

## **Status of Agricultural Mechanization in Nepal**

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### **1.0 BACKGROUND**

Nepal is a small land locked country situated in between India and China. Agriculture is the backbone of national economy, means of livelihood for majority of population, main source of GDP, income and employment opportunities in Nepal. The agriculture contributes to about 34.7% to national GDP and provides part and full time employment opportunities to 73.9% of its population (MOF 2011 & NLFS 2008). The average land holding per family across Nepal is found to be less than 0.8 hectare. Because of small land size, unavailability of the other employment opportunities in the country, majority of farmers in the country are compelled to adopt subsistence agriculture. Due to low investment capacity and lack of infrastructure & market opportunities majority of farmers are adopting traditional technology in their production system. Due to unavailability of attractive employment opportunity in the country, the majority of young people are going abroad (mainly in Gulf and Malaysia) in search of jobs. In the first eight months of F Y 2010/11, about 0.21 million youth formally went to various countries (mainly Malaysia and Gulf) to work as labour with formal approval of government. The trend of young people leaving Nepal for foreign employment is increasing every year. The number of people visiting abroad through unauthorized means taking undue advantage of open border with India is assumed to remain at large. Hence agriculture has become job of old people and that of women farmers in the village. In this context there is urgent need of appropriate agricultural mechanization in Nepal.

### **2.0 STATUS OF AGRICULTURAL MECHANIZATION:**

Animate power is the main source of power, in Nepalese agriculture. Human power and animal power occupies 36.3 and 40.5 percent of the total farm power available in the country respectively. The available mechanical power in the country is only 23 percent. Most of the mechanical power is concentrated in Terai, the share of available mechanical power in terai is 92.28% that of total available mechanical power of Nepal. (FBC, 2006)

The traditional wooden tools and implements have continued to remain in use in the hills and mountains. There has been some improvement in their design and performance capabilities over time. Due to the lack of physical facilities (viz. road networks and electricity) and cultivation in narrow terraces in hilly areas; hill agriculture is mainly depended upon human and animal power. Indegenous wooden plough, local hoes, sickle are the major implements/tools used for agricultural operation. In hills only 2.7 percent of holdings own iron animal drawn plough for tillage. In the valleys near the road heads it is observed that farmers have started using power tiller for tillage operation and it is spreading along with the extension of rural road. Due to increasing cultivation of vegetables near urban and peri urban areas about 3 percent of the holdings in the hills own hand sprayer. The paddy sheller and polisher and mechanical grinding mills are found to be adopted in majority of villages of terai and hills. However in the mountains, still the milling is found to be performed in local devices such as mortar & pestle, quern and traditional water mills. Attempts have made to improve more than 2000 local water mills by changing the wooden runner in to metallic one to increase the grinding capacity and to derive power for multiple processing operations (viz. hulling, oil expelling etc.).

In Terai, agricultural mechanization related tools used are manual tools, animal drawn implements and mechanical power operated machinery. Traditional farm tools and equipment are still found to be widely used in Terai. Spade, hoe, sickle etc. are major hand tools used. Animal drawn traditional power as well as improved implements are found to be used in agricultural operations in Terai. Traditional wooden plough, iron mold board plough, disc harrow, wooden plank etc, are major animal drawn implements. More than 51 percent of holding in terai own and use animal drawn iron plough due to increased field efficiency than traditional plough and easy availability in border towns.

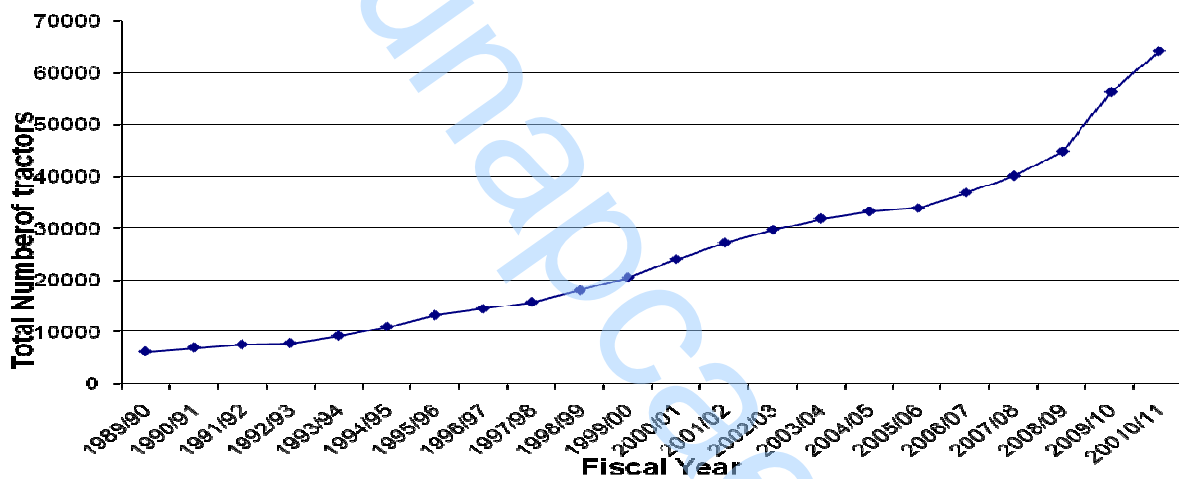
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Animal power is also widely used for threshing through tramping action. Similarly bullock carts with traditional type (wooden wheel) as well as improved type (rubber tyre wheel) is also common in Terai, as 12 percent of the holdings own bullock cart in terai. The zero tillage and minimum tillage technologies has been tested and validated by NARC and it is found to be preferred by the farmers in terai and the valleys. Major constraint is found to be the availability of machinery and governments support in promoting these beneficial implements. Diesel pumpsets are also found to be commonly used for pumping water in Terai. 4-wheel tractor as well 2-wheel power tiller is increasingly used for tillage and transportation. Use of thresher is also increasingly used for threshing operation. It is reported that labour is getting scarce during peak agricultural periods (transplanting and at harvesting rice) and their wage is increasing. From time to time, farmers are complaining on increased cost of production and reduction/unexpected fluctuation of price of certain commodities like rice, wheat, maize etc. So, some innovative farmers have imported few (20 nos) combine harvesters for custom hiring.

Number of tractors being registered with the Department of Transport Management is increasing every year. Total number of four & two wheel tractors registered had reached 64164. 4-wheel tractors in the terai and 2 wheel tractors in the valleys have brought revolution in the tillage operation and there is increasing trend on the adoption of tractors in Nepal and the trend of tractor use in agriculture is given in fig. 1.

**Fig. 1: Cumulative Number of Tractors Registered In Nepal**



### 3.0 AGRICULTURAL MECHANIZATION RELATED INSTITUTIONS

Agricultural Engineering Division under Nepal Agricultural Research Council, Agricultural Engineering Directorate under Department of Agriculture and Purbanchal Campus, Institute of Engineering under Tribhuvan University are major research, extension and education institutions related to agricultural mechanization in Nepal respectively. Blacksmiths are the primary suppliers of agricultural traditional hand tools in the country. It is estimated that more than 85% of tools/implement used by the farmers especially in hilly areas are made/repared by the blacksmiths/rural artisans (Manandhar, 1998). Major problems of the blacksmiths are lack of capital, good quality raw material, coal and knowledge on improved technology.

There are also several small metalworking industries in Nepal mainly involved in the production of small tools & implements and the tractor attachments, milling equipments etc. hand hoe, plough, threshers, feed mill, feed mixture, tractor/ power tiller trailer, case wheel, oil expeller, sheller mill, treadle pump etc. are found to be fabricated by these small metalworking industries on demand basis. Even though there is demand of agricultural tools and implements in the country, they are not in the position to supply due to the lack of favorable policy, technical capability and financial constraints. Tractor dealers dealing with different brands of tractor are promoting their tractor and

attachments among farmers through their marketing network in Nepal. Only few dealers have their own service workshop for after sales service. Majority of the tractor dealers are found to be focussing on tractor sale only they have least interest on the sale of tractor attachments. High interest rate on agricultural machinery, lack of awareness on the benefit of agricultural machinery, insurgency situation in terai are major problems faced by agricultural machinery dealers and retailers. The importers have also raised problem regarding the high custom duty and value added tax (VAT) during import of agricultural equipments. Five-year time bar for the transfer of ownership of tractors and power tiller is also realised as one of the constraints for the availability of credit from other commercial banks other than ADBN.

#### **4.0 Agricultural Mechanization Policy:**

The prevailing major agriculture related policy (viz. Agriculture perspective Plan (APP), Agriculture policy, 5year and 3 year plans etc.) is silent on agricultural mechanization. Because of this, investment on agricultural mechanization and institutional set-up and efforts on agricultural mechanization in Nepal is found to be weak. Hence a clear-cut policy and strategy on agricultural mechanization needs to be formulated. Similarly other related policies and legislations (land reform, transport, energy, irrigation, agricultural extension, industries, road, transport, labour sector etc.) need to be reviewed and streamlined. Because of the demand of appropriate policy, at present Ministry of Agriculture is working to prepare agriculture mechanization Policy.

#### **5.0 Issues and Constraints Related to Agricultural Mechanization:**

- Small and fragmented land holding with subsistence level of agriculture is the major constraints for promotion of agricultural mechanization in the country.
- Since, women farmer has got dominant role in crop production activities (except tillage and marketing) their contribution is rarely recognized and their drudgery problem is not addressed.
- The lack of access road & electricity distribution lines in the farm; near by market facilities, repair and maintenance workshops facilities etc. are the few infrastructure related constraints for mechanization and commercialization of agriculture in Nepal.
- Even though, there is extension of credit institutions in Nepal, the interest rates are found to be more in rural sector than in urban sector (viz. housing loan, car loans etc.). Many co-operatives and micro credit institutions have been evolved in the villages, but they need awareness on co-operative farming for intensification and commercialization of agriculture with appropriate mechanization.
- As the farm holding size socio-economic background of Nepal is diverse and is mainly dominated by small farmers and poor farmers, the mechanization need to be focused on appropriate mechanization technologies addressing the needs of different category of farmers and at different agro ecological zone and cropping system.
- The major technological constraints in farmer's perspective are difficulty in availability of spare parts, lack of training on operation and maintenance of farm machinery, inadequate facility for servicing and repair of farm machinery. Moreover the cost of spare parts is also reported to be high.
- The blacksmiths are the deprived group in the community and their indigenous skill and technology is at the verge of extinction from the community, due to lack of commercialization and modernization of their skills as well as lack of recognition of their contribution by the community and the state.
- Custom hiring of farm machinery (tractor, power tiller, combine harvester, thresher, sprayer etc.) is taking place in an informal way in each village without any support from government.
- Due to lack of clear-cut policy on agricultural mechanization, the agricultural mechanization is not found to be streamlined as per the need of the farming communities and national development goals on commercialization of agriculture in Nepal.

- Even though the progressive farmers in the hills and terai are in search of appropriate agricultural tools and machinery, but they fail to get in the local markets. Farmers of terai are in search of rice transplanter, tractor drawn seeding equipments for bold grain crops (maize, rajma, chick pea etc.), power weeders, efficient multi crop threshers, small scale processing equipments etc. Similarly the progressive farmers in the hills are in search of efficient animal drawn implements, single yoke harnessing system, efficient hand tools, small mechanical power tillage technology in the hills and small fruit and vegetable processing equipments. R & D system in Nepal could not respond effectively to meet their demand for adaptation and development of appropriate equipments to meet their demand.
- Agricultural Engineering Division (AED) and Agricultural Implement Research Center (AIRC) under NARC and directorate of Agricultural Engineering under Department of Agriculture are to be strengthened for effective R & D and the promotion of appropriate mechanization in Nepal.
- For the sustainable development of agricultural mechanization in Nepal, it is needed to locally fabricate widely used agricultural tools, implements and machinery. However, the prevailing policy does not favor production of agricultural machinery locally (high custom duty of raw materials, no support in promotion, irregular power supply, high electricity cost, poor research & testing support etc.). Hence there is need of reform in policy and program to encourage and support local fabricators to fabricate/manufacture agricultural machinery locally.
- There is need of testing and standardization of agricultural machinery to reduce the accidents related to agricultural machinery and to provide quality standard agricultural machinery to the Nepalese farmers.

#### 6.0 Intervention areas

In spite of low level on present status of agricultural mechanization there is urgent need on appropriate mechanization in the country to bring down the cost of cultivation, address the agricultural labour shortage in the villages, support intensification and commercialization in agriculture for the food security as well as for enhancing the socio economic condition of farmers in the country. There is urgent need for the interventions in following areas for the promotion of agricultural mechanization in the country.

- Formulation of Appropriate Policy and Institutional Reform for Agricultural Mechanization
- Development/ Adaptation & Promotion of Efficient Hand Tools, Animal Drawn Implements, small horse power hand tractor for hills, Efficient Processing Machinery and Conservation Agriculture.
- Promotion of Land Consolidation and Cooperative Farming
- Public & Private Partnership for promotion of Agricultural Mechanization

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