The Role of Agricultural Mechanisation in Achieving Food and Nutritional Security and Generating Employment

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Introduction

In the context of tremendous technological developments and population explosion, the world experiences a cruel paradox that while in some regions there is affluence and excess production of food, the greater part is subject to widespread poverty and subsistence feeding, malnutrition, unemployment, and lack of purchasing power. Many states of India are subject to these conditions despite the availability of abundant natural resources like land and water, favourable climate, and traditionally good vegetation.

During the last four decades, agricultural production in India has increased almost four-fold, and it now exceeds 200 million tonnes each year. However, there is need for another significant breakthrough in farm technologies in some agriculturally backward states like Bihar, Orissa, Assam, and other north-eastern states, so that even farmers having small landholdings can achieve food and nutritional security. This can be done through adoption of improved technologies and mechanisation in agriculture and allied sectors.

Mechanisation and Agricultural Productivity

India has adopted a selective mechanisation policy. Mechanisation primarily took place where traditional practices failed to achieve timeliness of operation. Equipment and machinery for seedbed preparation, sowing, irrigation, plant protection, and threshing have become more popular as compared to other operations. The number of tractors, power tillers, diesel engines, sprayers, electric motors, threshers, and so on has increased substantially during the last three decades, and correspondingly the availability of farm power per unit area has also increased. Similarly, during this period the demand for agricultural machinery has increased substantially to a level of Rs.300 billion annually (Rs.200 billion for power units and crop production equipment and Rs.100 billion for post-harvest equipment). The entire demand is met through indigenous production.

As global competitiveness and labour wages are steadily rising, it is imperative to bring appropriate mechanisation together with skilled operators to achieve high productivity. Farm power availability is a major constraint to agricultural productivity and needs to be increased from the current level of 1.15 kW/ha to 2.00 kW/ha. The increase can only come from electro-mechanical power sources. Table 1 shows that the share of animate power sources on Indian farms is reducing gradually and in 1997 accounted for 23% of all power used as against 97% in 1951. There has been a concomitant increase in the share of mechanical and electrical power sources. The availability of farm power and machinery has greatly helped to increase food production. Agricultural mechanisation in Punjab, Haryana, western Uttar Pradesh, and some parts of Tamil Nadu, Andhra Pradesh, Gujrat, and Madhya Pradesh has grown faster than elsewhere. Therefore, productivity levels in those areas are also higher than the national average. This higher productivity is due to an

increased area under irrigation, use of high doses of fertiliser, high yielding variety seeds, and higher availability of farm power. In developed countries like the USA, UK, and Japan, the farm power availability per hectare is three to five times that of India. Within India, farm power availability in Punjab is about 3.25 kW/ha as against the national average of 1.15 kW/ha.

Table 1: Power availability on Indian farms by source

Year	Total power (hp)	Animate (%)	Mechanical (%)	Electrical (%)
1951	0.25	97.4	2.1	0.5
1961	0.31	94.9	3.7	1.4
1971	0.36	79.2	16.3	4.5
1981	0.63	48.2	32.3	19.5
1991	0.92	34.5	34.7	30.8
1997	1.15	22.7	43.5 (27.3)*	33.8

* Figure in parentheses is mobile power
Source: Alam (2000)

The increase in availability of mechanical and electrical power at Indian farms has helped to reduce the cost of operation. Table 2 shows that the cost of mechanical and electrical power sources per unit time is much less than that of animate power sources.

Table 2: Economics of different power sources for agriculture

Source of power	Average power (hp)	Initial cost (Rs/hp)[1]	Running cost (Rs/hp.hr)[1]
Human	0.1	-	63.0
Bullock	0.5	6,000	19.0
Stationary oil engine	5.0	4,000	7.0
Electric motor	5	3,500	5.0
Power tiller	10	10,000	12.0

[1]In 2000, US$ 1 = IRs 45 approx.

Mechanisation in North-east India

Agriculture in the north-eastern hill region of India is still primitive. Most of the agricultural operations are labour intensive and performed manually. Farm tools are of traditional types (Table 3). Though existing tools are well suited to the current types of operation, they give low output and very high drudgery. Use of mechanical power is very limited. Therefore, introduction of improved technology in the existing farming system demands selective use of mechanisation.

Table 3: Commonly used farm implements in the North-eastern states of India

Name of implement	Power source	Purpose
Dao	human	Used for cutting forest, trees etc
Dibbler	human	For dibbling seed under zero tillage conditions
Spade	human	Digging of soil, preparation of seed bed, weeding bunds, etc.
Local plough	bullock	Ploughing and puddling
Leveller	bullock	Levelling of ploughed land
Peg tooth harrow	bullock/human	Puddling in wetland conditions
Knives/sickle	human	Harvesting of crops
Bamboo basket	human	Storage and transportation of food grain
Counterpoise foot pounder	human	Milling of paddy

Agriculture in hill regions demands machines that are small in size, light in weight, and have the capacity to perform the maximum number of operations. Machines should be able to operate on narrow terraces and in deep valley lands. The lightweight power tiller can be a very useful machine for hill areas because it can be used for ploughing, puddling, weeding, harvesting, and threshing operations with the help of suitable attachments and accessories. Manually driven machines like the wheel hoe, multipurpose weeders, seed drills, and pedal paddy threshers are well adapted to hill areas.

Post-harvest Technology for Nutritional Security and Employment Generation

At present, India produces about 425 million tonnes of food each year; this figure will double in a decade or so. However, foodstuffs are perishable and semi-perishable. In the absence of proper post-harvest technology and infrastructure, their perishability gets exploited by demand and supply factors, and market forces, thus depriving the growers of remunerative prices and possible additional income and employment generation through value added processing.

It is estimated that about 10% of food grain, 25-30% of horticultural produce, and 10-5% of animal based products are lost due to the lack of appropriate post-harvest technology for handling, transport, storage, and so on. This loss is estimated at approximately Rs.700 billion annually. In addition, farmers have to sell raw products without adding value to the products. At least half of this loss could be prevented by using appropriate post-harvest technology and associated equipment. Thus, there is a great need for promoting appropriate post-harvest technology to reduce losses, add value to the products, and generate income and employment in the rural sector.

Conclusion

In the future, agricultural implements and machinery will play a great role in increasing productivity, reducing the unit cost of production, minimising harvest and post-harvest losses, and adding further value to agro-processing industries. Improvement in agricultural mechanisation in the north-eastern region of India will make agriculture and rural life more rewarding, less arduous, and attractive enough to retain rural educated people.

Bibliography

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