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TABLE V—ELASTICITY OF LABOUR USE

Type of farms	Bullock labour	Technology	Farm income
Medium	0.17943	0.04595	0.39730
Large	0.15802	0.20141	0.27620

Conclusion

Employment of labour both casual and permanent is higher on the progressive medium and large farms as compared to the less progressive. It is also seen that both on the typical and tractor progressive farms there is greater employment than in the less progressive. Employment on the typical farm per acre is more than that on the tractor farm which shows a decrease in employment due to mechanization. Regression analysis showed that technology and farm income have significant effect on labour use.

IMPACT OF MODERN FARMING TECHNOLOGY ON
RURAL EMPLOYMENT IN SAURASHTRA

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INTRODUCTION

The recent spurt in the adoption of modern farming technology, like the use of hybrid seeds, fertilizers, insecticides, irrigation, etc., in certain areas and by certain sections of farmers will have its wide ranging favourable and adverse social, political and economic implications. This paper, however, attempts to find the impact of modern technology on employment. During the two decades of, what is called, planned development, unemployment and illiteracy, in absolute terms, have increased steadily and continuously and we are nowhere near the realisation of the constitutional directives of adequate means of livelihood and education for all children. The problem of unemployment has assumed a menacing dimension and is fraught with dire consequences for all.

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The objectives of this paper are (i) to measure the impact of the use of improved seed and irrigation on employment; and (ii) to measure the change in participation of family labour in farming due to the introduction of new methods of farming.

The study was carried out in Saurashtra in 1968-69 for the purpose of land use planning. South Saurashtra zone, one of the eight agro-climatic zones of Gujarat, was selected for the study. The zone comprises of Junagadh and Amreli districts and southern parts of Bhavnagar and Rajkot districts. It has 32 talukas and 2,364 villages spread in an area of 21,39,073 hectares, out of which 14,89,033 hectares are under net cultivation. The soil of the zone is medium black, shallow and calcareous in nature and the normal rainfall is 625 millimetres.

METHODOLOGY

Since the area under study is nearly homogeneous for agricultural and climatic conditions, a two-stage simple random sampling, with a village as the primary sampling unit and an operational holding within a village as the ultimate sampling unit, was resorted for selection of the sample. Twenty-five villages were selected at random and from each of the selected village, eight cultivators were selected randomly. The operational holding of each selected farmer was studied and since the tenancy has been abolished in Gujarat, the operational holding was also the ownership holding of the farmers under study. A qualified and experienced Agricultural Assistant with sufficient training was posted in each village for recording the day-to-day data under the cost accounting method. Various schedules were designed for information on bullock labour, fixed capital, cultivation operations, irrigation, etc. The data on labour utilization for different crops under modern and traditional methods of farming were extracted from the cultivation sheet maintained for each survey number of the selected farmers for preparing this paper. Two hundred farmers were selected from 25 villages but the data of 24 farmers from three villages were rejected on account of administrative lapses. Thus, this study is based on the data of 176 farmers from 22 villages of the zone. The average holding of the selected farmers was as high as 7.79 hectares but this is also the average for the zone as a whole. Six most important crops of the zone, groundnut, bajri, cotton, jowar, wheat and paddy were studied. Two inputs, improved seed and irrigation, which have considerable effect on labour utilization were selected. The findings are presented in Tables I to V. The labour utilized for different operations in different crops and seasons were recorded in the cultivation sheets. Separate data on men and women labour and for casual, permanent and family labour were recorded. The actual wages paid in cash and kind were also noted in the cultivation sheets but wages paid in kind were converted at the prevailing market rate in the village. The family labour was evaluated on the basis of the minimum wage prevalent for casual labour in the village. Tables I to V show the men and women hours of permanent, casual and family labour, their wages, total labour hours and wages and share of family labour in the total wage bill for different crops under dry and irrigated cultivation and under improved and local varieties of seeds. The figures presented in these tables are on hectare basis.

RESULTS AND DISCUSSION

Table I shows the data of labour utilization, wages, etc., for the groundnut crop which occupies the maximum area in the zone. It is seen that the improved varieties of groundnut, Punjab-1, AH-334 and AH-32, require 40 per cent more men hours than the local variety. Similarly, the women hours utilized, under improved varieties, were 64 per cent more than that under local seed. Comparing the irrigated and rain-fed crop under both improved and local varieties, it is observed that the irrigated crop requires nearly 50 per cent more men and women hours than that required by the dry crop.

TABLE I—LABOUR REQUIREMENT AND COST FOR IMPROVED AND LOCAL GROUNDNUT PER HECTARE

Labour	Improved			Local			Average for the crop			
	Irrigated	Dry	Average	Irrigated	Dry	Average				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
Men	Permanent	Hours ..	54.53	5.95	25.05	20.52	7.33	9.78	18.11	
		Wages ..	30.63	2.73	13.70	11.22	3.10	4.61	9.57	
	Casual	Hours ..	176.17	90.79	124.36	86.25	55.68	61.37	95.73	
		Wages ..	83.88	40.86	57.78	34.03	21.54	23.86	42.37	
	Family	Hours ..	217.47	203.39	208.91	196.16	182.18	184.78	197.95	
		Wages ..	104.89	80.10	89.84	83.53	62.61	66.51	79.23	
	Total	Hours ..	448.17	300.11	358.32	302.93	245.19	255.93	311.79	
		Wages ..	219.40	123.69	161.32	128.78	87.25	94.98	131.17	
	Women	Permanent	Hours ..	—	—	—	—	—	—	—
			Wages ..	—	—	—	—	—	—	—
Casual		Hours ..	125.65	62.19	87.14	51.94	41.41	43.37	67.24	
		Wages ..	50.43	19.56	31.70	18.22	15.55	16.05	24.59	
Family		Hours ..	93.57	81.29	86.12	91.33	56.00	62.57	75.43	
		Wages ..	33.20	31.01	31.87	37.82	22.93	25.69	29.06	
Total		Hours ..	219.22	143.48	173.26	143.27	97.41	105.94	142.67	
		Wages ..	83.63	50.57	63.57	56.04	38.48	41.74	53.65	
Total labour hours ..		667.39	443.59	531.58	446.20	342.60	361.87	454.46		
Total wages (Rs.) ..		303.03	174.26	224.89	184.82	125.73	136.72	184.82		
Average wage per hour (Re.)		0.45	0.39	0.42	0.43	0.37	0.38	0.41		
Share of family labour in total wage (per cent) ..		45	64	54	65	68	67	58		

The wage bill for the improved variety is Rs. 88 more than that for the local variety, representing an increase of 65 per cent. This figure represents the increase in employment by the improved varieties. The share of family labour in the total wage bill is reduced from 67 per cent in local varieties to 54 per cent in improved ones but in absolute terms, the improved varieties afforded the scope to increase the earnings from Rs. 92 in local varieties to Rs. 121 per hectare. Thus the improved varieties and irrigation of groundnut crop substantially increase the overall employment, employment of family labour and wage bill compared to local varieties and dry crop of groundnut, respectively.

Table II shows the comparison of hybrid and local varieties of bajri in their requirements of human labour and wages. The results are similar to those of groundnut. The hybrid used 59 per cent more labour hours than the local varieties of bajri. The total wage bill is also higher by the same per cent for the hybrid.

TABLE II—LABOUR REQUIREMENT AND COST FOR HYBRID AND LOCAL BAJRI PER HECTARE

Labour	Hybrid			Local			Average for the crop			
	Irrigated	Dry	Average	Irrigated	Dry	Average				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
Men	Permanent	Hours ..	24.60	—	17.98	9.84	5.28	6.13	6.68	
		Wages ..	8.03	—	5.87	5.12	1.90	2.51	2.66	
	Casual	Hours ..	152.70	183.86	161.08	120.39	86.60	92.88	96.05	
		Wages ..	54.80	69.23	58.68	45.48	33.31	35.56	36.64	
	Family	Hours ..	224.29	306.63	246.44	316.71	176.99	202.95	204.97	
		Wages ..	79.15	106.21	86.43	111.18	62.50	71.55	72.24	
	Total	Hours ..	401.59	490.49	425.50	446.94	268.87	301.96	307.70	
		Wages ..	141.98	175.44	150.98	161.78	97.71	109.62	111.54	
	Women	Permanent	Hours ..	—	—	—	—	—	—	—
			Wages ..	—	—	—	—	—	—	—
Casual		Hours ..	153.55	178.67	160.31	54.88	78.58	74.17	78.18	
		Wages ..	59.89	71.90	63.12	29.41	27.32	27.71	29.35	
Family		Hours ..	92.26	163.98	111.55	96.00	52.84	60.87	63.22	
		Wages ..	32.74	56.01	39.00	35.37	18.35	21.51	22.33	
Total		Hours ..	245.81	442.65	271.86	150.88	131.42	135.04	141.40	
		Wages ..	92.63	127.91	102.12	64.78	45.67	49.22	51.68	
Total labour hours ..		647.40	933.14	697.36	597.82	400.29	437.00	449.10		
Total wages (Rs.) ..		234.61	303.35	253.10	226.56	143.38	158.84	163.22		
Average wage per hour (Re.)		0.36	0.33	0.36	0.38	0.36	0.37	0.36		
Share of family labour in total wage (per cent) ..		47	53	49	64	56	58	57		

The share of family labour in the total wage bill is reduced from 58 per cent under local varieties to 49 per cent under hybrid but in absolute terms, its share has gone up from Rs. 93 under local to Rs. 125 per hectare under hybrid.

Table III shows the comparison of local and improved wheat, both grown with irrigation. Here, the improved varieties used less manpower than the local ones because the growth period of the former is less than that of the latter. The shorter growth period requires less number of irrigations, less weeding, etc., and

as such the scope of greater employment is not realised in improved wheat. It may, however, give higher profit and even farm income than those under local varieties. The total wage bill is reduced from Rs. 478 for local variety to Rs. 388 for improved variety per hectare. The share of the family labour in the total wage is also reduced considerably in the improved variety, both in percentage and absolute terms.

TABLE III—LABOUR REQUIREMENT AND COST FOR IMPROVED AND LOCAL WHEAT PER HECTARE

Labour				Improved	Local	Average
				(Irrigated)	(Irrigated)	
(1)				(2)	(3)	(4)
Men	Permanent	Hours	48·86	5·80	43·79
		Wages	23·23	1·46	20·75
	Casual	Hours	223·71	124·01	212·70
		Wages	117·41	40·45	108·92
	Family	Hours	465·29	927·96	516·34
		Wages	183·25	334·00	199·88
	Total	Hours	737·86	1,057·77	772·83
		Wages	323·89	375·91	329·55
Women	Permanent	Hours	—	—	—
		Wages	—	—	—
	Casual	Hours	72·65	58·70	71·11
		Wages	27·58	19·79	26·72
	Family	Hours	104·11	273·78	122·83
		Wages	36·97	82·81	42·03
	Total	Hours	176·76	332·48	193·94
		Wages	64·55	102·60	68·75
Total labour hours		914·62	1,390·25	966·77	
Total wages (Rs.)		388·44	478·51	398·30	
Average wage per hour (Re.)		0·42	0·34	0·41	
Share of family labour in total wage (per cent)		57	87	60	

Table IV shows the requirement of labour, etc., for jowar grown under different seasons like *rabi*, summer and *kharif*, for different purposes like fodder and grain and under different conditions like dry and irrigated. The *kharif* irrigated fodder jowar required more than double the wage bill of the *kharif* irrigated dry jowar and had also great share for the family labour in the total wage bill. Similar are the results for the grain jowar grown in *kharif* under dry and irrigated conditions but the difference between them is very small.

TABLE IV—LABOUR REQUIREMENT AND COST FOR FODDER AND GRAIN JOWAR PER HECTARE

Labour	Jowar (fodder)				Jowar (grain)				
	Rabi (Irrigated)	Summer (Irrigated)	Kharif		Rabi (Irrigated)	Kharif			
			Irrigated	Dry		Irrigated	Dry		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Men	Permanent	Hours ..	87.82	27.00	34.93	10.47	—	—	6.09
		Wages ..	44.07	13.79	19.44	4.99	—	—	2.20
	Casual	Hours ..	97.43	78.03	68.02	61.99	71.23	69.44	69.42
		Wages ..	50.47	20.96	33.77	27.01	23.39	28.64	29.47
	Family	Hours ..	378.85	667.50	340.82	152.75	512.33	186.38	176.84
		Wages ..	159.89	172.84	149.11	62.73	203.20	74.69	67.65
	Total	Hours ..	564.10	772.53	443.77	225.21	583.56	255.82	252.35
		Wages ..	254.43	207.59	202.32	94.73	226.59	103.33	93.32
Women	Permanent	Hours ..	—	—	—	—	—	—	—
		Wages ..	—	—	—	—	—	—	—
	Casual	Hours ..	15.38	32.03	12.32	34.67	87.67	33.89	41.32
		Wages ..	7.69	13.96	5.29	13.37	22.60	12.88	16.80
	Family	Hours ..	64.10	158.81	126.93	48.98	148.85	78.58	66.41
		Wages ..	27.59	38.26	48.99	18.77	61.18	39.76	27.43
	Total	Hours ..	79.48	190.84	139.25	83.65	236.52	112.47	107.73
		Wages ..	35.28	52.22	54.28	32.14	83.78	52.64	44.23
Total labour hours ..		643.58	963.47	583.02	308.86	820.08	368.29	360.08	
Total wages (Rs.) ..		289.71	259.81	256.60	126.87	310.37	155.97	137.55	
Average wage per hour (Re.)		0.45	0.27	0.44	0.41	0.38	0.42	0.38	
Share of family labour in total wage (per cent) ..		65	81	77	63	85	73	69	

Table V shows the comparison between improved and local cotton. The improved cotton varieties like 170-CO-2, Kalyan and CJ-73 needed 91 per cent more human labour than required for the local varieties like *Vagad*, *Mathio* and *Dhummad*. The total wage bill is also nearly double for improved cotton. Though the shares of the family labour in the total wage bill, in percentage terms, are almost the same in both the varieties, the improved varieties afforded opportunities to farm families to earn Rs. 62 more per hectare or 25 per cent more than that under the local variety of cotton. Column (5) of the table gives the data about the local paddy grown under irrigated conditions. These are merely for general information of the readers and for comparing them with those of other crops.

TABLE V—LABOUR REQUIREMENT AND COST FOR IMPROVED AND LOCAL COTTON AND PADDY

Labour	Cotton			Paddy			
	Improved	Local	Average				
(1)	(2)	(3)	(4)	(5)			
Men	Permanent	Hours	.. 54.40	27.66	43.87	107.86	
		Wages	.. 27.92	9.88	20.75	61.75	
	Casual	Hours	.. 173.93	74.73	134.68	235.65	
		Wages	.. 67.72	28.17	52.08	111.78	
	Family	Hours	.. 554.75	196.15	412.25	764.85	
		Wages	.. 224.28	73.67	165.18	314.44	
	Total	Hours	.. 783.08	298.54	590.80	1,108.36	
		Wages	.. 319.92	111.72	237.21	487.97	
	Women	Permanent	Hours	.. —	—	—	—
			Wages	.. —	—	—	—
Casual		Hours	.. 202.40	143.61	179.88	158.02	
		Wages	.. 71.50	49.40	63.01	56.42	
Family		Hours	.. 277.06	217.95	254.99	299.89	
		Wages	.. 91.33	81.93	88.19	105.16	
Total		Hours	.. 479.46	361.56	434.87	457.91	
		Wages	.. 162.83	131.33	150.80	161.58	
Total labour hours		1,262.54	660.10	1,025.67	1,566.27	
Total wages (Rs.)		482.75	243.05	388.01	649.55	
Average wage per hour (Re.)	0.38	0.37	0.37	0.41		
Share of family labour in total wage (per cent)	65	64	65	64		

It can, therefore, be summarised that of the five crops, groundnut, bajri, wheat, jowar and cotton, only improved varieties of wheat used less labour and could give less family labour earnings than those under local varieties.

INTER-REGIONAL DIFFERENCES IN AGRICULTURAL LABOUR USE, EFFICIENCY AND WAGES

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Agricultural labour constitutes about 40 per cent of the total cost of the inputs used in crop production. The peculiar characteristic of agricultural labour is its abundant supply on most of the farms, except during the peak operation period when the majority of farmers experienced scarcity of farm labour. Owing to its peculiar characteristic, agricultural economists have been known to state : “Mana-