

# SECTOR BRIEF

Issue #7, March 2015



**Sector:** Mechanization

**Intervention:** Improved access to marketing, financial and technical services, Increased efficiency of traditional equipment, Capacity building of mechanics to improve after sales services

**Districts:** Palpa, Dang, Dadeldhura, Myagdi, Ilam, Surkhet, Arghakhachi, Syangja, Dhading, Sindhuli, Doti, Baitadi

## Making Molehills out of Mountains: expanding Access to Mechanized Cultivation in the Mid-Hills of Nepal



The benefits of mechanization to smallholders have been known ever since hand was first put to *ard* over eight thousand years ago. Since then there has been a steady evolution of technology into the leviathan tractors we see today which incorporate satellite technology and automatic steering. In the mid-hills of Nepal however this process has largely passed smallholders by, and today smallholders' access to reliable and affordable draft is further constrained by other external factors.

The following briefing paper outlines Samarth-NMDP's approach to changing this, to bring the benefits to smallholders in a way which is sustainable by engaging with those who have a vested interest in seeing the industry grow and who have the capacity and incentive to do so. Importantly, this case demonstrates how the principals of market systems development were upheld: notably those of facilitation and flexible, adaptive management. This has resulted in early indications of success in terms of buy-in from the private sector and access to mechanized services from smallholders.

### Mechanization and Smallholders in Nepal

80% of the 87% of Nepal's population who are engaged in agriculture subsist on under 1 ha of land, blending a range of crops and livestock into their mixed, low external input systems. However the small farm size is partly compensated by the agro-climate which allows for up to three crops per year of cereals, pulses, vegetables, oil crops and fodder.

Cultivating the land is an arduous, physical task, especially on the steep terraces of the mid-hills. Over 40% of farmers have access to draught animal power (mainly oxen and buffalo) via around 250,000 owners. Among draught oxen and buffalo owning families, women are usually tasked with gathering forage and caring for these animals – spending around an hour a day in doing so.

In some areas there is a taboo against women using oxen directly, meaning that they are consigned to use hand cultivation and ox cultivation services if they don't have direct access. Nevertheless even in areas where taboos don't exist, women often find they are disadvantaged in using tools designed for men, and in obtaining ox cultivation services provided by men.

Migration is also a key driver of change. Net migration from Nepal currently stands at around 384,000 per annum and is increasing (Paudel, 2012). Most of those leaving are men who would otherwise be primarily responsible for cultivating land by ox, with women mainly performing hand hoeing and weeding. This is leading to the “feminization” of agriculture, and importantly an evolutionary pressure on the smallholder system towards less labour intensive crops and even the abandonment of farm land (Tamang, Paudel, & Shrestha, 2014).

Mechanization offers a potential solution. Tractors, hand tractors (large two wheeled tractors) and mini-tillers (small two wheeled tractors) can cultivate more land in the same amount of time as oxen and buffalo, and require less labour to maintain them<sup>1</sup>. Hence mechanized services are cheaper than those provided by draught animals, affording savings of around 30 GBP per season for the average smallholder over two-three seasons annually.

Whilst 23% of farmers have access to mechanized power, over 92% of this is in the flat terai areas in the south (Shrestha, 2011). Hence the lack of draught cultivation is felt most acutely in the mid-hills, and amongst women.

## THE MINI-TILLER

Hand-operated and weighing 70-120kg, mini-tillers are primarily used for cultivation although additional attachments can be used for post-harvest operations, pumping and haulage. They typically cost 45,000 – 90,000 depending on size and engine type.

Owners of mini-tillers generally offer services to people in their neighbourhood in much the same way as draught animal services are offered. The cost of service varies between 300 – 800 NPR per hour and around 0.5ha can be cultivated in an hour.

“The mini-tiller market in the hills is like the hand-tractor market was in the terai 12-15 years ago”.

**Machinery Dealer, Nepalgunj**

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<sup>1</sup> Collecting fodder for oxen, and mucking them out is mainly women's work and takes over an hour a day for those who own them.

### Tillage cost – Oxen vs. Mini-tillers (NPR)<sup>2</sup>

Area	Oxen	Mini-tiller	Savings per season
Ropani (0.05 ha)	700	400	300
0.77 ha (avg. landholding)	10,780	6,160	4,620 (GBP 30.8)

### Samarth's Intervention

Samarth-NMDP's mechanization component began in June 2013 and decided, based on initial market analysis, to focus primarily on facilitating the development of the mini-tiller market in the mid-hills. This is where the deficit in labour is being most acutely felt, and where the mechanization market is least developed.

There is great market potential for mini-tillers in the hills. Samarth calculated that if they were to be fully adopted, then there would be a demand for a total of 90,000 to provide services for the 1,348,850 smallholder families who live there. With a lifespan of 5 years, this means an annual demand for 18,000 mini-tillers. Demand was being catered for by several machinery importers that were bringing in mainly Chinese machinery that was fairly simple, but generic and unbranded. In addition, mini-tillers comprised a small part of the business of these companies who mainly focussed on larger agricultural and construction machinery. Their main focus for sales was mostly in the terai and in the Kathmandu Valley where agriculture is more commercial and capital intensive. Sales in the mid-hills were negligible.



Analysis revealed that the constraints to smallholders buying mini-tillers were mainly a lack of finance, and a lack of knowledge of what mini-tillers were and how to use and maintain the machinery. In addition there were some negative perceptions among farmers who had seen them used – often misused by the uninitiated; often those who had received them through a subsidy programme but lacked knowledge.

The Ministry of Agriculture had attempted to stimulate demand for mini-tillers through a subsidy programme administered through local District Agricultural Development Offices (up to 50%). However uptake was still limited, and this programme often stood in the way of machinery dealers and farmers communicating to understand the market and the product. International programmes had attempted to address skills gaps through training farmers directly, or in conjunction with government, in how to use and maintain the machinery. Uptake remained stubbornly low.

<sup>2</sup> It is possible to plough 2 ropanis (0.1ha) per day using bullocks and 1ha per day by mini-tiller.

Samarth-NMDP's overall vision was not that all farmers owned a mini-tiller, but that mini-tiller services were provided by capable, active parties. The obvious candidates were those who were already providing similar services with oxen and buffalo. However others such as farmers and landless micro-entrepreneurs could also be providers.

### Round 1

Initial research confirmed that mini-tiller importers and their dealers had a rather laissez faire approach to selling mini-tillers. Promotion and marketing was limited, no training was provided to potential or existing users, and there was very little in the way of after-sales care such as sales of spares and repair.

Samarth visited all of the three major importers with an offer mainly focussed on assisting them to embed training services alongside an expanded retail network into 4 districts in the mid-hills in the East. The capacity building necessary to support this was to be delivered through a consultant who would ultimately become a business service provider to the industry and scale this out to other importers and their dealers. Samarth envisaged the costs of this model being borne by the importers, paid for by the margins on increased sales.



An importer – Force – was selected on the basis of their scale (2<sup>nd</sup> largest) and willingness to try new ideas and work begun in January 2014. Force provided their Marketing officer and a technician to conduct two trainings in each of two eastern districts of Ilam and Terhathum. In all 36 farmers and small entrepreneurs attended and sales of mini-tillers in both the districts picked up – 22 mini-tillers were sold and an additional 15 smallholders were served.

The initial results looked favourable, and Samarth-NMDP was optimistic that Force would continue to grow the model, however this was not the case. The main reasons for this were A) that the cost of embedded services was fairly high as it involved a key staff member who had a wider role in their larger core business; B) the technical component was delivered by an embedded Samarth-NMDP staff member, and as such the programme was taking on a heavy management role that was unsustainable, and C) Force was also involved in another more lucrative business of heavy construction equipment and indeed subsequently exited the mini-tiller market altogether.

### Round 2

Clearly the initial model was not going to scale-up, as the initial partner lacked the incentives to continue the embedded model, and indeed appeared to be decreasing their involvement in mini-tillers in favour of other more profitable product lines. Samarth's options were either to tinker with the original model, or to re-design. Samarth chose the latter.

Firstly, Samarth looked at the training model and realized that rather than each company developing their own in-house team to deliver training to prospective buyers, they could potentially outsource this. The programme therefore sought potential commercially-driven training providers and found several who were mainly delivering manpower development services aimed at improving the skills of migrant labourers in construction etc. One of these – F-Skill - was interested in looking at new markets – especially agriculture.

## A MINI-TILLER SERVICE PROVIDER

Amar Karki is a farmer from Ilam, a hilly municipality in eastern Nepal famous for its tea production. Like many residents, he has never had the opportunity to go to secondary school. Married, Amar now lives with his wife and two sons. He and his wife work their fields together to eke out a living from the land for just 4,500 rupees (£30) a month from mixed farming on 1.2ha of land.

Oxen have traditionally been used for ploughing and transporting goods to market. However, keeping oxen is hard work. Women are usually responsible for their upkeep and Amar's wife would spend at least an hour a collecting fodder, cleaning the shed and taking them for grazing.

Samarth's intervention enabled Mr Karki to buy a mini-tiller through the proceeds from the sale of his oxen. This has reduced the work burden on his wife, improved their cultivation and that of the seven or so of his neighbours to whom he provides services.

"The time I used to spend on my ox can now be spent on more productive farm activities". This was echoed by his wife, who was on her way to socialise with her neighbours, something which she rarely had time for before the mini-tiller came along.

Secondly, Samarth looked at other factors that may be inhibiting the purchase of mini-tillers. Clearly lack of finance was potentially chief among them, so Samarth approached a number of finance institutions. One of these – Nirdhan Utthan said they had been planning to release an agricultural machinery product, but were concerned that without adequate training there was a risk that buyers would not be able to reap the benefits of the machinery and repay the loan.

Samarth also went back to analysing other importers of mini-tillers and chose another Importer whose sole focus was on agricultural machinery. BTL was identified, although their main focus was on two-wheeled tractors and their dealership network was limited to terai. However they were looking to expand their business and shift their interest on mini-tillers targeting hill districts.

Samarth brought these three market players together and showed them the benefits that each player could reap out of working together on a "package". This consisted of a training module for farmers and entrepreneurs considering buying a mini-tiller on operation, repair and maintenance of mini tillers and importantly how to run a small service business as well as information on loan products available for financing their purchase. This package was jointly marketed in 5 hill districts of Dadeldhura, Dang, Palpa, Myagdi and Ilam, resulting in 18 mini-tillers sold, and services were provided to 49 additional smallholders (two of the dealerships did not work out).

### Round 3

The partners were buoyed by the success of the model. However, Samarth had found it necessary to take on a heavier management role than was desirable for sustainability. The importer wanted to expand the product and the joint marketing exercise will commence marketing the model in 10 districts altogether. This time BTL will be primarily responsible for managing and coordinating the campaigns as they have the highest economic incentive. In addition it appears that another importer has begun to do embedded training as part of their business. Whilst Samarth's influence needs to be verified, it looks likely given the exposure they have had through various fora.

### Action Research

Meanwhile Samarth has initiated some action research to understand the barriers as well as opportunities for female/disadvantaged groups to become mini-tiller service providers. All four participants have started using the mini-tiller and are also providing services to other farmers. For a male farmer belonging to the disadvantaged groups, there doesn't seem to be any social/caste barrier to servicing higher caste farmers. Female service providers face difficulties in that they

are heavy to start and operate. However it has been observed that if given the opportunity to own a mini-tiller they find novel ways to use them. One of the female recipients has hired an operator who provides services taking an hourly cut for the work. The findings of his research has been used to help the partners tailor their marketing messaging so that they are open to women and disadvantaged groups who may be important customers for them.

### What Next?

The sales, presence and use of mini-tillers and other small agriculture machinery are growing, be it by direct sales or through government subsidy. With the growing number of machines will grow the need for after sales and repair services of these machines. The dealers who run these businesses are small scale entrepreneurs themselves and hardly have the capacity to grow their after sales services beyond a single mechanic. Local public agencies that are distributing machines on subsidy don't have any resources when it comes to providing services like training and repair/maintenance. Hence, it is of utmost importance to develop a good network of mechanics in and around the regions where there have been good sales of machinery. Samarth will be working on supporting the development of viable training services for mechanics in areas where mini-tiller sales are concentrated.



A mini-tiller's utility goes far beyond the tilling of land. Limiting the usage to land tilling, means the machine remaining idle for a good 3 quarters in a year. Therefore, to increase the utility of the mini-tillers so that buyers can reap maximum benefit out of the machine, additional attachments for mini-tillers need, to be promoted. Immediate and most viable usage can be threshing and water pumps. Our plan is to support market players so that they see the incentive in promoting these additional attachments and implements.

Along with this, Samarth will also be working on improving the farming practices of the vast majority of smallholders who rely on traditional cultivation equipment. For this Samarth aims to work with applied research and development agencies who have developed new and improved tools and linking them with local artisans/tools makers so the end beneficiaries or smallholders would have better access to these improved tools.

In all, Samarth aims to impact over 5,000 smallholders in the mid-hills through systemic interventions in the mechanization sector - a figure that will continue to grow long after the end of the programme.

### About Samarth-NMDP

Samarth-NMDP is a five year UK aid-funded program that aims to reduce poverty in Nepal. The programme follows a market systems development approach, addressing underlying causes in the performance of the market systems, to bring about more competitive and sustainable markets that work better for the poor.

*Samarth-NMDP is a DFID-funded programme managed in partnership with the Government of Nepal by a consortium comprising Adam Smith International, The Springfield Centre and Swisscontact. For more information on the programme, please visit [www.samarth-nepal.com](http://www.samarth-nepal.com).*