

Changes in Demand for Agricultural Labour: Results of a Resurvey of a Village in Maharashtra, India

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In any developing country, agriculture remains the most important source of employment for a substantial proportion of rural population. In India, the agricultural labour supply in relation to demand for labour has always been higher, except during peak seasons such as sowing and harvesting. Both demand and supply of agricultural labourers derive from multiple factors. Considering demand-side factors, labour demand has been determined by intensity of inputs, farm size and cropping pattern. This paper deals with demand factors associated with labour use/absorption in agriculture in a surveyed village. I discuss the level of labour use in major crops and changes in labour absorption between two data points i.e. 1957 and 2010. This paper is part of my ongoing PhD research, which is based on a resurvey of Maskawad village in Jalgaon district of northern-Maharashtra, India. The earlier study was carried out in 1956-57 by Mulla (1957) at the Gokhale Institute of Politics and Economics, Poona, India. It has been argued that the overall demand for labour in agriculture per acre of land has increased between 1957 and 2010 in cash crops, due to spread of modern technology and mechanisation. Analysis of labour demand in this paper is limited to labour absorption and not extended to agricultural employment.

Land and Labour Augmenting Factors in Agriculture

A wide range of literature covers the subject of labour absorption in agriculture and technological intervention in less developed countries such as India (Bardhan 1983; Vaidyanathan and Jose 1977; Dasgupta 1977). It shows that the level of labour absorption in agriculture varies across crops, gender, regions and is determined by multiple other factors such as intensive use of inputs, cropping pattern, farm size, irrigation, technology and mechanisation (Dhar 2013). The land augmenting factors – high yield variety seeds, fertilizers, plant protection measures and irrigation, which increase cropping intensity and crop production/productivity – therefore, generate more employment in agriculture (Basant 1987). On the other hand, it has been argued that labour augmenting technology such as tractors, tiller and combine harvesters adversely affect labour use, resulting in labour displacement (Binswanger 1978; Ramachandran 1990). It is also argued that mechanisation in agriculture compensates labour displacement and in fact increases labour demand (Basant 1987). In this paper, operation wise examination of labour absorption in major crops like banana and Jowar has been carried out to understand

both positive and negative implications on labour absorption in a commercialised region.

Agricultural technologies (including farm mechanisation) have varied impact on the internal composition of hired labour, family labour and attached labour. The changes in the labour contracts due to advent of technology and mechanisation were reported in many studies (Raj 1972; Devi et al. 2013; Bardhan 1983). It was noted by Raj (1972) that the introduction of tractors did not result in any major displacement of casual labourers in agriculture. However, mechanised irrigation i.e. pump-sets and tube wells increased the demand for casual workers and replaced permanent/attached labourers. Bardhan (1977) indicated that in India, new technology negatively affects the relative share of wage labourers in output, which may also lead to absolute decline of agricultural labourers in terms of number of labour days. It has been argued that there is an inverse relationship between farm mechanisation and use of family labour (Ghosh 1979 cited in Bardhan 1983).

The question of mechanisation in agriculture and labour displacement is mainly concerned with the use of machines such as tractors, threshers, combine harvesters etc. However, the fact is that these machines reduce labour hours and labour cost (both human and bullock), reduce unit cost of production and offer precision technologies. Mechanisation also enhances cropping intensity, timeliness of operation and ultimately enhances production and productivity in agriculture. This leads to more employment opportunities not only in the agricultural sector but also in secondary and tertiary sectors of manufacturing, servicing, distribution, repairing and maintenance (Hanumantha Rao 1975; NCAER 1980; Basant 1987; Singh 2005; Sarkar et al. 2013).

Methodology

Through a survey, crop operations data and average number of days of labour required in each operation have been collected from cultivating households for major crops. However, information on crop operations was not uniform for all cultivators and depended on the economic status of the cultivating households. In order to get a clear picture of the level of labour use in the village, I have gathered information from different groups of cultivators. In addition, to avoid overestimation and underestimation of labour use, I calculated an average number of labour days required for a particular crop. I have also conducted

three interviews with older generation farmers to get a better understanding of crop operations and changes over the period of time. A comparison between the earlier study of 1957 and the resurvey of 2010 was also carried out.

Change in Labour Absorption: 1957 and 2010

a) Banana

Banana was an important cash crop in the surveyed village in 2010. With an estimation of 8 hours per day, the average human labour use per acre of banana plot was 197 days in 2010. The share of male workers was slightly higher (102 days) than female workers (95 days). Irrigation was an important agricultural operation, which required substantial male labour days (48 per cent of total male labour days were required). Despite having all the banana fields modified with drip irrigation, male labourers were required to supervise it.

Among the other operations assigned to male labourers, de-suckering and the removal of male buds were important. Pertaining to female labour absorption, hand weeding, transplantation, harvesting and removal of male buds were important operations that required a higher number of labour days. Comparing these results with the earlier study shows that the number of labour days rose from 163 days to 197 days. The most striking feature was that male labour days declined on the one hand and female labour absorption in banana cultivation increased significantly on the other (more than 300 per cent). With respect to mechanisation of ploughing (use of tractor) and other operations related to land preparation and changes in cultivation practices, male labour days in banana declined. On the other hand, an increase in the female labour use was a result of land augmenting technological changes (Mulla 1957).

b) Jowar

In 2010, the average number of human labour required for Jowar (Sorghum) cultivation was 36.5 days. The Data shows that male labour days (11.5) were lesser than female labour days (25 days). The average labour days required for Jowar cultivation in Maskawad was higher than the official estimation published by the Directorate of Economics and Statistics (DES 2009) in 2009-10. Within the top five Jowar growing states in terms of gross cropped area (GCA) in India in 2009-10, Maharashtra has the highest number of labour absorption in Jowar cultivation. Comparison of the resurvey data collected in 2010 with Mulla's (1957) study shows that the number of labour days required for Jowar remained stagnant with some minor changes in the cultivation practices. For female, hand weeding was an important agricultural operation, which required 10 days followed by harvesting in 2010. Modern threshers and chemical fertilisers replaced manual

threshing and an application of manure. Moreover, introduction of new modern agricultural equipments made changes in the cultivation practice. For instance, thinning was a major agricultural operation in 1957. However, with modern metal seed drills, introduced in mid 1980s, thinning was no longer necessary.

c) Cotton

Similar results can be seen in case of cotton cultivation. According to the resurvey of 2010, two cotton varieties were sown – hybrid cotton and Bt cotton. No traditional cotton variety was reported in the village. The average labour absorption in hybrid cotton was 118.5 days, whereas Bt cotton (*Bacillus thuringiensis*) required around 155.5 days for one acre of area. Higher amount of labour inputs in Bt cotton was mainly because of its higher productivity/production per acre, which required higher number of pickings. Along with this, cotton being a high value cash crop, extra care was taken in terms of more rounds of fertilizers, pesticides, number of weeding etc.; all of which increased labour demand. Data shows that no labour was required for irrigation in hybrid varieties of cotton, where as in Bt cotton around 8 labour days were required. For instance, an average female labour required for harvesting hybrid cotton were 60 days and Bt cotton required 80 labour days. Moreover, Bt cotton sowing did not happen through seed drill but manually by female workers. Comparison of the two time period data shows that the labour use in both the cotton varieties has increased substantially. The most striking feature was the higher number of female labour use in cotton cultivation.

Labour absorption in cotton cultivation increased for both male and female labourers. Except operations such as land preparation where machines were used, male labour declined. However, due to introduction of Bt cotton, the demand for agricultural labourers has increased. Female labour intensive operations such as sowing, hand weeding and pickings, led to increase in demand for female workers. It is clear from the data that farm mechanisation played an important role in labour input. Comparison between 1956 and 2010 shows that farm mechanization has had a negative impact on labour absorption (Mulla, 1957). However, modern varieties of cotton increased the labour demand in particular agricultural operations.

Changes in the agricultural operations and labour

In agriculture, different operations and crops allow for different mechanisation alternatives; and this may have varying implications across gender and crops. In Maskawad village, we have observed that certain factors like mechanisation and use of bio-chemicals have had an impact on labour input for different crops and operations. Use of mechanisation

and technology in agriculture had positive and negative impacts on the labour input. However, reduced labour input due to mechanisation was compensated by bio-technology. Major factors that have had negative impacts on labour input were the introduction of tractors for ploughing and transportation, drip irrigation¹, and threshers. Tractor operated machines are gaining popularity in the village especially in ploughing operations, which significantly reduces labour inputs - human as well as bullock. The modern technology of irrigation such as electric pump-set, drip and sprinkler irrigation equally reduced labour usage in irrigation in the village. For many crops, threshing, which used to be done manually, is now completely replaced by threshers. However, in case of sowing and inter-culturing such as hoeing² activities, the survey finds that cultivators in the village do not use machines. On the other hand, high yield varieties, new cultivation practices, use of agrochemicals such as fertilizers and pesticides and irrigation led to increased cropping intensity and therefore labour demand in different agricultural operations - mainly in sowing/transplantation, hand-weeding, fertilizers application and harvesting.

It was reported that the number of bullocks in the village reduced significantly in the last two decades. Along with this, there has been labour scarcity - labourers are not ready to work in agriculture anymore, even under higher wage rates. Bullocks and human labours have been substituted by machine labour. Farmers also reported that for banana crop, it was necessary to plough by tractor for more yield and to increase productivity: tractor made ridges or rows are more precise and deep enough to transplant the suckers. Similarly, flowing irrigation was substituted by drip irrigation because it saves a lot of water and human labour (in terms of days and wage)³. However, banana and to some extent also onion irrigation was not substituted by modern technology such as drip and sprinkler.

Conclusion

It is evident from the data that new agricultural technology has had a significant impact on the labour use and cultivation practices. Due to intensive mechanisation of certain agricultural operations, the demand or absorption of male agricultural labourers declined sharply whereas female workers rose. In other words, agricultural technology (labour augmenting factors) in agriculture compensated for mechanisation (land augmenting factors) in Maskawad village in 2010. This argument is supplemented by empirical data on rural employment and changes in the rural labour market. I have also argued that positive relations have been observed between intensive use of agricultural technology and the incidence of reverse tenancy in the studied village. The main reason was that ownership of expensive machines and equipments were fairly limited in number and distributed extremely unequally. Such expensive agricultural technology requires large capital investment, which is not feasible for the majority of small and marginal landholders.

¹ Drip irrigation was also used for fertilizers application mainly for water soluble fertilizers in the village.

² During a visit to the case study village in 2013, I noted that sowing by tractor became very popular trend. Moreover, the cost per acre of sowing by tractor was much cheaper than the bullock labour. The average cost for sowing was between Rs.600 to 700 per acre and for bullock labour it was around Rs.900 to 1000.

³ Binswanger (1978) argued, there are two views of machine use. First, the substitution view; it looks at tractor and animals as two different power sources and under this view the switch from animal power to tractor power is primarily guided by factor prices. Such shift from animal to tractor takes place when the opportunity cost of labour and the cost of maintaining bullocks become sufficiently high. Second, the contribution view; it argues that power is the primary constraint to agricultural production almost regardless of factor prices. Machine/tractor power allows for much deeper ploughing than animal power and also achieves a higher level of precision.

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