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## Evaluation of Agricultural Mechanization Policies and Need of Agricultural Machineries Testing Centre in Nepal

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### ABSTRACT

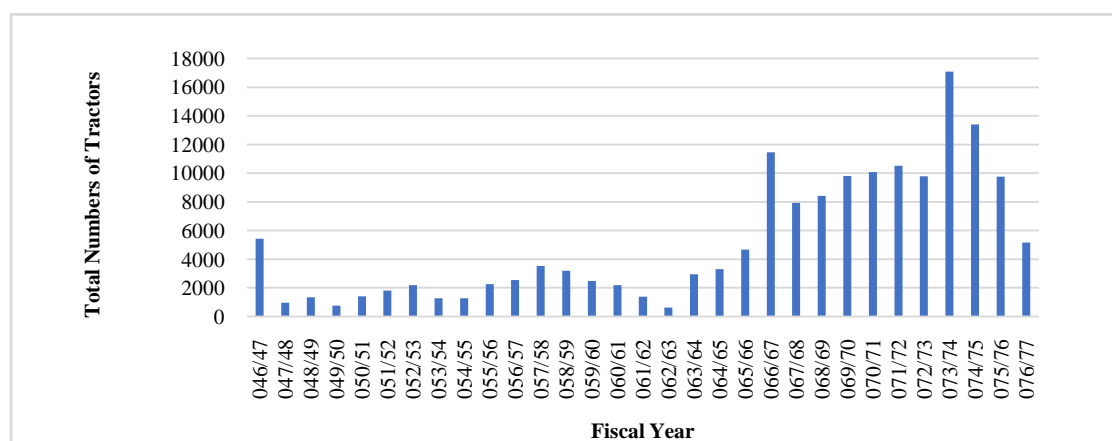
Being an agricultural country, mechanization can become a significant means to attract youth in agriculture for sustainable and profitable agriculture. Data indicates that the import of farm machineries has gone of significantly in recent years. Many policy level approaches have come up for mechanization management. However the nature of policy divergence has created confusing condition for the promotion of agricultural mechanization. This study has aimed to document the institutional and legal framework of agricultural mechanization and the development of agricultural machineries testing Centre in Nepal. To assist in transforming the traditional agricultural profession into mechanized commercial agriculture by changing the existing traditional practices, thinking and behaviors in the general farming chain by testing and research on the agricultural equipment, tools or implements currently used in the country and introducing newly developed/proven agricultural machinery and technology through demonstration and training, a testing Centre has been established under the umbrella of Nepal Agricultural Research Council (NARC).

Key Words: Mechanization, Testing Centre, Policy Divergence

### Introduction

Nepal is an agricultural country. A wide variety of crops can be grown here because of its diversified type of climatic conditions. The agriculture sector contributes 25.8% to the national GDP and provides part- and full-time employment opportunities to about 60% of its population (MOF, 2078). The average land holding per family across Nepal is found to be less than 0.6 hectares (ADS, 2072). Because of small land size, unavailability of other small land holdings, and low investment capacity of the farmer, agriculture production is lagging far behind. Lack of suitable machines suitable for different farm operations, lack of repair and service facilities locally, lack of trained manpower and high cost of machines farmers have to depend on the traditional system of farming.

The Food and Agriculture Organization (FAO) has defined Agricultural mechanization as the process of improving farm labour productivity through the application of agricultural tools, implements and machinery (FAO, 2018). The main objective of AM is the efficient use of resources and it provides several social and economic benefits to farmers (ICAF, 2017).



In Nepal, about 159000 tractors/power tillers are registered till 2076/77 (DoTM). The number of tractors being registered is increasing every year. It is estimated that large numbers of tractors are used for non-agricultural purposes about 30% of registered tractors, 80% of power tillers and 100% of mini tillers are actually used in agriculture.

The average size of land owned by a household currently in Nepal is about 0.68 ha, which is highly fragmented, averaging 3.1 parcels with an average size of 0.21 ha per parcel (CBS, 2013). At present, about half (52%) of the farm households own less than 0.50 ha of land with low farm labor productivity, and a low level of intensification. The area under farming is declining over the years as a result of the conversion of prime agricultural land into non-agricultural uses (e.g. housing, industries and infrastructure development) through rapid urbanization and rural-urban migration. Hence, in the last 10 years, the net cultivated area has declined by 5% from 2.65 million ha in 2001 to 2.52 ha million in 2010 (CBS, 2013). Average farm size has also declined over the years from 1.11 ha in 1961/62 to 0.68 ha in 2011/12. The number of households with 2 ha or more of land has decreased from 12 percent in 1995/96 to 4 percent in 2010/11. Moreover, two thirds of the cultivated area is rain fed, where agricultural production is risk-prone and marginal. A large proportion of farm households (30%) are employed only partially. About 60% of the households in Nepal have only six months of food sufficiency from their own production. Population density on cultivated land is high where more than 10 people are dependent on a hectare of land for their livelihood. Agricultural productivity and profitability from farming are low due to low use of modern and mechanized technologies, high cost of production, limited commercialization and diversification of agriculture. Labor scarcity is chronic in agriculture as a result of massive youth migration from rural areas.

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## Materials and Methods

This study includes the evaluation of the existing legal frameworks related to agricultural mechanization, export import status of agricultural machineries and status of agricultural testing Centre in Nepal.

- Constitutional provisions related agricultural mechanization.
- Evaluation of ADS provisions and AMPP provisions for the promotions of agricultural mechanization.

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## Result and Discussion

### Policies And Strategies For Agricultural Mechanization

#### Constitution of Nepal 2072 (2015):

The Constitution of Nepal 2072 on its part 4 PART 4 Directive Principles, Policies and Responsibilities of the State and Article 51 State policies: Section (e) Policies regarding agriculture and land reform state that Protecting and promoting rights and interests of peasants and utilizing the land use policy for increasing production and productivity of agriculture and for commercialization, industrialization, diversification and modernization of agriculture; Making arrangements for agricultural tools and an access to market with appropriate price for the produce.

#### Agriculture Development Strategy (ADS: 2015-2035)

The Government of Nepal has developed and enforced Agriculture Development Strategy (ADS: 2015-2035) with a 20 years vision and 10 years of plan. The ADS recommend four pillars of agriculture development: governance, productivity, commercialization and competitiveness. Out of four pillars, achieving improved productivity is visualized through 13 outputs of which sustainable agricultural mechanization is one of the key factors and has given priority by accessible through the private sector. Sustainable agricultural mechanization aims to increase land and labor productivity, create rural jobs and reduce drudgery while enhancing the resilience of producers and operators in face of climate change. The ADS recognize the need for a more vibrant and inclusive agriculture sector. The ADS identify the following areas for mechanization improvements. Awareness development activities for promotion of agriculture mechanization. The approach would be oriented to, Information dissemination, Improve customer access to finance Capacity building for service and maintenance providers, Enable the business environment for leasing agricultural equipment, and Revise regulations and taxes to support mechanization, Pilot a voucher scheme.

A mechanization strategy focusing on awareness creation, demand stimulation. The ADS has put forwarded the concept of establishments of Agriculture Mechanization Centre in the terai (2), mid-hills (1) and high hills (1) within existing research centers.

#### Agricultural Mechanization Promotion Policy, 2071

Promotion of agricultural mechanization has been started with the formulation of "Agricultural Mechanization Promotion Policy 2071" with the view to minimize human drudgery, save time and labor resulting in reduction in cost of production directly. In the long run mechanization will help to enhance water productivity, climate change mitigation, women empowerment, youth attraction on agriculture. Promotion of mechanization is not easy due to its high initial cost, diversified geography and small land plot size and lack of farm road. Hilly terrains and land fragmentation are major hindrances for mechanization in Nepal. The mission of development of the policy is to contribute to sustainable economic development through the agricultural mechanization and agribusiness modernization. Its goal is to research, develop, adopt, extend, and promote agricultural machines, implements & equipment's to increase agricultural productivity and make it sustainable and competitive.

The major objectives of the Policy are as follow:

- To increase productivity through appropriate agricultural mechanization as per the economic and geographical need of the country in order to develop the sustainable, competitive and commercial agriculture sector
- To develop the services and business of agriculture machineries through the coordination among the Government, private sectors and cooperatives in order to increase the access of the farmers and the business people
- Identification and promotion of women and environment friendly agriculture machineries.
- To establish and strengthen the organizational structural development to develop, quality standardization, regulation, monitoring and promotion of agriculture machineries for agricultural mechanization.

The AMPP has also made it mandatory for machine entrepreneurs (producers, manufacturers, importers or distributors) to provide information in the Nepali language on quality, safety, operation, repair, and maintenance of farm tools and machines because maintenance and availability of spare parts at the local level has been found to be a major challenge in the past. The policy stipulates that to increase access to marginalized farmers, a minimum interest rate loan or subsidy will be provided to individuals or groups of farmers, without collateral, for the purchase of machinery or tools. The policy also aims to develop programs to provide farm tools or machinery for rent to assist those who cannot afford to purchase these items an insurance provision is also highlighted in the policy for machine operators at a discount. The policy states that as an encouragement, awards will be provided to farmers, businesspersons, researchers or distributors who promote an innovative and useful machine, tool or equipment for the agriculture and livestock sector. This is a clear attempt to promote responsible farm mechanization innovation by identifying stewards of the technologies, but the substantive goals are focused more on agricultural productivity and competitiveness than equitable and environmentally sustainable farming. Nevertheless, the policy also has a subsidy or low-interest loan provision to enable the purchase of farm tools or machinery for commercial production, group farming on a land consolidation basis, and/or for intensive livestock rearing. The policy stipulates that commercialized farms operated by women and youth will receive up to 50% capital subsidies for equipment purchases. These policy statements imply that large-scale industrial producers could potentially obtain subsidies for on-farm tools and machines.

The AMPP provides a provision to grant patent rights on the production of modern machines to encourage the private sector in the identification, research, production, and dissemination of farm tools and machinery. It also prioritizes the involvement and collaboration of local institutions for testing and dissemination of technologies. The policy has encouraged cooperatives and private sector organizations to establish small-scale trades or large machine factories in order to enable import substitutions and create local employment. The policy aims to support local or traditional machinery manufacturers, such as blacksmiths, to scale up and achieve commercial production. With respect to Sustainability 2020, 12, 374 13 of 24 tax incentives, the AMPP recommends reductions in the customs and value-added tax (VAT) pertaining to the import of raw materials required to produce tools or machinery in the country. Under the policy, domestic production will not be charged a VAT or other tariffs, while private sector manufacturers will receive reduced taxation for a limited period. Furthermore, private sector entrepreneurs, farmers, groups or cooperatives will receive a discount on VAT and customs tariffs.

By considering the diverse topography of Nepal, the AMPP recommends the establishment of at least one farm machinery research center in the high mountains, one in the mid-hills, and one in the mid-western region. In the eastern part of the country, the policy proposes to develop the capacity of an existing research center, the Agricultural Implement Research Unit in Ranighat, Birgunj, which was established in 1959. Finally, the policy has recognized the hardship of hill farmers, most of whom are women and the elderly, and the need for developing geographically and socially appropriate machinery and farm tools.

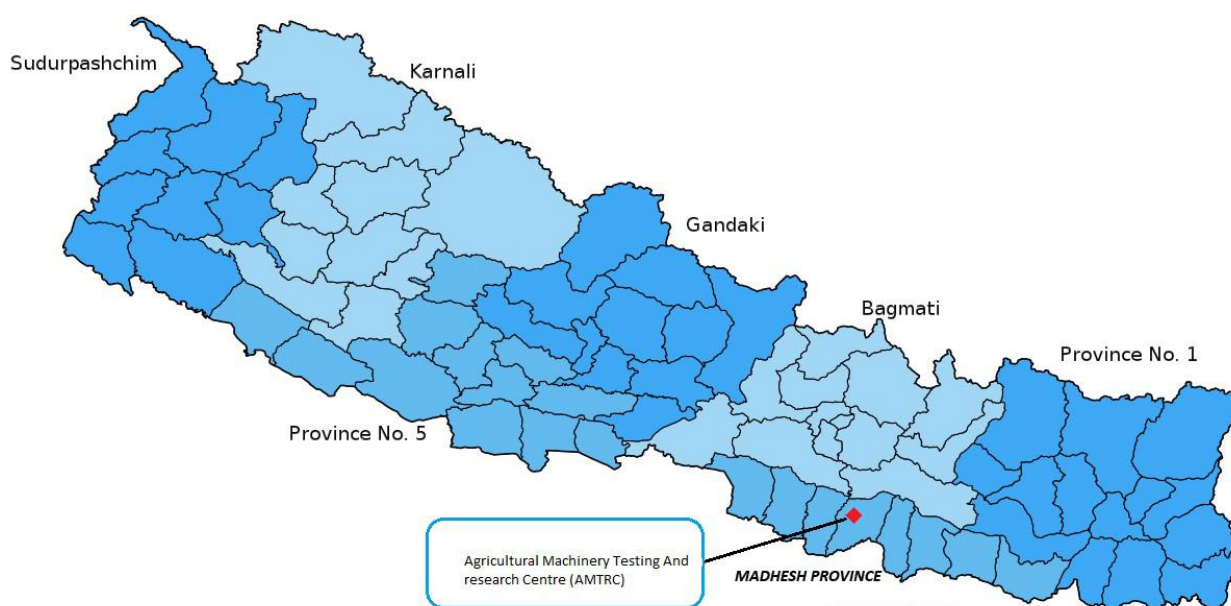
### Policy Analysis

All the legal framework specially the AMPP came into practice before the promulgation of the current Constitution of Nepal. Now the jurisdiction related to agriculture come down mainly to the local bodies. Many provisions need to be amended for effective implementations. Furthermore, the import of agricultural machineries is going up in recent years. Import of machineries of more than NRS 150 million easily demands the need of institutional and legal framework for maintaining quality. In this context, need of a testing Centre is must for sustainable agricultural mechanization. The policy harmony and coherence is must for the growth.

### Agricultural Machinery Testing

With the objectives of testing agricultural machinery manufactured within the country or imported with a view to assess the functional suitability and performance reliability so that it will help farmer and user for their selection, making the manufacturers about performance and durability of the machine/ equipment for proper/ efficient utilization along with the technical information available to the farmer for proper selection of the required equipment's/ machine, the Agricultural Machinery Testing and Research Centre (AMTRC) under NARC has been established on 11th Magh 2074 B.S, Thursday (25th Jan 2018 A.D). It lies at 27° 03' 86" north latitude and 85° 35' 52" east longitude and an elevation of 144 meter above mean sea level.

The Centre has been mandated to provide good quality, user friendly and cost efficient Farm Machinery and equipment to the ultimate users, to provide feedback to the Researcher/ Agricultural department to make them familiar about their functional suitability, field performance, ease of operation and appropriate adoptability on the farmer's field. With this view, AMTRC is responsible for conducting test as per National/ International standard norms. Agricultural Machinery Testing and Research Centre is considered to be one of the most important Centre responsible for provide good quality Farm Machinery and Equipment to the ultimate users, to provide feedback to the Researcher/ Agricultural Department to make them familiar about their functional suitability, field performance, ease of operation and appropriate adoptability on the farmer's field. With this view, we are responsible for conducting test as per National / International standard norms. Agricultural machinery Testing and Research Centre is a testing and research center mandate to perform test of various Agricultural machinery (Such as Mini tillers& their attachments, Power tillers& their attachments, Tractors attachments, pumps etc.) and other agricultural machines and implements imported and manufactured within the country will be tested to assess their functional suitability, compatibility and performance characteristics based on National and International Test Codes and Test Regulations under different agro-climatic conditions. This Centre also works with research on the agricultural machinery used in Nepal to provide good quality, user friendly and cost efficient Farm Machinery and Equipment to the ultimate users, to provide feedback to the Researcher/ Agricultural Department to make them familiar about their functional suitability, field performance, ease of operation and appropriate adoptability on the farmer's field.



## Conclusions and Recommendations

The institutional and policy level growth should go together for the mechanization management in Nepal. Though there is the establishment of testing Institute, no operational strategies and National Standard (NS) have been developed yet for the effective functioning of the centre. Hence, there is urgent need of operational framework for developing national test codes and certification of the machineries. Furthermore, operational strategies for AMPP are also equally important for the sustainable agricultural mechanization and for the reduction of duplication at the three tier federal structure.

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