Country Presentation

Nepal

The 2\textsuperscript{nd} Regional Forum on Sustainable Agricultural Mechanization

Enabling Environment for Custom Hiring of Agricultural Machinery

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Serpong, Indonesia
Role of Custom Hiring Services of Agricultural Machinery in Agricultural Mechanization in Nepal

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Nepal

Land area 147181 sq km (EW-885 km, NS-193 km)
Population 26.67 M
Three geographical region Terai, Hill & Mountain
Elevation ranges from 70 m to 8848 m
Climate temperate to sub tropical
Rugged terrain and diversity (in all sense) the typical feature
Agro Eco zone

Mountain (35%)

Hill (42%)

Terai (23%)
Agricultural Scenario

- Dominated by subsistence and small holder agriculture. Average land size <0.65 ha.
- Agriculture contributed 34% AGDP and employment to about 60 percent of population.
- Young people moving away from agriculture.
- Aging of farm labour.
- Feminization in agriculture.
- Emerging commercialization in agriculture.
<table>
<thead>
<tr>
<th>Crops</th>
<th>Area (ha.)</th>
<th>Production (mt.)</th>
<th>Yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>1420570</td>
<td>4504503</td>
<td>3171</td>
</tr>
<tr>
<td>Maize</td>
<td>849635</td>
<td>1999010</td>
<td>2353</td>
</tr>
<tr>
<td>Millet</td>
<td>274350</td>
<td>305588</td>
<td>1114</td>
</tr>
<tr>
<td>Wheat</td>
<td>754243</td>
<td>1727346</td>
<td>2290</td>
</tr>
<tr>
<td>Barley</td>
<td>29598</td>
<td>33782</td>
<td>1141</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>10681</td>
<td>10056</td>
<td>941</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3339077</strong></td>
<td><strong>8580285</strong></td>
<td><strong>2570</strong></td>
</tr>
</tbody>
</table>
Gender-wise Farm Labour Involvement in Agricultural Operation in Terai

![Diagram showing gender-wise farm labour involvement across various agricultural operations in Terai. The bars are color-coded, with red representing female involvement and blue representing male involvement.](image-url)
### Status of Agricultural Mechanization

(Source: National Sample Census of Agriculture, CBS, 2012)

<table>
<thead>
<tr>
<th>Machinery/Equipments used</th>
<th>No of Households</th>
<th>% Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ploughs</td>
<td>1,073,441</td>
<td>28.02</td>
</tr>
<tr>
<td>Tractor &amp; Power tillers</td>
<td>920,371</td>
<td>24.03</td>
</tr>
<tr>
<td>Thresher</td>
<td>803,154</td>
<td>20.96</td>
</tr>
<tr>
<td>Pumping sets</td>
<td>548,203</td>
<td>14.31</td>
</tr>
<tr>
<td>Sprayers</td>
<td>574,014</td>
<td>14.98</td>
</tr>
<tr>
<td>Shallow tubewells</td>
<td>367,744</td>
<td>9.56</td>
</tr>
<tr>
<td>Deep tubewells</td>
<td>159,725</td>
<td>4.17</td>
</tr>
<tr>
<td>Treadle pump (Dhiki)</td>
<td>79,145</td>
<td>2.06</td>
</tr>
<tr>
<td>Animal drawn cart</td>
<td>334,978</td>
<td>8.74</td>
</tr>
<tr>
<td>Other Equipments</td>
<td>290,084</td>
<td>7.57</td>
</tr>
</tbody>
</table>
Trend of Tractor Registered in Nepal
Farm Power Used in Agricultural Operation in Terai

- Animal
- Mechanical
- Human
Constraints of Agricultural Mechanization in Nepal

- **Past policies ignored mechanization due to fear of labor displacement** by the use of larger power operated machines (mainly tractor). Agricultural Policies and Plans such as APP(1995-2015) and other policies did not have any policy statement on agricultural mechanization

- **Past policies such Land Act (1964), National Civil Code (1853;1962) have encouraged land fragmentation** with the provisions of land inheritance & land ceiling resulting in disincentives for mechanizations

- **Subsistence farming, small farm size, fragmented land holding and physical constraints of rugged and steep topography, narrow terraces** in Hills and Mountains discouraged use of machineries.

- **Infrastructure, institutional capacity and capital constraint.**
Status of Agricultural Mechanization

**Tillage**

- Majority of tillage by animal power
- Only 28% of farmers use iron plough
- In Nepal 25% use tractor & Power tiller
- Most of the tractor use cultivator
- Custom hiring of tractors is common
- Power tiller / mini tiller is getting popular
Status of Agri. Mechanization (cont.)

**Planting / Seeding**

- Rice is manually Transplanted
- Wheat is broadcasted
- Maize & vegetable seeds is dibbled
- More than 64% is performed by women
- Zero till drill & minimum till drill is being promoted
Status of Agri. Mechanization (cont.)

**Inter-culture Operation**

- Rice, Potato, maize and vegetables need major inter culture operations
- Hand tools- Khurpi and sickles, Kuto etc. are used
- Bullock drawn local plough is also used for maize inter culture
- More than 72% of inter-culture operation by women
Status of Agri .Mechanization (cont.)

Irrigation

- 42% of area irrigated and 18% year round
- only 242000 ha is irrigated by GW in which 208746 is through STW and 33732 ha by deep tube wells
- 14.3% of farmers use CF pump mainly for shallow tube well and lifting water from river
- More than 100000 treadle pumps in terai
- Simple low cost drip system and sprinkler irrigation is being used for vegetable cultivation
Status of Agri. Mechanization (cont.)

Harvesting
- Manually performed by using Locally made sickles
- Serrated sickles locally made is also popular
- More than 300 Combine harvesters are in operation in Terai
- 4 wheel tractor operated reapers, power tiller & mini tiller operated reaper are also getting popular
Threshing

- Beating on stone/ drum
- Animal/ tractor treading
- 21% of Nepalese farmers use thresher. It is found that more than 85% of threshing in terai is performed by thresher
Demand for Agricultural Mechanization

Â In recent years, however, demand for mechanization is increasing with **acute labor scarcity at peak season and high cost of production** (as a result of increased wage rate) in farming resulting in from youth migration and feminization

Â **Wage rate in agriculture has doubled in the last 10 years** and households receiving remittance income has more than doubled in the last one and half decade from 23% in 1995 to 56% in 2010. (CBS, 2011)

Â **Female headed households have also doubled in last 15 years** from 13% in 1995 to 26 % in 2010 (CBS, 2011).
Demand for Agricultural Mechanization...

- Increased attraction of returned youth migrant in commercial agriculture and use of modern machineries
- Increasing road connectivity in rural areas resulting in use of tractors and other machineries
- Increasing realization of agricultural mechanization among planners and policy makers resulting in development of new policy on Agri Mechanization
- Very liberal import policy with tax exemption for Agricultural Machinery particularly on Tractors
- Spill over effect from neighboring countries
Agricultural Mechanization and Custom Hiring

Custom hiring has got major role in agricultural mechanization due to following reasons:

- Small land holding
- Low purchasing capacity
- Less technical capability
- Economy in renting in of agricultural machinery than self owning

![Graph showing land holding and custom hiring relationship](image)
# Custom Hiring of Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Used HH</th>
<th>Owned HH</th>
<th>Custom Hiring HH</th>
<th>Used/Owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ploughs</td>
<td>1073441</td>
<td>838176</td>
<td>235265</td>
<td>1.28</td>
</tr>
<tr>
<td>Power tillers</td>
<td>75671</td>
<td>9123</td>
<td>66548</td>
<td>8.29</td>
</tr>
<tr>
<td>Tractor</td>
<td>844700</td>
<td>36158</td>
<td>808542</td>
<td>23.36</td>
</tr>
<tr>
<td>Thresher</td>
<td>803154</td>
<td>48157</td>
<td>754997</td>
<td>16.68</td>
</tr>
<tr>
<td>Pumping set</td>
<td>548203</td>
<td>136607</td>
<td>411596</td>
<td>4.01</td>
</tr>
<tr>
<td>Animal drawn cart</td>
<td>334978</td>
<td>155272</td>
<td>179706</td>
<td>2.16</td>
</tr>
<tr>
<td>Sprayer</td>
<td>574014</td>
<td>248790</td>
<td>325224</td>
<td>2.31</td>
</tr>
<tr>
<td>Other equipment</td>
<td>290084</td>
<td>81684</td>
<td>208400</td>
<td>3.55</td>
</tr>
</tbody>
</table>
Share of HH Using Custom Hired Agricultural Equipment and Self Owned Equipment

- Iron ploughs
- Tractor & Power tillers
- Thresher
- Pumping set/Motor
- Animal drawn cart
- Sprayer
- Other equipments

- Owned & Used
- Used by Custom hiring
Characteristics of Custom Hiring of Agricultural Machinery

- **Informal business** (not recognized by government)
- **Various types**
  - Means of Livelihood (animal drawn Plough, traditional water mill)
  - Partially commercial (power tiller, pedal operated thresher, winnower, pumping set, sprayer etc.)
  - Commercial business (Tractor, power tiller, tractor operated thresher, combine harvester, grain processing mills etc.)
- **Mainly Individually owned machinery**, group and cooperative owned machinery not that successful
- **Lack of capacity** on technical maintenance, management including record keeping
- **Wide range of renting charge** of same equipment service in various location.
- Most of the **service is provided in same village** except tractor, power tiller, tractor PTO driven thresher and combine harvester
# Custom Hire Charge of Agricultural Operation

<table>
<thead>
<tr>
<th>Custom Hiring Service</th>
<th>Eastern</th>
<th>Central</th>
<th>Western</th>
<th>Mid Western</th>
<th>Far Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor with Cultivator (Rs. Per hour)</td>
<td>1200 to 1500</td>
<td>1200 to 1500</td>
<td>1200</td>
<td>1000 to 1200</td>
<td>1100 to 1500</td>
</tr>
<tr>
<td>Tractor with rotovator (Rs. per hour)</td>
<td>1600 to 2000</td>
<td>1500 to 2000</td>
<td>2000</td>
<td>1400 to 2000</td>
<td>-</td>
</tr>
<tr>
<td>Power Tiller (per hour)</td>
<td>500 to 600</td>
<td>500- 600</td>
<td>600</td>
<td>300 to 500</td>
<td>400 to 600</td>
</tr>
<tr>
<td>Animal Drawn Plough (Rs. Per day)</td>
<td>450 to 1000</td>
<td>1000</td>
<td>1000</td>
<td>700 to 1000</td>
<td>1300</td>
</tr>
<tr>
<td>Sprayer (per day)</td>
<td>25 to 100</td>
<td>80 to 100</td>
<td>25 to 40</td>
<td>80 to 100</td>
<td>15 to 50</td>
</tr>
<tr>
<td>Pump set (Rs. Per hour)</td>
<td>300 to 400</td>
<td>250 to 350</td>
<td>300 to 500</td>
<td>250 to 400</td>
<td>250 to 300</td>
</tr>
<tr>
<td>Thresher (grain: grain threshed)</td>
<td>1:20 to 1:10</td>
<td>1:12 to 1:8</td>
<td>1:15 to 1:10</td>
<td>1:13 to 1:8</td>
<td>1: 9 to 1:07</td>
</tr>
<tr>
<td>Combine Harvester (Rs./hr)</td>
<td>5000</td>
<td>5000</td>
<td>4800 to 5000</td>
<td>-</td>
<td>4500</td>
</tr>
</tbody>
</table>

1USD = Rs. 98
Farmer’s Perspective on custom hiring service provided

- Monopoly of custom hiring service provider
- High rate but quite cheaper than traditional practice
- Service not available at right time and have to wait for long time
- Some case poor quality of service (grain cracking in threshing)
- Some times operation at night
- Difference in rate from one service provider and other
- Straw burning after harvester led to lack of fodder for livestock farmers
Custom Hiring Service Provider’s Perspective

- Lack of spare parts and repair and maintenance service
- Difficult in credit availability and high interest rate from bank
- High competition in same location
- Lack of technicians/operators
- Farmers not demanding service in advance
- Difficulty in collection of service charge specially during tillage
- No support from government
- Obstruction of use of agricultural tractor in non agricultural use
- Government’s inconsistent approach
Some Custom Hiring Innovative Service Providers

- Collection of **service charge in terms of kind** during threshing, milling etc.
- Innovative service provider **promoting Laser land leveling service, rice transplanter, zero till drill, straw harvester, micro hydro powered grain processing mills etc.**
- Organized machine service provider in Biratnagar **“Nepal Krishi Company”** Promoting agricultural cooperative to provide custom hiring service through cooperatives.
- It has successfully demonstrated that 1 cooperative can provide service to 135 ha of rice-wheat/ lintel farming by using 2 tractors, 1 tractor trolley, 2 rotovator, 2 cultivators, 2 levellers and 1 combine harvester. It is found that annually Rs. 6.4 million can be saved from 135 ha by mechanized farming (tillage and harvesting). It has been adopted in 4 cooperatives in eastern terai.
- **Gravity ropeway** for transportation in the hills
- Custom hiring **in collaboration with farmer’s group**
Major Findings of Survey

- Custom hiring service providers have a major role in the promotion of agricultural mechanization among smallholder farmers in Nepal.
- Among the agricultural machinery used by households, the custom hired machinery used by HH includes metallic animal-drawn plough (22%), power tiller and tractor (88%), thresher (94%), sprayer (57%), water pump (75%), and other agricultural equipment (72%).
- Privately owned agricultural machinery custom hiring service is found to be more successful than the group owned agricultural machinery service provider.
- Increased use of machinery has caused increased accidents.
- Custom hiring service in tillage, water pumping, harvesting, and threshing has been successfully used in the Terai region of Nepal for milling and transportation all over Nepal.
- Almost all the custom service providers are providing their service informally, as none of them are registered.
- There are several important issues raised by custom hiring service provider and the farmers which need to be addressed by the government for the promotion of agricultural mechanization in Nepal.
Suggestions and Recommendations

Government’s Role:

• Custom hiring service provider should be well recognized as major and strong stakeholder in promotion of sustainable agricultural mechanization in Nepal.

• Government as facilitator and should create enabling environment for custom hiring service provider in following area:
  - Recognition of service provider through registration. (Nominal registration fee and tax waived).
  - Create a database and monitoring of service.
  - Innovative and best custom hiring service provider should be awarded
  - R & D on appropriate models of custom hiring
  - Capacity development of service provider on selection, procurement, operation and maintenance of agricultural machinery, record keeping and service management and marketing skill
  - Policy for easy access to credit and subsidy in bank interest.
  - Selective, targeted and sustainable subsidy on agricultural machinery
  - Promote custom hiring service providers for competitive renting.
Government’s Role (contd.)

- As custom hiring service provider can also be promoter of improved agricultural technology, they should also be trained in improved agricultural technologies.

- Human resource development to develop the operators and technicians.

- Facilitate to fix maximum rate of service in consultation with leader farmers and service provider (new agri mechanization policy).

- Demonstration of innovative and efficient agricultural machinery through custom hiring service providers.

- Preparation & implementation of law, regulation and standard of custom hiring service. Testing and Standardization of Agricultural Machinery.

- Other subsidiary policy and regulation viz. land consolidation, rural development, agricultural credit, rural energy, agricultural road, market storage facilities, custom duty, etc favorable for SAMS.

- Support / policy incentives for green technologies viz. energy efficient technologies, conservation agricultural technologies, GAP, RETs etc.

- Insurance in agricultural machines/operators.
Role of farmers

• Plan the agricultural operation in advance inform the service provider in advance
• Block approach/ group approach for small holders
• Record keeping
• Get information about the new technology, available custom hiring service providers.
• Maintain farm roads, irrigation, field condition in advance
• Pay immediately after service. Commercialize their production system with direct access to the market
• Primarily processing in farm itself – value addition.
Role of custom hiring service provider

- It is their business **it should be profitable** to be sustainable. Preparation of complete updated **business plan** (technical, financial, marketing, human resource etc.) and seasonal planning.
- **Record keeping** financial, customer, maintenance, service etc.
- Focus on **Quality service, competitive price and customer’s satisfaction**
- Custom hiring service provider should **use ICT for communication to customer and other service providers for timely and quality service**
- Custom hiring service provider should **diversify their service** through the introduction of new and innovative agricultural machinery.
- **Other agriculture technology and input service be linked** with machinery service (marketing strategy)
- **Take care of safety with primary responsibility** (operator, environment and consumer)
- **Custom hiring service provider should be organised** and create a network to share the problems and lobby the government for favorable policy.
Sustainable Agricultural development in Nepal is possible only through competitive, innovative, efficient and reliable custom hiring of agricultural machinery in business model by the young farmers.
Thank You