 154 members of the APCs covered by our interview, 66.9 percent reported a consistent decline in their income. On the other hand, while 15.5 percent reported a continuous increase, the rest experienced an inconsistent trend in their income. Moreover, a little more than 78 percent of our farmers reported that the income which they derive out of their large enterprise is unable to cover the expenditures required to satisfy their basic needs. More important than the above, indicating the future trend of the cooperative development in the region, is the responses of our respondents on their income vis-a-vis that of the individual producers. Out of the total, while 65.5 percent found their income as members being less than that of the individual farmers, 31.7 percent indicated the opposite and the rest observed equality between their income and that of the individual farmers.

Given the above responses of members of the cooperatives, it will not be difficult to observe that farmers do not still have adequate incentive which can motivate them to apply themselves more fully in order to raise productivity. It is also simple to observe that most of them are at any time ready to go back to individual farming if they obtain the chance to do so.

4.3.2 Other Problems

Other problems in cooperatives development include absence of democratic participation in management and decision making process and problem of forced membership which neglects Lenins' Principle of Voluntarism.

5. POLICY RECOMMENDATIONS

An investigation of the performance of cooperatives in time showed that while APCs have become more and more resource intensive, the productivities of these factor inputs on the other hand have been declining. An important factor contributing to this situation was drought. An appropriate policy must look into ways of introducing irrigated agriculture. The relative large size and the surplus labour available in the cooperatives indicate a possibility of labour investment in the development of irrigation system.

Our comparative investigation also showed that, land, the main agricultural resource, put under the cooperatives is less productive than land placed under the state farms or individual producers. Even though it is too difficult to suggest conclusive recommendations involving all the three sectors without looking into all other factors affecting yield, our findings tend to support the view, under present conditions, of retaining land under private holding than placing it under the cooperatives since private holders seem to achieve a higher yield under the conditions of the scarcity of yield increasing inputs compared with the APCs. This, in turn suggests, a slow development of the cooperative sub-sector.

In general, a look into the allocative efficiency of the APCs indicated the existence of sub-optimality in their production pattern. The optimal pattern of production suggested by our LP model varied from one group of cooperatives to another. This implies the fact that given the existing, technological, physical and economic situations in which the cooperatives operate any planning which is directed at maximizing the benefit of the cooperative members should take the specific position of the cooperative (for which the plan is drawn) into account to decide on the allocation of land to various crops. This indicates a need for appropriate and differentiated land utilization policy.

The variation in the marginal value product of land from one group of cooperatives to another and its inverse relation with land-labour ratio implies a need to establish an appropriate land holding and land allocation method for each APC which takes its resource availability into account. Such a policy, should aim at establishing the optimum land-labour ratio that maximizes the returns of land to society. This approach, by prohibiting the cooperatives from appropriating land held by individual producers will not only reduce the problem of land insecurity but will make the more efficient utilization of that resource possible.

The existence of disproportionately large amount of labour and ox-power during the plowing season on the one hand, and the utilization of hired tractors which involve a significant cost on the other for the same season is something paradoxical. Indeed, since our findings indicate the existence of surplus labour and ox-power even in those cooperatives which did not use hired tractors, the use of machinery during this season should be questioned. The Government would need to evaluate the advantages and disadvantages of the machinery hiring stations sooner than later.

On the contrary, the existence of shortage of weeding, harvesting and/or threshing labour on the one hand, and the existence of large unemployed family labour which is untapped because of the creation of cooperatives produces yet another paradox -- shortage under the condition of abundance. This situation also implies a need to draw a policy which encourages the utilization of family labour in production. Labour can easily be drawn into production by applying the correct system of distribution of income within the cooperatives. In many countries this problem was resolved by introducing the family contract system. If such a system, which allows the flow of family labour is not going to be introduced, our solution suggests the utilization of combine harvesters in the harvesting and threshing seasons. However, given the

fact of relatively bountiful family labour, this alternative is hardly justified.

An investigation into the input-output pricing and marketing policy of the Government had shown that this policy contains a contradiction which on the one hand favors APCs and on the other penalizes them. If the objective of the Government is to encourage their development, a policy must be designed such that cooperatives in the final analysis receive a net flow of resources. Under the existing system, this implies an improvement by reducing the per capita quota placed on APCs below that of individual peasant farmer and allowing the APCs to sell their produce above that amount on the free market. In this respect, however, the most radical solution is to abandon quota purchases and allow free competition in the purchase and sale of both inputs and outputs.

As far as an income policy is concerned, given the present low level of income that is derived from large collective farms, one should think of a policy which maximizes not only the aggregate income of the farms but also one which prevents wastage of labour tied in unnecessary operations of the cooperatives in pursuit of increasing their total work points -- thus untying labour so that it may find an alternative of creating additional revenue. This implies again setting a correct distribution system which allows a free flow of labour. The appropriate distribution system in this case would be the family contract system.

Finally we recommend that cooperatives develop voluntarily by themselves, by means of education and by example. We also recommend that cooperatives permit democratic participation in decisions and indeed serve as examples for excellence of "socialist democracy" in action.

NOTES

1. Agriculture still contributes more than 45 percent to the GDP, it accounts for more than 90 percent of the export earning of the country and provides employment for about 85 percent of the population.

2. Between 1968/69 and 1982/83 for instance, while agricultural GDP grew by about 20 percent in real terms, population grew by about 31 percent.

3. Thus, the share of food and live animals in the total imports increased from 3.6 percent in 1977 to 6.8 percent in 1980.

4. Cooperatives at *Malba* stage (initial stage of development) were also included in our sample. It was, however, later discovered that only 2 out of the 8 cooperatives included in our sample were found at that level, the rest having been transformed into the higher stage - *Wolba*. Thus we restricted our study to *Wolba* stage.

   A cooperative can be called Wolba a when it reaches such a level that it transforms all land (except 1000 sq. mts. which is left for each member as a kitchen garden) under one collective body, when all farm animals and production tools come under its control and members are all paid according to their labour contributed to production.

5. The determination of the total sample size was influenced by its representativeness of the various strata and the statistical requirements of the methodology that were intended to be applied in the analysis part. Econometric method was expected to be applied as an alternative which requires more than 29 observations.

6. Of the sampled cooperatives, Burkitu 01, Kerensa 01, Bosha Burkitu and Lodie Sharbie have shown a marked difference from others and among themselves in terms of the criteria we have employed and hence were excluded from the grouping.

7. Labour and land are not costed in cooperative farms.

8. The net income of the cooperative enterprise is divided in varying ratios for variouss purposes [9]. While 60 percent of the total is assigned for fixed and operating capital (30 percent each) for the subsequent crop year, 25 percent is retained as a reserve fund. The rest is used for material and moral incentive (2 percent) and for social development (13 percent).

9. Costs of production and their debts exceeded their production. Members of these cooperatives survived by meeting their food requirements through borrowing.

10. Here, the pattern of the utilization of the main resources are given. For the utilization of other resources see [15].

11. Even though APCs may use their family labour in production, the utilization of this labour in the sampled cooperatives is negligible. Thus APCs may secure additional labour from that source. The average family size of the sampled cooperatives in 1987/88 was 5.95 of which 1.98 was in the working age category.

12. All other inputs, including improved seeds, insecticides and pesticides command the same price in both the cooperative and individual peasant markets.

13. Disaggregated data by type of grains supplied to the AMC by individual peasant farmers were not obtained. Thus aggregate data was used.

14. In group contract system, the resources of the cooperatives are distributed among groups formed out of members of cooperatives.

15. For details of the problem, see [15].

REFERENCES

[1] Cohen, J.M. *Smallholder Vs Agricultural Collectives: Agricultural Strategy Debates in Ethiopia Since Revolution.* Paper presented to the Conference on the Problems of the Horn of Africa. Washington, D.C.: Woodraw Wilsen Center, Smithsonian Institute, June 1987.

[2] Collinson, M. *Farm Management in Peasant Agriculture.* Boulder Colorado: West View Press, 1983.

[3] Cuddihy, W. *Agricultural Price Management in Egypt* - World Bank Staff Working Paper No.388. Washington D.C.: 1980.

[4] Ghose, A.K. "Transforming Feudal Agriculture: Agrarian Change in Ethiopia since 1974". *The Journal of Development Studies,* October, 1985.

[5] Griffin, K. and Hay, R. "Problems of Agricultural Development in Ethiopia: An Over View and a Suggested Survey". *Thee Journal of Peasant Studies,* October, 1985.

[6] Hazell, Peter B.R. and Norton, Roger D. *Mathematical Programming for Economic Analysis in Agriculture.* New York: Macmillan Publishing Company, 1986.

[7] Provisional Military Administrative Council (PMAC). *Negarit Gazeta.* 39th year, No. 2.

[8] PMAC. *Negarit Gazeta.* 39th year, No. 3.

[9] PMAC. *Directives on Agricultural Producers' Cooperatives.* Addis Ababa: Artistic Printing Press, 1979.

[10] PMAC, Central Statistics Authority - *Time Series Data on Area, Production and Yield of Major Crops 1979/80 - 1985/86.* Addis Ababa, Oct. 1987.

[11] PMAC, Ministry of Agriculture. *Annual Report 1979 E.C.* Addis Ababa, June 1987.

[12] PMAC, Ministry of Agriculture. *Statistical Book of Agriculture,* Amharic. Addis Ababa, 1987.

[13] Sampath, R.K. "Nature and Measurement of Economic Efficiency in Indian Agriculture". *Indian Journal of Agricultural Economics.* 1979.

[14] Sisay Assefa, "An Analysis of Resource Allocation in Household Farm Economy: Cases from Chilalo Province, Ethiopia". *Ethiopian Journal of Development Research, October, 1983.*

[15] Wegenie Yirko, *The Development of Agricultural Producers' Cooperatives in Ethiopia: Cases from Arsi Region.* M.Sc. Thesis, Addis Ababa University, 1989.

[16] World Bank. *Ethiopia, Agriculture - A Strategy for Growth - A Sector Review.* Washington D.C., U.S.A.: March 25, 1987.

[17] World Bank, Country Study. *China: Socialist Economic Development: Volume II, The Economic Sectors: Agriculture, Industry, Energy, Transport and External Trade and Finance.* Washington D.C., U.S.A.: 1983.

ANNEX 1. PARTICULARS OF THE SAMPLED COOPERATIVES - 1987/88 DATA

	NAME OF THE COOPERATIVE	YEAR OF ESTABLISHMENT	NUMBER OF MEMBERS	NUMBER OF OXEN	TOTAL CULTIVATED LAND (HA)	INPUT RATIOS		TOTAL OUTPUT (QUINTALS)	INPUT-OUTPUT COEFFICIENTS	
						LAND-MAN RATIO	OX-MAN RATIO		OUTPUT PER MAN	OUTPUT PER HECTARE
01	UPPER ABOAW	1972	79	146	265	3.35	1.84	3194.24	40.43	12.05
02	BULAD	1978	69	119	97	1.40	1.72	1329.15	19.26	13.70
03	KEMELE	1977	61	74	120	1.96	1.21	1099.79	18.03	9.16
04	SIRBO	1977	63	108	112	1.77	1.71	851.16	13.51	7.60
05	BOKOJJI CHEFA	1975	176	272	337	1.90	1.54	5172.61	29.39	15.35
06	ABOSERA ALKO	1973	100	113	208.5	2.00	1.13	2037.82	20.38	9.95
07	HABIE CHORA	1975	115	142	230.	2.00	1.23	3072.22	26.71	13.36
08	JIDA HALILA	1974	310	458	648	2.09	1.48	10424. -	35.60	16.11
09	FEJE FEJE	1976	140	262	338	2.41	1.87	4092.16	29.23	12.10
10	KERENSA 02	1976	76	134	214	2.82	1.76	2131.5	28.05	9.96
11	BORE 02	1976	67	119	212	3.16	1.78	2498.2	27.30	11.78
12	BUCHO 02	1974	250	268	758.8	3.03	1.07	6971. -	27.88	12.76
13	EAWA 01	1974	222	244	714.34	3.22	1.09	3660. -	16.49	5.12
14	WAJJI	1976	125	183	260	2.08	1.45	5303.61	42.43	20.40
15	WENJI GORA	1976	62	65	92.5	1.49	1.05	1296.34	20.91	14.01
16	KAWA 02	1974	252	256	729.38	2.89	1.02	3398.10	13.48	4.66
17	LODIE SHARBIE	1975	69	87	168	2.43	1.26	643.9	9.91	3.83
18	HURUTA GERDEBUSA	1975	120	81	264.1	2.20	0.675	5544.67	46.21	20.99
19	GULELE ODAJILA	1977	59	110	142	2.41	1.86	2708.45	45.90	19.07
20	JIDA ASKELTU	1974	160	260	358. -	2.24	1.63	6216.-	38.85	17.36
21	BUCHO 01	1974	201	252	774.12	3.85	1.25	6405.36	31.87	8.27
22	WELKITE 01	1974	188	187	631.-	3.26	0.99	3593.51	19.11	5.86
23	LIMU HIRT	1973	194	144	243.-	1.25	0.74	3835.30	19.76	15.78
24	LIMU AREA	1973	178	174	256.5	1.44	0.97	3676.93	20.66	14.33
25	LIMU CHEMERIE	1972	315	174	590.81	1.87	0.55	10031.05	31.84	17.00
26	HURUTA HITOSSA	1972	227	180	439.75	1.93	0.79	8334.40	36.70	18.95
27	LEGE DENA	1978	67	105	173.-	2.58	1.57	2362.-	35.25	13.65
28	ALELTU MOLE	1971	116	200	174	1.50	1.72	2555.01	22.02	14.68
29	BOSHA BURKITU	NG	34	40	39	1.14	1.18	227.13	6.68	5.82
30	HEROTA	1975	332	537	535.25	1.61	1.61	8126.78	24.48	15.18
31	BURKITU 01	1977	42	78	167. -	3.98	1.86	2627. -	62.54	15.73
AVERAGES			144	180	331	2.29	1.25	3981.2	27.61	12.0

*Because of incompleteness and unreliability in data, it is excluded from analysis NG- Not Given