AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Agric. Econ.Res. Rev., Vol 8 (1), pp. 43-50 (1995)

DETERMINANTS OF AGRICULTURAL LABOUR USE IN BIHAR

S.C.P. THAKUR[1], R.K.P. SINGH[2], AND J.N. CHOUDHARY[3]

ABSTRACT

The study aims at examining the main determinants of human labour use in Bihar. Intensity of cropping and machine labour utlization were main determinants of human labour utilization in the project area. An increase of 10 per cent each in machine labour utlization and intensity of cropping would result in the increase in human labour utilization by 4.81 per cent and 11.43 per cent, respectively.

The study further revealed that the wage rate, net cultivated area and irrigated area had positive and significant influence on hired human labour utilization, whereas percentage area under share cropping and family labour utilization had negative influence on hired human labour utilization. An increase of 10 per cent each in wage rate, net cultivated area and percentage area under irrigation would increase the hired human labour utilization by 10.80 per cent, 3.28 per cent and 2.27 per cent, respectively on sample households.

Introduction

Bihar is one of the thickly populated and poor states of India[1,2]. Agriculture is still a major sector of the state economy and contributes 42 per cent to state domestic product. It provides employment to the majority of working force (81 per cent). Moreover, there has been a paradox of under employment coupled with peak period scarcity of labour in agriculture. Technological breakthrough in agriculture, no doubt, increased the employment opportunites in the state but the increase had not been unifrom on all size group of farms as well as over all parts of the state. As the new technological break-through in agriculture requires large doses of capital, the small and marginal farmers lagged behind in adopting new farm technologies because their income as well as saving potential were very low which ultimately resulted in less generation of employment in rural area[3]. On the other hand, there are pockets in Bihar, where the adoption of new technology has been slow due to natural calamities visiting almost regularly

1. Junior Scientist (Agril. Economics), R.A.U., Pusa Bihar.
2. Senior Scientist (Agril. Economics), R.A.U., Pusa, Bihar.
3. Associate Professer (Agril. Economics), T.C.A. Dholi, Muzafarpur, Bihar.

and also there are pockets with assured irrigation facilities where the rate of adoption has been substantial, comparable to the most developed regions of the country. It has been observed that the technological break-through and irrigation facilities help increase in human labour employment[4,5]. Hence, the present project has been undertaken to study the principal determinants of labour use in two agricultural settings of Bihar, one where acceptable degree of agricultural growth has taken place in the wake of green revolution and another where comparatively backward agricultural setting with structural constraints persists.

Back-ground information:

Darbhanga district (setting I) is situated in North Bihar which is frequently affected by the flood water of rivers namely, *Bagmati, Kamla* and *Audhbara Samuh*. About one fourth of cultivable area is irrigated in the district but half of them through the traditional source of irrigation namely tanks and wells. Paddy and maize are the principal kharif crops of the district which cover jointly more than 50 per cent of net area sown but these crops are generaly washed out due to floods. Principal rabi crops are wheat, pulses and oilseeds which cover only 35 per cent of cultivated area. The intensity of cropping is about 123.

The population density was 981/ per sq. km which is quite high as compared to the corresponding density of the state of Bihar (402). The literacy percentage of the district was only 23.94 per cent. The unemployment was as high as 71.09 per cent in the adult population.

Rohtas district (setting II) is situated in South Bihar plains which is the most prosperous district of Bihar. It has the highest area under irrigation (91.63 per cent), mainly through canal system. Paddy was the pricipal crop in kharif season, covering nearly 56 per cent of net area sown of the district whereas wheat is the principal crop in rabi season which covered nearly 47 per cent of net area sown of the district. The intensity of cropping of the district was nearly 157.

Population density in the district was 328/sq km which was lower than the corresponding density of the state. The literacy was nearly 30.53 per cent and unemployment was estimated to be 73.15 per cent in the adult populaton.

Methodology

The study was conducted in Darbhanga and Rohtas districts of Bihar. The former district has been regularly affected by flood since more than 70

per cent of the area of this district is flood prone whereas the latter district has higher irrigated area (91.63 per cent) and higher fertilizer consumption (118.0 kg per hectare). These districts are named as setting-I and setting-II, respectively. A sample of 150 farmers consisting of 75 farmers in each setting were selected through multistage stratified random sampling. The data pertains to the agricultural year 1990-91.

In order to ascertain the determinants of labour use in agriculture, some of the important factors like operated area, cropping intensity, bullock labour utilization, expenditure on purchased inputs, machine labour use and tenure system (share cropping) were included in the functional analysis. The following was the specification of the fitted function.

$$\log L = \log a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3$$
$$b_4 \log x_4 + b_5 \log + b_6 \log x_6$$

where,

L = human labour days per hectare

X_1 = operated area in hectare

X_2 = bullock labour days per hectare

X_3 = purchased inputs (value of seeds, manures, fertilizers & insecticides) per hectare

X_4 = machine labour days per hectare

X_5 = cropping intensity in percentage

X_6 = percentage area under share cropping, and b_1, b_2, b_3, b_4, b_5 and b_6 are their respective regression co-efficients.

An effort has also been made to split the labour use into family and hired, and separate functional analysis was tried in which hired labour was taken as dependent variable and family labour was considered as independent variable. Other independent variables included in the function and form of equation specified are as under:

$$\log H = \log a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3$$
$$b_4 \log x_4 + b_5 \log X_5 + b_6 \log x_6$$

where,

H = hired human labour days per hectare

X_1 = average per day wage paid to hired labours

X_2 = operated area in hectare

X_3 = percentage area under share cropping

X_4 = percentage of irrigated area to operated area

X_5 = family human labour days per hectare

X_6 = intensity of cropping in per cent

b_1, b_2, b_3, b_4, b_5 and b_6 are their respective regression co-efficients.

Results

The data relative to agricultural labour determinants were put to regression analysis separately for setting I (undeveloped region), setting II (developed region) and pooled data (for both the regions) and the estimated regression co-efficients of different factors are presented in Table-I.

Table I: Elasticities of Different Determinants of Labour use in Two Agricultural Setting in Bihar

Particulars	Undeveloped Agriculture (settings-I)	Developed Agriculture (setting-II)	pooled (setting I + II)
Sample number	75	75	150
Intercept	4.1062	4.9592	-0.6613
Operated area in hectare (X_1)	(-) 0.0960*** (0.0301)	(-) 0.0141 (0.0204)	(-) 0.1042*** (0.0172)
Bullock labour days per hectare (X_2)	0.2313*** (0.0563)	0.0323*** (0.0124)	0.1470 (0.5941)
Purchased inputs (value of seeds, manures fertilizers and insecticides per hectare) (X_3)	0.0301 (0.0364)	0.0812 (0.0601)	0.0298 (0.0356)
Machine days per hectare (X_4)	0.5003 (0.9004)	0.4004 (0.6040)	0.0080*** (0.0028)
Cropping intensity (X_5)[1]	-	-	1.1428 *** (0.0843)
Percentage area under share cropping (X_6)[2]	-	-	0.0294 (0.3023)
Co-efficient of multiple deterination (R^2)	0.5831	0.4469	0.8261

Figures in parentheses indicate standard error

1. Cropping intensity was almost same within a particular setting, hence it was not included in analysis of data for individual setting

2. There were only 12 farmers who had share cropping hence it was also not included in analysis of data for individual setting.

*** Significant at 1 per cent level of probability.

On the basis of estimated co-efficients of multiple determination, it may be said that the factors included in the function explained nearly 82. 61 per cent of variations in the use of human labour in case of pooled situation, 44.69 per cent in developed region (setting II) and 58.31 per cent in undeveloped region (setting I). The values of multiple detrmination (R^2) for setting I and setting II were comparatively lower than the multiple determination obtained for pooled situation, probably due to non-inclusion of factors like cropping intensity and percentage area under share cropping in the analysis for two different settings separately. The former was not included because cropping intensity for all the sample farmers was almost equal within the respective setting whereas the latter was not included since very few farmers had area under share cropping, resulting in large number of zero level observations, particularly in the setting II. However, it was included in pooled analysis due to its expected influence on labour employment.

It may further be observed from the table that for the sample as a whole the regression coefficients of bullock labour, purchased inputs, machine labour, cropping intensity and percentage area under share cropping were 0.1470, 0.0298, 0.4814, 1.1428 and 0.0294, respectively, indicating positive influence of these factors on human labour use. When these were put to statistical 't' test the regression co-efficients of only machine labour and cropping intensity were found significant at 1 per cent level of probability, indicating that an increase in cropping intensity and machine labour utilization by 10 per cent each would lead to an increase in human labour use by 11.43 per cent and 4.81 per cent, respectively. The regression co-efficients of operated area was negative (-0.1042) but statistically significant at 1 per cent level of probability, indicating that the increase in operated area on sample households would reduce per hectare utilization of human labour. This may be possible because increase in operated area may result in comparatively lesser demand for human labour (per hectare). However, the principle of scale economies might have started operating on large size farms which reduced the demand for labour on farms of comparatively larger operated area. Almost similar result was observed when data were analysed for two different settings separately. The regression coefficients of operated area were also negative in setting I and setting II, however, it was

statistically significant in setting I but non significant in setting II. Setting-wise analysis further revealed that the increase in bullock labour utilization would increase per hectare utilization of human labour in both the settings i.e. developed and undeveloped regions since both the factors of production are complementary to each other.

Hence, it may be said that the operated area, intensity of cropping and machine labour utilization had significant effect on the demand for human labour in the project area. However, an increase in latter two factors would increase the demand for human labour but the increase in former factor (operated area) would result in decline in per hectare demand for human labour. It may also be said that both the settings under study did not differ much as far as determinants of human labour use are concenrned.

An effort was also made to analyse the factors affecting the hired human labour use on sample households. The factors included under study were wage rate, operated area, percentage area under share cropping, percentage irrigated area, family labour utilization and intensity of cropping. The estimated regression co-efficients of these factors are presented in Table II.

It may be seen from the table that the factors included under the functional analysis explained more than 98 per cent of the variations in hired human labour utilization in the project area. The regression co-efficients of wage rate, operated area and irrigated area were1.0796, 0.3283 and 0.2269, respectively which were significant at 1 per cent level of probaility. On the other hand, regression co-efficients of percentage area under share cropping, family labour utilization and intensity of cropping were (-) 0.0539, (-) 0.0271 and (-) 0.1977 but regression coefficients of former two factors, that is area under share cropping and family labour use were found statistically significant at 1 per cent level of probability.

On the basis of above discussion it may be said that an increase of 10 per cent each in wage rate, operated area and percentage area under irrigation would increase the hired human labour utilization by 10. 80 per cent, 3.28 per cent and 2.77 per cent, respectively on sample households. On the other hand, an increase of 10 per cent each in percentage area under share cropping

Table II: Elasticities of Different Determinants of Hired Human Labour use in Two Agricultural Setting in Bihar

Particulars	Undeveloped Agriculture (settings-I)	Developed Agriculture (setting-II)	pooled (setting I + II)
Sample	75	75	150
Intercept	1.7925	1.7476	2.1049
Wage rate (X_1)	1.1113*** (0.0178)	1.0580*** (0.0199)	1.0796*** (0.0124)
Operated area (X_2)	0.3631*** (0.0837)	0.4141*** (0.0837)	0.3283*** (0.0543)
percentage area under share cropping (X_3)	(-) 0.0237 (0.0235)	(-) 0.0373 (0.0306)	(-)0.0539*** (0.0109)
Percentage of irrigated area (X_4)	0.0667*** (0.0104)	-	0.2269*** (0.0729)
Family labour days (X_5)	(-) 0.0130 (0.0189)	(-) 0.0378*** (0.0125)	(-) 0.0271*** (0.0093)
Intensity of cropping(X_6)	-	-	(-) 0.1977 (0.1364)
Co-efficient of multiple deterination (R^2)	0.9848	0.9864	0.9875

and family labour utilization would reduce hired human labour utilization by 0.54 per cent and 0.27 per cent, respectively. The setting wise analysis also showed the similar result with respect to influence of area under share cropping and family labour utilization on hired human labour utilization but the coefficient of family labour days was significant in setting-II only. It may further be observed from the table that the increase in wage rate and operated area had positive and significant effect on hired human labour use in both the settings, indicating thereby that the developed and undeveloped regions do not differ in creating employment for hired human labour since both the settings behaved similarly on this score (Table-II). It is worth-pointing out that the result relating to the impact of wage rate on hired human labour use has negated the established truth of inverse relationship between input demand and its price. Peak peroid scarcity of human labour for agricultural operation is a common problem and the timely operation in crop production is possible only by paying higher wages. The supply of agricultural labour could be increased by increasing wage rate since the services of non-agricultural labourer can be made available on higher wages for agricultural operations in peak periods.

On the other hand, percentage area under irrigation had positive and significant effect on hired human labour utilization in setting-I which was not true for developed region since hundred percent area was irrigated in setting II (developed region) and there is no scope to increase irrigated area in the setting for increasing the utilization of hired human labour.

Conclusion

On the basis of above discussion it may be concluded that the main determinants of human labour use are intensity of cropping and machine labour utilization. The machine labour emerged as one of the main determinants of human labour utilization because most of the sample farmers used pump set and oil engine for irrigation purposes which increased the intensity of cropping and ultimately the human labour utilization. On the other hand, major determinants of hired human labour utlization are wage rate, net cultivated area and irrigated area which had positive influence on use of hired human labour. It is worth pointing out that an increase in net cultivated area would decline the use of per hectare total human labour use because the larger households tend to utilize comparatively less per hectare human labour but the utilization of hired human labour tends to increase with the increase in the size of holding (net operated area). Moreover, percentage area under share cropping and family labour utilization had negative influence on hired human labour utilization, indicating that the increased area under share cropping and utilization of family human labour would result in declining demand for hired human labour.

Refefences

1. Population Figures At a Glance (1992), Directorate of Census Operations, Bihar, Patna, p-4.

2. State Income of Bihar (1970-71 to 1990-91), Directorate of Statistics and Evaluation, Govt. of Bihar, Patna, p-43.

3. Thakur, S.C.P., Singh, R.K.P. and Singh, D.K. (1985). Process of Capital Formation in Rural Areas, The Economic Studies, 24 (3), pp-235-40.

4. Acharya, S.S. (1972).Green Revolution and Farm Employment, Indian Journal of Agricultural Economics, 28 (3), p. 30.

5. Kunwar, R. (1982). Impact of Irrigation System on Quantification of Labour Absorption in Agriculture, Manpower 23 (4), p. 89.