FARM MECHANIZATION AND CONSERVATION
AGRICULTURE FOR SUSTAINABLE INTENSIFICATION
(FACASI) PROJECT

MARKET ANALYSIS FOR SMALL MECHANIZATION- KENYA

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EXECUTIVE SUMMARY

This study was commissioned by CIMMYT through its Farm Mechanization and Conservation Agriculture for Sustainable Intensification (FACASI) Project. The aim of the study was to come up with a picture of general farm mechanization in Kenya biased towards small farm machinery like two wheel tractors. Both primary and secondary data was used in this study. Data collection was done between April and September 2014 by CIMMYT and KENDAT staff. Among actors interviewed in this study were importers, spare part dealers, farmers, and service providers, government officials in Nairobi, Bungoma, Laikipia, Nakuru, Kitale and observations from other counties.

The study found that use of mechanization on Kenyan farms is still very low. Most farmers access mechanization services through service providers. Most of these service providers use four wheel tractors. Few service providers are using 2WT. Because of the decreasing land sizes due to land fragmentation, alternative to 4WT would be 2WT. The market for 2WT has a potential for growth especially in provision of post-harvest services like transportation, shelling and threshing of grains like maize. The most ideal model is individual farmers owning the 2WT for their own use and providing services to farmers. The best practical service provision would be small and medium service providers owning several tractors exclusively providing services to other farmers.

For the 2WT service provision to grow, there is need for Government and NGO support in creating demand because the private sector is sitting and waiting for the demand to grow before they can import the tractors.

The major challenge faced in this study was lack of official data on mechanization from various organizations including the Ministry of Agriculture.
ACKNOWLEDGEMENTS

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<td>Animal Draft Power</td>
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<td>Community development Centre</td>
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<td>CIMMYT</td>
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1. **CHAPTER 1: OVERVIEW OF THE STUDY**

1.1. **Background**

The purpose of this study was to get a broad understanding or a ‘picture’ of farm power in Kenya with bias to 2WT and 4WT using both secondary and primary sources. Various publications including government documents, FAO papers and other documents were reviewed. Face-to-face interviews were conducted to various chain-actors including importers, dealers, manufacturers, service providers and farmers in the two project areas (Laikipia and Bugoma counties), Nakuru town and observations from various other counties.

One of the major challenges in doing this study was lack of data and information on mechanization in Kenya especially on 2WT. This situation has been observed by other writers, in a paper on investing in agricultural mechanization for development in East Africa, Hatibu (2013) notes that ‘... there is a very limited data and information on mechanization in all the countries....’

The study provides overall information on agricultural performance in the country, overview of agricultural mechanization in Kenya, dynamics for markets for various technologies, mechanization services- current demand and supply, opportunities and constraint and finally possible interventions.

1.2. **Objectives**

2. To establish the status of 2WT use in Kenya
3. To establish the opportunities that exist to expand the use of 2WT in Kenya
4. To establish opportunities and possible interventions in 2WT business in Kenya
1.3 Methodology

The sources of data for this study included government publications and reports, Kenya Revenue Authority and FAO reports. In Kenya there were no previous specific studies conducted on 2WT but some have been carried out on 4WTs. Some of the information comprising this report has been borrowed from these studies. The other sources of data collected was through interviewing key informants who included all the actors in the tractor sector - including importers, dealers, manufacturers, service providers and farmers.

To collect data interviews were conducted using both structured and semi-structured questioners. Structured questioners were used first but they had the effect of disrupting the flow of information from the interviewees who were willing to give information without being interrupted. Some of them were not comfortable with structured questionnaires and some of the questions were answered by the interviewees without even being asked. Semi-structured questions were preferred as they were easier to follow and acted as a perfect guide to the discussions.

The other source of data was Multi-Stakeholder round tables. These were done during a training organized by FACASI at Nakuru. The training was attended by various actors including Importers, dealers, farmers/service providers. The actors were engaged in discussions during the training aimed at identifying opportunities, constraints, strategies and interventions to address market system weaknesses. The findings are presented in chapters 5 and 6.

Chapter 2: AGRICULTURAL MECHANIZATION IN KENYA

2.1. Overview of Agricultural Sector in Kenya

Agricultural sector is the backbone of Kenya’s economy and the means of livelihood for about 80% of rural population. The sector contributes 25 per cent of the country’s GDP annually and another 25 per cent indirectly and accounts for 65 per cent of total exports, provides more than 70 per cent of informal employment in the rural areas. (Republic of Kenya, 2012) However, for many years farming in the country remains predominantly small scale, rain-fed and poorly mechanized, in addition to inadequate institutional support and infrastructure. The fact that 80% of the population provides only 25% of the GDP speaks volumes. It says that with a hoe and panga (machete) in hand, the population is able to contribute very little towards the national economy. This is the opportunity for CA, the opportunity for mechanization as it calls for labour, land and power intensification, for improved productivity in a country that has only 20% land capable of producing crops under rain-fed systems.
Kenya has an area of about 587,000 km$^2$, of which about 20% has high potential for rain-fed agriculture. 80% of the national population (42 million) making some 5.6 million households (of about 6 persons each) depend on agriculture. About 84% of Kenya is arid and semi-arid (Republic of Kenya, 2013). For Kenya, agricultural growth must be led by intensification and substitution rather than by expansion of the cultivated land. A move into the semi-arid lands is possible through irrigation and mechanization of the larger tracts of land available here.

Studies by the Ministry of Agriculture show that of the total 3 million hectares is under food crops in Kenya, 50 per cent of this land is prepared using hand tools, 20 per cent by animal-drawn equipment and the remaining 30 per cent by tractors.

One of the key drivers for the transformation of agriculture as stated in National Agribusiness Strategy in Kenya is agribusiness, which is defined as including all businesses involved in agricultural production, including farming and contract farming, seed supply, agrichemicals, farm machinery, wholesale and distribution, processing, marketing and retail sales (Republic of Kenya, 2013).

2.2. Farm Mechanization in Kenya

Agriculture faces a lot of challenges in Kenya. Land fragmentation continues to pose challenges on mechanization as the land sizes become smaller and smaller. Smallholders cultivate less than one hectare of land, which may increase up to 10 hectares or more in sparsely populated semi-arid areas. For these land sizes the application of large 4WT becomes uneconomically viable. On the other hand, animal-traction is threatened by the lack of grazing land due to the shrinking land sizes, alongside the impacts of drought, animal disease vulnerability etc. In this context, alternative means of mechanization such as provided by 2WT become attractive. The ability of 2WT to perform multiple functions (like planting, ripping, transportation, shelling, threshing etc) makes them ideal candidates for the various functions along the agricultural value chains. Their application can lead to increased agricultural productivity which can in turn lead to off-farm rural development, led by the service sector (sales, spare parts, equipment hire services, repairs and maintenance) similar to the trend experienced in recent times with the ‘explosion’ of the motor cycle industry. In the last few years, the motor–bike industry has amazingly grown at an expected rate. In every rural village in Kenya motor-bikes are providing transport. One or the drivers of motor-bike growth was need for rural transport caused by under-developed road networks and poor rural economy coupled by the fact that motor-bike transport is more affordable to many rural people.

The National Agricultural Mechanization Strategy – MAMS (1995) and Strategy for Revitalizing Agriculture (2004-2014) identifies low levels of mechanization as one of the main causes of low
agricultural productivity in the country and further states that the three main causes of low utilization of mechanization to be:

- Inadequate mechanization extension services
- Inadequate access to mechanization technologies, and
- Lack of finance available to farmers.

In the Strategy for Revitalizing Agriculture (SRA), the following measures are stipulated:

- Accord the private sector incentives to set up mechanization centers to provide machinery and equipment hire services to both small and medium-scale farmers,
- Provide financial incentives to local institutions of technology; public and private institutions to research, design and develop appropriate technologies for different categories of farmers and farming systems
- Provide tax incentives to manufacturers to set up local assembly or manufacturing of machinery suitable for smallholder farming.

It is worth noting the Ministry of Agriculture has 23 Agricultural Machinery Service (AMS) stations spread all over the country, with a fleet of 40 operational earth moving equipment (in 2007). There was an intention to increase the fleet to 120 units and 150 farm tractors in subsequent years. This has happened haphazardly as the Government Tractor Hire Services Scheme that used to provide farmers with subsidized farm services collapsed.

AMS in Naro Moru provides services to farmers. They charge Ksh 1500 for Hallowing new old land and Ksh.2000 for Hollowing old land. The purpose of the AMS is generation of revenue for the MOA while at the same time regulating charges. The always charge less than market rates. The problem is that in the process of regulating prices they may distort markets and give a wrong picture to farmers on services provided commercially by other service providers.

At Mitungu, AMS is also providing various services to farmers at still subsidized rates. Because of the devolved system of governance in Kenya, there is still a confusion on the ownership of the AMS. Previously they would provide services to the surrounding districts but now their services may be limited to Meru county. The problem with such a decision is that the tractors and accessories would be idle after providing services to Meru farmers whereas they could be busy providing services to farmers in other counties giving the much needed revenue to the AMS.

Both Mitungu and Naro Moru AMS staff were of the view that 2WT could not work some of their county area due to stick soils but in both AMS staff agreed 2WT were a good option due to decreasing draught animal population and decreasing sizes of land.

In 2007, there was a Government plan to spend KSh. 1.5 billion over the following five years to revamp Agricultural Mechanization Services. Observations on the ground show that this did not
happen. Inevitably farm mechanization services have been scanty for the majority smallholder farmers and services have been left to the private sector hirers.

The other challenge is on the prices of the tractors. From 2003 the government zero rated the importation of agricultural machinery in Kenya. Imported agricultural machineries were not attracting VAT from the same time but from 2013 September all agricultural machineries attract a VAT of 16%. Again from 2013 September all machinery manufactures pay an import duty for all raw materials imported. The VAT has made it very expensive for farmers and service providers to buy tractors. During the interviews manufactures also complained that due to the import duty on raw material, locally manufactured equipments have become very expensive and thus not possible to compete with imported equipments that attract no import duties. Ndume Ltd. In Gilgil reported decreased business and the inability to compete with imported tractors and implement. They complained bitterly about the issue. VAT is also affecting tractor sales. Holman brother said tractors were cheaper before the introduction of VAT. Now they are more expensive for their customers who complain of the high prices.

2.2.1. Tractor importers and dealers

According to a FAO (2013) study, there is a growing demand for Agricultural equipments that offers opportunities for suppliers. Farmers create a demand for the usual range of equipment associated with traditional agricultural techniques – earth movers, tractors, ploughs, harrows, harvesters, planters and choppers. The small scale sector has a demand for the hired equipment, and this is fairly constant throughout the year as the wheat and maize crops are complementary (summer/ winter) crops

The increasing demand has led to emergence of various chain-actors including importers, service providers, manufacturers and repairers.

Some of the local manufacturers are Ndume Ltd, Jalbert Engineering and Kickstart. Of the three Ndume is the most important and they manufacture a range of Agricultural equipments on order bases. They keep no stock. The company has also diversified to service a wider clientele including airport baggage handling equipments. One of the reasons for diversification is that small- scale farmer has limited purchasing power
Jalbert is a registered Jua Kali self help group whose objective is to train local youths of repair and maintenance of equipment. The organization faces financial challenges in meeting this objective.
Kickstart formally known as Approtec is a not for profit organization that develops and markets low cost technologies in Africa. One of their successful equipments is the money marker treadle pump which is commercial manufactured by several manufacturers in Kenya.
The Agricultural Technology Development Center (RTDC) of the MOA, Nakuru has made some efforts to supply better equipments to small-scale farmers with the design and manufacture of a range of tools.

Retailers may import directly or may sell locally manufactured equipments. Both public and private sectors are involved in retailing. These include KFA (public) and FMD, Rift Valley Machinery, Holman Brothers, Hekima Engineering Works. The retailer equipment business is mainly concentrated in the private sector with public sector withdrawing. KFA imports machinery for the Agricultural sector through the ministry of Cooperative development. KFA services have declined because of financial bureaucracy and mismanagement.

**CAMCO Ltd**

This is a Chinese farm machinery company. They sell 2WT with other inputs over the counter. Not interested in leasing arrangements/ only cash payment because African market is risky. They do not give credit as the risks are too high. They would expect the project to buy the machines from CAMCO and distribute them to service providers.

They imported 35 units of 2WTs – Changchai 16hp + rotovator @ $2000. 20 units have been sold; 15 units left. The tractors were largely used by smallholders involved in vegetable and flower production and for gardening. In general it is difficult to sell more than 50 units as the demand is low.

Yang clarified that Dong Feng assembles is a machine assembling company. The engine is the Changchai. They have stocked spare parts which are basic (only 20-30 units)

Some other dealers are selling 2WTs. Flying Horse imported 60 units per year. Multi Tools is also an importer but of 7-8 hp JD tractors used for gardening/ green houses.

Their promotion strategy is largely through advertising and brochures. They plan to open branches in Nakuru and Kisumu. In the past they reached farmers through demonstrations but it did not work well. Advertising works better.

In general farmers prefer to buy 50-70 hp although the 2WTs are more suitable for farmers on 1-2 acres.

Figure 1: 2WT imported by CAMCO – they stopped imported due to low market demand
Nonman tractor and farm equipments

The company imports tractors from UK and Japan. The brand they import are Massey Ferguson, and Cherry. In 2013 they managed to sell 13 Units of tractor. They have never imported 2WT but they can if there was a market for them.

They have a credit arrangement where a trusted customer pays 50% of a customer price then pays the rest on installments. They keep the tractor until the customer completes all the payments. They also are able to sell 3 harrows in a year. They have many shellers that they are not able to sell.

Their promotional strategy is advertising in standard news paper. They make no financial arrangements on behalf of their customers. They have after sells services for farm tractors. They do not know of any government subsidy.

Car and General – Nairobi

Car and General have branches in the major towns in Kenya i.e. Nairobi, Nakuru, Mombasa and Kisumu.

They currently sell 2WT as weeders. In stock they have three Garunda 5hp each costing Ksh 150,000. Due to the low demand they appear to be disinterested. Could consider marketing 2WT with 4WT
Import Kubota 4WT – 23 hp retailing at Ksh 1.5 million = $17,647

They had experience in the past with Premier power tiller but found that there was a challenge with acceptance. They conducted demonstrations and tried to develop the market for over 2 years. The price of the machine that they imported was high Ksh. 400-450,000 ($4700). They worked with a different market segment – commercial farmers strategizing to reduce costs through 2WT. They stopped importing the tractors because they were tying in a lot of capital.

C&G have branches in a number of regions and are intending to establish workshops and stock spare parts in other regional centers. Car and General also have a workshop where they train private tractor operators. They are the regional training centre for CARMIS.

They currently sell 1600 units of motorbikes every year. They also stock Kubota tractors from Japan. In their strategy they sell 30% small equipments (Class B) and 60% Medium and Large equipments (Class M and L).

A number of partnership options were discussed:

1) C&G buying a number of units of tractors and equipment and leasing them out to service providers that the project would identify and support. A financial organization could be used to manage the financial repayment process. The project would be responsible for creating demand.

2) The project creating demand for machinery and accessories and give an order to C&G to procure the imports. Through an arrangement with C&G getting a financial institution to manage the lease/loan repayment.

3) Cost sharing scheme. Project buys 2 units at cost (with no margin attached). C&G buy 2 units and promote it through a gradual acquisition scheme.

4) Asset financing: C&G issues customer with a pro-forma invoice to the Family Bank for customers to procure the 2WT. C&G provides a preferential interest rate negotiated by them. Similarly the repayment period and down payment is negotiated. Family bank requires 20 percent equity. A loan is provided for up to 80% of the cost of the asset. The bank provides the loan to the customer who procures from C&G. The latter provides after sales services and spares.

The leasing model appears to be risky for the dealers. They had experience previously with Tuc Tuc buyers who failed to repay loans. In the case of leased assets this issue is what happens if the customer sells the asset? In-house financing may be difficult for the Board to approve.
Brazafriq

Brazafriq is a Kenyan based Brazilian company that imports and sells Planters, seed classifiers, sub-soilers, disc ploughs, harrow openers, disc harrow, forage harvesters, maize shellers, feed mixers, chaff cutters, chemical application equipments among other agricultural machinery. In brazil they buy their equipments from various companies. The consolidate and export the equipments. Because some companies are not allowed by law in brazil to export, they come in to fill the gap. Their strategy is to sell as many equipment lines as possible as a way of diversification and reducing risks associated with equipments. They have have not yet started 4WT and 2WT lines in Kenya but are willing to start in future but they already have accessories like planters. Their strategy for promotion is through newspaper adverts and participating in various show like ASK shows. In ASK shows they exhibit under the Ministry of Agriculture. They have sold equipment to KENDAT, EAGC, CIMMYT, EADPP and Farm Concern International among many other customers. Their customers can pay for their machines in instalments but the machine must remain in their hands until they are fully paid for. They provide one year warrant and after sales services to their customers but not for free. They also train operators. Their brands are Trapp, Vence tudo, Lavlae, JF maquinas etc

Massey Ferguson – Farm Mechanization Division (FMD) - Nakuru

FMD sells 4WT and implements like ploughs, sprayers and Rotovators. They do not sell 2WT. In a good year they sell between 250 and 300 units of 4WT. They said the problem with 2WTs is the size of the Engine, it is hard to maintain. They have branches in Nakuru, Eldoret, Arusha (Tz) and a dealer in Uganda. They sell their tractors in cash. Customers can make financial arrangements with banks on their own. They provide after sales services and warranty. For tractors the warranty is for one year while for implements it is for 6 months. They have after sales service providers based in Nakuru but after available on call. They promote their machinery through flyers, demonstrations, and advertising and through agricultural trade fairs. They also participate in National Ploughing Competition. Some of their customers include county governments like Bugoma, Kakamega and Taita Taveta. They have sells network all over the country. They import their tractors from Pakistan, India and Brazil. Quality tractors and machinery is their mail strategy.
Sametrack - Nakuru

Sametrack sells 4WT and equipments. In 2003 they sold 76 4WT units. They have distribution networks in Kisumu, Nairobi, Nakuru and Mombasa. They promote their equipment through walk ins, trade fairs. Their main sales period is January to April before the onset of rains. They never sell on credit to strangers but to trusted customers like vegepro and finlay they do. They had the view that 2WT are not good for ploughing and only can only be bought and used for small scale farms. According to the one of the challenges in equipment business from 2013 september was high VAT at 16%. This is passed to their customers hence reducing sales.

Holman Brothers

Raja was categorical that there was no opportunity for 2WT and therefore had no interest in them. 2WT is a good concept but will take 20 years for attitude of farmers to change. Farmers are lazy and are most likely to employ operators to do their farm work. 2WT work well when farmers operate them themselves.

Attitude of farmers – dependency. Mechanization is critical for agriculture to flourish. Agricultural land is disappearing because of fragmentation.

CA among smallholders will not work because the farmers will not stop livestock from going to the field after harvest and this leads to compaction. CA operations are better in Arid and Semi Arid Lands (ASALS).

Land size in Kenya is decreasing due to fragmentation; every member of a family believes they must inherit land from their farmers hence the decreasing land sizes.

They sell tractors between 50-160 hp. Most are 85 hp for farms in excess of 200 acres. Raja was also of the opinion that locally manufactures equipments are more expensive than imported ones because imported equipments do not attract import duty (upto September 2013) while materials do in Kenya.
John Deer – Nakuru

TATA are the franchise holders of John Deer tractors in East Africa. They sell about 170 units of 4WT tractors in a year. They do not stock 2WT. Their main sales period is between February to May and September to April every year. They give their customer after sales services for a year or 1500hrs whichever comes first. Their warranty is for one year. They also have field team for after sales service provision in Nakuru, Narok and Kitale. They also stock spare parts and have sub dealers in Kisumu and Narok. They promote their machinery through advertisements, participation in Ask shows. They work closely with financial institutions like CFC stanbic bank but they do not give credit themselves. CFC are flexible in loan repayment with their customers. It can be seasonally, biannually or annually. VAT is a challenge to them because they pass it to their customers, the equipments become very expensive to their customers. They also have a close working relationship with Kenya Bureau of standards in equipment and tractor standards. They have branches in Nakuru, Kisumu, Eldoret, Mombasa and Nairobi. They were of the view that Kenyan farmers are not interested in 2WT. Many farmers would rather buy small 4WT than 2WT.

Farm Mechanization Division of Massey Fergusson Franchise - Eldoret

Deal with larger tractors – 46-170 hp. and a range of equipment. They recognize the trend towards fragmentation but most smallholders with < 10 ac. are moving into higher value enterprises (horticulture/ dairying). Many farmers may be interested in smaller tractors to cultivate peas, potatoes, citrus, and sorghum. They provide good after sales services (spare, training in repairs and mechanics) and have 9 people in the field. They have small tractors of 22hp. Cost of Ksh 1.2 mill which is high.

Hardi has in the past stocked 2WT but they had a job selling. The main problem experienced is that the operations with 2WTs are tedious.

Small scale farmers from Kerio Valley, Kapsowar, Kaptumu and Nandi Hills call the office asking for 2WT. University of Eldoret used to sell 2WT way before it became a constituent college of Moi University when it was a technical school. The company sells around 300 units of 4WT in a year.

FMD were to import 2000 units of tractors for Tanzania government from China but were skeptical about the Chinese products.
FMD was of the opinion that group ownership of assets may work elsewhere but not in Eldoret where farmers could afford to buy assets like machines individually.

**CMC - Nakuru**

CMC sells tractors and implements including Hollows, disc ploughs, Chisel plough, Boom sprayers, Trailers, Mowers, threshers etc.

In 2013 they sold 300 units of 4WT. They do not sell 2WT. They project the sales to increase by between 10 and 15 tractor units in the years to come. Their fast moving products are tractors, disc ploughs and Hallows. They give one year warranty and after sales services. They transport tractors for free and in some cases provide insurance policy for tractors. They also stock spare parts. Warranty for spare parts is 3 months.

They advice customers on financial institutions and what they offer. They require a down payment of 30% of implement price. Most banks would finance the remaining 70%. Normally credit period with banks can be up to 60 months.

They have branches in Mombasa, Nakuru, Kisumu, Nanyuki, Eldoret, Kitale, Uganda and Tanzania. They also have stockists who buy machines from them at a discount. Such stockists are in Nyahururu and Embu.

The most bought tractors are of 75 horse power. Their brands are New Holland from Turkey. They also sell Ford tractors.

If an organization places an order they can import any machine.

**Mr. Kim – 2WT importer - Nakuru**

There has been experience with a businessman from Korea importing 2WTs but this initiative failed. The company imported 13 units of the Korean Didong make. The machines were expensive at $4 - 4,500. This came together with a wide package of accessories: trailer, pump, plough, rotovator. According to Mr. Kim the failure was due to lack of training in operations. The machines were used by rice and horticulture farmers mainly for transportation (60%) and ploughing (5%). Import taxes are high.

Lessons learnt- local assembly of parts, affordability, need govt. support (subsidies, extension etc.), training of operators and farmers.
Chepkoilel Workshop

The company is an importer, dealer, manufacturer and provider of mechanization services. The workshop fabricates seed drills and provides support in calibrating machines. The business employs 3 mechanics and 2 assistants to provide support services – repairs and maintenance.

The business consists of four units:
1. The workshop: manufacturing accessories and spare parts
2. Dealer: buying machinery
3. Mechanization services – ploughing, seeding, chiseling, spraying, wheat harvesting and transport
4. Farming – practicing conservation agriculture

The company owns 4WTs in the range of 55-80 hp. He divides farmers in the area as smallholders (1-50 acres) and medium scale farmers (50-100 acres) Most of his business is with farmers of between 5-100 acres (80%) cutting across both smallholder and medium scale farmers categories. 20 percent of his business is with smallholders of up to 5 acres but this is largely with farmers in dairying and horticulture. Among smallholder farmers with up to 5 acres, the 55hp tractor is hard to maneuver. His client pool consists of 250 farmers, 200 of which falls into the 5-100 acre category. There seems to be a rising demand from smallholders as the process of land fragmentation continues and this could provide an opportunity for small scale tractors. Division of land is given to both sons and daughters. There is a need to consolidate to farm efficiently but this will require agreement among family members.

There may be a high demand for shelling and threshing. Shellers are operated with 6hp engines but although this implies a lower cost they will need to purchase a motorbike in order to transport the sheller between farms.

The entrepreneur has imported second hand 4WT machines from auction markets in the UK. (Cheffins and Mitchums.) The engines for 2WT may be available in local markets raising the possibility of manufacturing the remaining machineries. In his experience if tractors are imported consideration should be given to ensuring that spare parts are also made available. He also sells tractors to other parts of the country including Kericho and Kilgoris and in one month he could sell 4-5 tractors. He has also in the past trained farmers in CA and machinery calibration.

It seems easier to work in the Eldoret and Nakuru areas where there is more potential for tractorization and its support services. Consideration should be given to flexibility of sites.


Hiring charges

1) Ploughing Ksh 2,500 – 3,000 per ac.
2) Drilling Ksh 1,500/ ac. (maize/ wheat)
3) Harrowing Ksh 1500/ac.
4) Threshing Ksh 50/ bag (exclusive of labour). Labour costs: 12 persons to thresh a bag @ Ksh 20/ bag (200 bags/ day)
5) Spraying Ksh 600/ ac.
6) Wheat harvesting Ksh 1,800/ ac.
7) Transportation Ksh 40/ threshed bag
8) Mowing and baling of grass Ksh8/ bail (100 bails)

Most money comes from harvesting of wheat. Minimum work rate is 20 ac./ day. Maximum of 40 acres/ day.

Figure 2 : A Mechanic at Work in Raymond’s workshop
2.3. Two Wheel Tractor Service Providers

2WT tractor service providers are not many especially in the project areas of Bugoma and Laikipia counties but 4WT services are available. In Bugoma, no 2WT providers started privately. ATDC in Bugoma has two, one donated by MOA and one provided by FACASI. Another group, Tuuti Community Development group have a tractor provided by ministry of planning. The Tuuti Community driven Centre model is a good example of a group service provider business model. They have a committee that manages the tractor service. At the moment the tractor is not working. This could be a model worth incorporating and studying in FACASI. Upgrading the model to make it function well would be of great interest though uphill task because decisions have to be made by the whole group. At the ATDC, services are provided by a young man, Eric who provides planting and transportation services. According to him, transportation using the 2WT tractor keeps him busier than other services. He is an excellent operator of the 2WT and given an opportunity he would buy his.

Figure 3: 2WT at ATDC Bugoma provided by FACASI

Many more farmers in Bugoma own and use draught animal for own farm ploughing and providing services to other farmers once they are through with their own farms.
At Laikipia, two brothers (Muriuki and Mwiti) provide services to other farmers using a 2WT provided by FACASI. According to them, the tractor can plant 8 acres of land in a day. In service provision, the two brothers said they can make money out of the 2WT. They are happy using the tractor though they said later in a telephone call that they prefer to upgrade to small 4WT or 75 Hp tractors to the 2WT tractor.

Table 1: Marginal Analysis of Mwiti’s Service Provision Business in a year (two seasons)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TOTAL ANNUM (Kes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Income</td>
<td></td>
</tr>
<tr>
<td>- Ripping – 40 acres</td>
<td>- 48,000</td>
</tr>
<tr>
<td>- Sub-soiling 15 acres</td>
<td>- 18000</td>
</tr>
<tr>
<td>- Planting 70 acres</td>
<td>- 105,000</td>
</tr>
<tr>
<td>- Spraying 20 acres</td>
<td>- 10000</td>
</tr>
<tr>
<td>- Transport</td>
<td>- 15000</td>
</tr>
<tr>
<td>Total 196,000</td>
<td></td>
</tr>
<tr>
<td>B. Variable costs</td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td></td>
</tr>
<tr>
<td>- Sub-soiling</td>
<td>30,800</td>
</tr>
<tr>
<td>- Planting</td>
<td>2310</td>
</tr>
<tr>
<td>- Spraying</td>
<td>5390</td>
</tr>
<tr>
<td>- Transportation</td>
<td>770</td>
</tr>
<tr>
<td>Labour</td>
<td>5500</td>
</tr>
<tr>
<td>Total variable costs</td>
<td>22,000</td>
</tr>
<tr>
<td>Total variable costs 74,000</td>
<td></td>
</tr>
<tr>
<td>C. Fixed Costs</td>
<td>71,500</td>
</tr>
<tr>
<td>D. Net Income (A-B-C)</td>
<td>49,730</td>
</tr>
</tbody>
</table>

Source: Mwiti’s assignment during a FACASI training at Nakuru in September 2014

His return on investment is 34%

NB: The table above is just indicative, Mwiti did not have written records and relied much on his memory.

A retired teacher, Mr. Moses Kirare accidentally bought a 2WT in Meru town in 2005 after retirement. He has just received his retirement benefits and he saw the three 2WT tractors at a small shop in Meru and decided to buy his to help transport maize flour to his customers from his small processing plant in Nanyuki. He stopped his milling business and currently he is using the
tractor to plant his 10 acre farm. He said the tractor is exclusively for his farm provides planting and transport services to other farmers once he is through with his own farm. He is not willing to upgrade and own another tractor because according to him, his tractor is not for business. His driver is so excited about the tractor and he long for the day he will own his. He talks so positively about the use of the tractor and its efficiency.

Figure 4: Moses’ 2WT bought in 2005

Another person who own a two wheel tractor in Laikipia is a Ministry of Agriculture Staff, a Mr. Samuel Mungai. He bought his tractor from a loan he got from his SACCO at Ksh.490,000. He provides services to other farmers. He thinks the 2WT is too expensive for small scale farmers. He is of the view that farmers should be assisted in buying the 2WT. He plants 2-5 acre in a day during planting season. In a good season he can plant 30 acres charging Ksh.1500 per acre.

2.4: Financial Institutions

There are many financial institutions in Kenya willing to lend money to the Agribusiness Sector. The table below identifies the some of the major financial institutions operating in Kenya.
Table 2: Financial Institutions in Kenya

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>ORGANISATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFIIs</td>
<td>IDB Capital Limited</td>
</tr>
<tr>
<td></td>
<td>Industrial and Commercial Development Corporation (ICDC)</td>
</tr>
<tr>
<td></td>
<td>Agricultural Finance Corporation</td>
</tr>
<tr>
<td></td>
<td>Kenya Industrial Estates</td>
</tr>
<tr>
<td>Regional Organizations</td>
<td>East African Development Bank (EADB)</td>
</tr>
<tr>
<td></td>
<td>African Development Bank</td>
</tr>
<tr>
<td></td>
<td>African Guarantee Fund</td>
</tr>
<tr>
<td></td>
<td>Eastern and Southern Development Bank (PTA Bank)</td>
</tr>
<tr>
<td></td>
<td>Africa Export Import Bank (Afreximbank)</td>
</tr>
<tr>
<td>Foreign &amp; Multi-lateral</td>
<td>Swiss Investment Funds for Emerging Countries</td>
</tr>
<tr>
<td>Organizations</td>
<td>International Fund for Development (IFU)</td>
</tr>
<tr>
<td></td>
<td>German Development Company (DEG)</td>
</tr>
<tr>
<td></td>
<td>International Fund for Agriculture Development (IFAD)</td>
</tr>
<tr>
<td></td>
<td>Norwegian Investment Company (IFAD)</td>
</tr>
<tr>
<td></td>
<td>International Finance Corporation (IFC)</td>
</tr>
<tr>
<td></td>
<td>Alliance for a Green Revolution in Africa (AGRA)</td>
</tr>
<tr>
<td>Private Equity &amp; Venture</td>
<td>Business Partners International</td>
</tr>
<tr>
<td>Capital Organizations</td>
<td>TBL Mirror Fund</td>
</tr>
<tr>
<td></td>
<td>InReturn Venture Capital</td>
</tr>
<tr>
<td></td>
<td>African Agricultural Capital</td>
</tr>
<tr>
<td></td>
<td>Transcendury</td>
</tr>
<tr>
<td></td>
<td>Centum</td>
</tr>
<tr>
<td></td>
<td>Fanisi Capital</td>
</tr>
<tr>
<td></td>
<td>Kibo Fund</td>
</tr>
<tr>
<td></td>
<td>Grofin Kenya</td>
</tr>
<tr>
<td></td>
<td>Fusion Capital Limited</td>
</tr>
<tr>
<td></td>
<td>MYC4</td>
</tr>
<tr>
<td>Commercial Banks</td>
<td>Equity Bank</td>
</tr>
<tr>
<td></td>
<td>Kenya Commercial Bank</td>
</tr>
<tr>
<td></td>
<td>Cooperative Bank</td>
</tr>
<tr>
<td></td>
<td>Family Bank</td>
</tr>
<tr>
<td>Micro-finance Institutions</td>
<td>Micro and Small Enterprise Trust (MESPT)</td>
</tr>
<tr>
<td></td>
<td>Technoserve</td>
</tr>
<tr>
<td></td>
<td>Faulu Deposit Taking Microfinance</td>
</tr>
<tr>
<td></td>
<td>Youth Enterprise Development Fund</td>
</tr>
</tbody>
</table>
Of these institutions, Commercials Banks and informal lending organizations like table banking are the most used by SMEs in Kenya.

Chart 1: Usage of different financial services

(Source: FDS, 2006)
One of the institutions interviewed was Equity Bank.

Equity Bank

*Julius Kiluk at Eldoret Branch*

Equity bank does asset financing including Agricultural machinery loans. They require customers to contribute 30% equity as deposit while the bank gives a loan for rest of 70%. Their interest rates are at 9.5% flat rate. They can give Loans for a maximum of 5 years. Under this
scheme the ownership is joint until the client pays back the loan. The terms, however, are flexible and in some cases of credit worthiness 10 percent equity could be provided.

Esther Mururi – General Manager- Agribusiness at Head Office

Esther supported Julius’s view and explained that preference is given to individual service providers. She was however critical of farmer groups and group management. According to Esther group owned assets lead to breaking of groups when members are not able to pay for the assets or mismanage their operations. They provide finance for all value chain stakeholders – dealers, manufacturers, stockists, and distributors. They look at the cash flow and ability to repay as the most important criteria for lending. One’s ability to pay for a loan is very important to the bank. Group support by credible organization is a factor the bank considers before issuing a loan to a group. She said there was need for the government and NGO’s to focus on creating awareness of 2WT. They have also had experience with warehouse receipts system. This has been operating since 2008.

Esther said the bank is open to new and innovative financial products in financing agribusiness. was however keen to point out that before they settled on their current financial products they had tried many other that failed. She explained the bank was interested in dealing with service providers directly not third parties so as to assess the risks involved in a financial

2.5. Historical context

According to data available from Kenya Revenue Authority (KRA), 4WT tractor sales in Kenya have risen very slowly since 1961 when only 6,422 units were operational. This figure rose very slowly to reach 12,844 units in 2002. The figure is estimated to have risen above 18,000 units by the year 2012. With an estimated 3.5 million hectares of crop land, this gives a ratio of one tractor per 195 hectares.
Table 3: Importation of 4WT in Kenya from 2009 – 2012

<table>
<thead>
<tr>
<th>YEAR</th>
<th>UNITS</th>
<th>VALUE (CIF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1432</td>
<td>1,802,995,881</td>
</tr>
<tr>
<td>2010</td>
<td>1,174</td>
<td>1,799,083,305</td>
</tr>
<tr>
<td>2011</td>
<td>1,411</td>
<td>2,862,946,995</td>
</tr>
<tr>
<td>2012</td>
<td>1,587</td>
<td>3,418,561,481</td>
</tr>
</tbody>
</table>

Source: Author with data collected from Kenya Revenue Authority

Table 4: Importation of 2WT in Kenya from 2009 – 2012

<table>
<thead>
<tr>
<th>YEAR</th>
<th>UNITS</th>
<th>VALUE (CIF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>66</td>
<td>5,736,527</td>
</tr>
<tr>
<td>2010</td>
<td>106</td>
<td>12,121,891</td>
</tr>
<tr>
<td>2011</td>
<td>272</td>
<td>11,803,522</td>
</tr>
<tr>
<td>2012</td>
<td>68</td>
<td>6,865,310</td>
</tr>
</tbody>
</table>

Source: Author with data collected from Kenya Revenue Authority

In the last five years, 4WT imports fluctuated between 1,000 and 1,500 new units per year. In 2009, a total of 1,432 tractor units were imported valued at KSh. 1,802,995,881 (CIF). In the same period only 66 units of 2WT were imported valued at KSh. 5,736,527. In 2010, 1,174 4WT units were imported at a CIF value of KSh. 1,799,083,305 compared to 106 units of 2WT valued at KSh. 12,121,891. In 2011, the number of 4WT imported rose to 1,411 units imported at CIF value of KSh. 2,862,946,995. The number of 2WT imports also increased to 272 at a CIF value of KSh. 11,803,522. In 2012, the number of 4WT imported continued to rise reaching 1,587 units at CIF value of KSh. 3,418,561,481. In the same period, the number of 2WT units imported seems to have declined to only 68 units whose CIF value was a mere KSh. 6,865,310.

It is possible that not all tractors that land in the country are in the agricultural sector, some going to civil works and other industrial operations.

Most of the 2WT imported are used by flower farms to transport flower from green houses to the pack houses.
2.6. Services provided

There are various providers of machinery hire services. The AMS of the MOA of is well established in the country and there have been concerted efforts by the government of Kenya to upgrade all the 23 AMS centers with the acquisition of new machinery. AMS services had concentrated on earth moving (e.g. Dam construction) and combine harvesting. Recently the government has acquired from its own resources 50 tractors to offer tradition services of soil tillage (ploughing and hallowing). Through a grant from the Italian government the G.O.K. has received 60 more tractors through ADC to offer the same services.

Large-scale farmers also offer farm machinery services to small-scale farmers. Farming Systems Kenya, a not for profit organization based in Nakuru also offer limited services to small-scale farmers.

Several actors offer farm machinery repair services. Some large scale farms have their own workshops for repairing their tractors and equipment while offering minimal repair services to their neighbors at a fee. All manufactures and retailers offer warranties on the equipment they make and sell. They also offer repair and maintenance services outside the warranty period.

Jalbert Engineering in Laikipia train local people on repair and maintenance of equipments. RTDC in Nakuru also offer artisan short courses to artisans.

While most large scale farms have their own workshops for repair and maintenance of their farm machinery, small-scale farmers rely on artisans (jua kali sector) for repair and maintenance of their equipments.

The farming community is characterized by many small-scale farmers with limited purchasing power. This makes it difficult for them to acquire farm mechanization services offered by other service providers.

It can be concluded that 2WT are popular with transport. It is unlikely they are being used for water pumping here, where petrol and diesel pumps are popular for irrigation. Maize shelling is gaining prominence in Laikipia and other parts of Mt Kenya region. Small petrol engines and motorcycle power sources are gaining popularity in this regard. Jua kali sector is taking on maize sheller production by storm, at least in Laikipia, many of them without winnowing capacity.
In Bugoma especially the Kiminini region shellers powered by tractors were seen by the roadside waiting for customers.

2.7 Summary of Business Models Identified

**Individual service providers (Laikipia, Bungoma)**

In Bugoma, as discussed above, Eric Mulungu hires a 2WT from ATDC to provide services to other farmers. The current tractor he is using was bought by FACASI through KENDAT and given to the ATDC. Eric pays a small fee to the ATDC for every job done.

In Laikipia, two brothers provide service to other farmers using both animal draft power and 2WT. The 2WT was provided to them again by FACASI through KENDAT. The tractor currently is used for seeding and ploughing. This model is a FACASI led trial model.

**Farmer group – service provider (Bungoma)**

The Tuuti Community driven Centre model is a good example of a group service provider business model. The 2WT was provided by a Ministry of Planning programme. They have a committee that manages the tractor service. At the moment the tractor is not working. This could be a model worth incorporating and studying in FACASI. Upgrading the model to make it function well would be of great interest though uphill task because decisions have to be made by the whole group.

**Dealer/ manufacturer/ service provider (Eldoret)**

This model discussed above owned by Raymond Ng’eno is of great interest though at the moment he does not provide 2WT services. Because of his experience and contacts it would be worthwhile to work with him to establish demand for 2WT in Eldoret County. Raymond is convinced farmers in Eldoret will buy 2WT if shown how to use them. For the success and better impact of FACASI, it is important to include Eldoret and Nakuru counties in the project area. This is because these are farmers already experienced with 4WT and produce maize for business not subsistence like most farmers in Bugoma.
BDS provider (Eldoret)

Phillip a Lecturer at the University of Eldoret leads this model. Though he provides 4WT tractor services, he is a trainer and consultant being an Agricultural Economist. He is ready to provide his services whenever needed by the project.

Public sector models
To develop demand for 2WT, the public sector and NGO’s needs to play a great part. This is because the private sector is not taking the lead and will only come in to supply once the demand has been created and may participate in expanding their market shares then. Moreover, they may be reluctant to invest in a new 2WT line as this is perceived as lower status. However, the draft livestock service providers may see the move into 2WT as an upgrading.
Chapter 3: Dynamics of the market for specific technologies

In the high maize and wheat production regions both small scale farmers are used to mechanized agriculture. The use of 4WT is nothing new to them. Shellers and threshers in these regions have been used for a long time but planters and rippers are seemingly a new technology to many farmers in these regions and the whole of the country in general. Below is a detailed analysis of tractors and their accessories

3.1. Four Wheel Tractors (4WT)

Most of the 4WT operating in the country are concentrated in the large commercial farms, both Government and private. They fall under the sugarcane, rice, wheat/barley, tea and maize crop enterprises. Farmlands where the colonial white settler chose quality farm base in the Rift Valley and around Mt Kenya and Aberdares are the typical mechanized farming zones. They are the same localities where the more recent horticultural farming has found base in the areas of Naivasha/Nakuru, Narok, uasin Gishu and Laikipia.

It is in these areas that one would find most actors. In most cases importers also act as dealers. The agricultural machinery sector is dominated by private sector. In 2007, there was a Government plan to spend KSh. 1.5 billion over the following five years to revamp Agricultural Mechanization Services. Observations on the ground show that this did not happen. Inevitably farm mechanization services have been scanty for the majority smallholder farmers and services have been left to the private sector hirers.

The agricultural machinery market is by far dominated by the private sector. Kenya has well established companies known for their dealership (sales and services) in agricultural equipment (Farm Engineering Industries Ltd, (Claas, Bell) MFD (Massey Fergusson), Hughes Ltd (Ford), John Deere, CarGen (Kubota), Holman Brothers, among others). Others such as Ndume and a number of medium scale companies situated in the industrial areas are involved in the manufacturer as well as importation of ancillary equipment such as ploughs, harrows, planters and sprayers, mills, silage processors etc. Other machines are such as combine harvesters, cane handling and haulage trailers etc. State run institutions such as AMS are service providers and do not conduct direct machinery sales.

All the dealers and actors in Kenya provide warranty of at least one year or 1500 hrs of machine use and after sales services for one year.
There are many service providers using 4WT providing ploughing, shelling and threshing services.
In the case of 4WT, the relationship between the buyer and seller continues long after the sale especially in the provision of spare parts and repair services. In such cases good terms of sell can also be arranged by the seller if one comes to buy a second tractor e.g. the John Deer in Nakuru would easily trust a customer with whom they have a long term business relationship to the point of allowing one or two installments.

A typical importing company will tend to do the entire import, service and spare part supplies business. There is local assembly of knocked down kits of tractors and ancillary equipment. Equipment may be modified to fit the job but there are no main-stream manufacturers of tractors in the country. Some ancillary equipment (mowers, planters, plough parts, subsoilers, cultivators and harrows, grain milling, block making etc.) are manufactured locally (see www.NdumeKenya.com)

3.2. Two Wheel Tractors (2WT)

The market for 2WT in Kenya is not well developed. From available figures from the Kenya Revenue Authority the country imported the highest number of 2WT in 2011 i.e. 272 units. From field study, most of these tractors are used in the Horticultural Industry to transport flowers from farms to pack-houses. Most of importers do a one off importation and when they realize the demand is very low they stop importing them to avoid tying in their capital in the tractors.

2WT opportunities exist in Kenya due to decreasing farm land sizes meaning small-scale farming is on the increase. Services in demand are in transportation of farm produce, shelling, threshing, water lifting and milling. They may not be suitable for ploughing because of soil types and land topographies in some areas and also many farmers are unwilling to change from 4WT to 2WT because of status that comes with using 4WT.

One of the greatest challenges of 2WT promotion in Kenya is due to passed failure of uptake when the Ministry of Agriculture tried to introduce them in the 1990’s. Again many of private sector actors are unwilling to invest in creating demand adopting a wait and see situation. If somehow demand is created by NGO’s or the government, they are willing to receive orders to supply 2WT tractors

3.3. Accessories

Plough
The main tractor service apart from transport provision is Ploughing in Kenya. This is mainly done using 4WT. The most common type of plough for tractors is the disc plough. Most of these are imported. But with the introduction of C.A one local manufacturer (Ndume) stopped manufacturing disc plough because they understand the long term effects to soils. The other common plough in Kenya is the animal drawn mouldbound plough. These are mainly used by small scale farmers and SME service providers. Some service providers would have more than one pair of draught animal and several ploughs to make a kill during rainy seasons.

**Rippers**

With the introduction of CA in Kenya, some local manufacturers like Lotec are now manufacturing Rippers though their market is not well developed. There is a great potential for the growth of the market as more and more farmers adapt CA as a way of farming.

**Seeders,**

Most seeders in Kenya are used together with 4WT. The service for ploughing are charged separately. In average most service providers charge Ksh. 1500 for planting per acre while ploughing per acres is charged at Ksh. 2000. The most preferred seeders are the Fiterreri make

**Sheller and Thresher**

Kenyan farmers especially in the maize growing regions of Uasin Gishu, Transnzoia, Bugoma and Laikipia counties have been using maize shellers for a long time. They are either powered by 4WT or movable engines. Service providers mover from farmer to farmer providing the services. Some of these threshers and shellers are transported on motorbikes or on trainers attached to four 4WT. Engines on motorbikes provide one of the biggest competition to the introduction of 2WT to provide shelling an threshing services.
3.4. Market organization/ competitor identification

Most of the 4WT operating in the country are concentrated in the large commercial farms, both Government and private. They fall under the sugarcane, rice, wheat/barley, tea and maize crop enterprises. Farmlands where the colonial white settler chose quality farm base in the Rift Valley and around Mt Kenya and Aberdares are the typical mechanized farming zones. They are the same localities where the more recent horticultural farming has found base in the areas of Naivasha/Nakuru, Narok, uasin Gishu and Laikipia.

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In the case of 4WT, the relationship between the buyer and seller continues long after the sale especially in the provision of spare parts and repair services. In such cases good terms of sell can also be arranged by the seller if one comes to buy a second tractor e.g. the John Deer in Nakuru would easily trust a customer with whom they have a long term business relationship to the point of allowing one or two installments.

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3.5. Mapping of the 2WT machinery supply chain

Typically the supply chain of 2WT would follow the same chain as that of 4WT. Importer would sell tractors directly to both large scale farmer and small-holders (2WT). The large scale farmers provide services to themselves and small-scale farmers. Rarely would a small-scale farmer own a 4WT. Small-scale ownership of 2WT in Kenya is mainly led by NGO’s and government support projects. This was observed in Laikipia and Bugoma where services providers are using tractors provided by FACASI through KENDAT and a government support programme in Tuuti CDC in Bugoma.

Figure 5: Farm power and machinery supply for Laikipia and Nakuru, Kenya

In the above figure FAO had identified dealers instead of branches, this study indentified branches (owned by Mother Company) in all the cases. FAO also observed weak relationship between dealers and Hardwares stores. This study observed strong relationship between the

Modified from (FAO, 2009)
two. This study also did not see any relationship between importers and small-scale farmers unlike in the case of FAO.

Figure 6: Current 2WT Supply chain in Kenya

(source: field observations)

Figure 7: Supply chain for farm machinery hire service providers in Laikipia and Nakuru, Kenya
Chapter 4: Mechanization Services

The agricultural machinery market in Kenya is relatively small despite the importance of machinery for a country that needs to intensify agricultural production. Companies compete heavily for the few large-scale farmers and hirers. There is also a small market for used 4WT imported from Europe. It is common for tractor hire service providers to move from one region to another say after land preparation season they move to areas with ongoing post harvest activities like harvesting, shelling and threshing of maize or wheat.

It was observed during the interviews that service providers had moved from Uasin Gishu county to Narok county to provide wheat harvesting services. Long rains have started and tractors as far as Nyahururu in Central Kenya were seen in Kitui county in the Lower Eastern Province.

Figure 8: Tractors from Central Kenya packed after a busy day at Kabati - Kitui County
Chapter 5. Constraints and opportunities

SWOT analysis

Compared to Asia and other parts of the world including the rest of Africa (South Africa, Egypt, Morocco etc.) farm machinery is relatively non-existent. The market potential is huge but hire services need to drive the way. This is because in the journeys from subsistence to commercial agriculture smallholders are unlikely to be expected to own machines (2WT). It is likely that FACASI will make advances in Kenya and Tanzania (Ethiopia and Zimbabwe) that will see export market grow for dealers from these countries to neighbouring ones.

Table 5: SWOT analysis

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<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
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<tr>
<td>• Strong private sector already importing WT</td>
<td>Over reliance of rain fed agriculture in Kenya reducing the periods of use</td>
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<td>• Political support on importation of new agricultural technologies both</td>
<td>of tractors</td>
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<td>from National and County governments</td>
<td>Few spare parts dealers and distributors. A dealer in Nakuru (Farm Parts</td>
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<tr>
<td>• Existing market for end maize in Kenya</td>
<td>Ltd) sells his parts as far as Kilifi, Nyahururu and Laikipia</td>
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<tr>
<td>• Organized maize marketing out organizations like NCPB</td>
<td>Few tractor operators in the country. only a few know how to operate a</td>
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<td>• Courier services providers with networks all over the country willing</td>
<td>2WT</td>
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<td>to deliver spare parts at a fee</td>
<td>Lack of innovative financial products for acquisition of tractors. Most</td>
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<td>•</td>
<td>Financial Institutions in Kenya like Equity Bank, Cooperative Bank of</td>
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<td></td>
<td>Kenya and Kenya Commercial Bank only have an Asset Finacing Product.</td>
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<td>Buyers are given loans to buy tractors at prevailing interest rates.</td>
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<td>These averaged 18 – 25% and the buyer has to raise at least 30% of buying</td>
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<td>price before they are fiancés. Products like Asset leasing are not</td>
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<td>available from any institution interviewed.</td>
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OPPORTUNITIES | THREATS
Key 2WT services are such as:
- Water pumping
- Shelling/threshing
- Transport on and off-farm if traffic regulations will allow 2WT on high roads.
- Milling of feeds, animal feeds and other materials
- Direct Seeding
- Many other operations tapping power through a belt drive.

The cost of farm machinery especially is way above what most Kenyans can afford. In average, a 75 HP tractor retails for Ksh 1.5 M and that of a 2WT with its accessories amounts to Ksh. 500,000 (Trailler, rotovator and planter (Chinese model). A Brazilian planter retails for more than Ksh400,000.

Operational costs are also too high. The cost of fuel has been increasing for many years.

Lack of National policy on Mechanization. According to the MAO, a draft policy has will soon be presented to Kenyan parliament for debate and approval.

Private sector unwilling to invest in creating demand for farm mechanization especially the 2WT. They are waiting for somehow the market to grow before they can start importing 2WT.

Difficult topography in the high areas where mechanization would potentially pay, has been another major obstacle to accelerated mechanization.
Chapter 6. Possible interventions

As observed in this report, farm mechanization adoption in Kenya is still very low more than 50% after independence. The country’s population of forty one million people needs to be fed. Currently more than ten million people are food insecure and this number is increasing. To feed the people farm mechanization should rapidly increase. Some of the possible interventions are:

- Educating farmers in all counties on the importance of use of using advanced technologies in farms like use of tractors. This should go hand in hand on training on financial benefits that come with using machines
- The government should provide financial incentives to importers and local manufacturers. Such incentives would include continuing exempting farm machinery from custom duties and reducing or exempting farm machinery from paying VAT
- To encourage local manufacturing, the government should exempt raw materials especially steel from custom duties and reduce or exempt them from paying VAT
- Middle level colleges and polytechnics should introduce courses short on tractor operation and maintenance
- Private sector dealers and importers should be encouraged to participate in demand creation. This could work as a Public Private Partnership where importers would give their one or two 2WT to MOA and other willing partners as a contribution in creating demand
- There is need also for a stakeholders forum where different actors would air their views on traction in the country, these would include farmers, importers, service providers, senior government officials etc. At the end of the forum clear map on the way forward should be drawn
- Financial institutions should be engaged to think outside the box in financing farm machinery. They should come up with new innovative financial products like the current financial arrangements in road construction where contractors are guaranteed by the government when applying for loans for road construction. In this case the contractors pay their loans back after being paid for the work done by the government.
- To reach more service providers, the project area should be expanded to other counties surrounding Laikipia and Bugoma like Eldoret, Nakuru, Meru and Nyeri. Especially Eldoret where individual farmers have enough incomes to purchase 2WT for their own use and pride services to few of their neighbour
Chapter 7: Conclusions

From this study it can be concluded that for Kenyan Agriculture to be taken to the next level mechanization will be a key driver. Many small-scale farmers are still not using tractors either because the tractors are un-available or the few available tractors cannot serve all farmers on time because Kenyan Agriculture is rain dependant. A lot needs to be done in creating awareness among farmers on the use of tractors and introducing affordable business models for providing services to farmers.

The 2WT tractor market is not well developed in Kenya. This study concludes that there is a potential for the market to grow. In high production areas like Eldoret where farmers are assured of high harvests, individual farmers are likely to buy the tractor because they can afford it and the payback period is less. In such areas, only small scale farmers owning upto less than 50 acres of cultivation land are likely to buy 2WT. Large scale farmers who have more than 50 acres of land have their own 4WT and are likely not to buy 2WT.

The project envisions use of 2WT in planting in CA practices. This is a brilliant idea because 2WT in Kenya might not be suitable for ploughing. Because many farmers have not used them, the best way to introduce them is to train farmers and other actors on the various uses of a 2WT like shelling, threshing, water lifting and transport.

The ideal use of 2WT is in own farms where individual farmers own a tractor for their own use. Such farmers are likely to provide services to few other farmers after they have finished planting in their own farms. The constraints here is affordability of a tractor to individual farmers.

Another possibility is group ownership of a 2WT or several. In such a case, the best way to manage the tractor is to employ an operator to manage the tractor on behalf of other farmers. In that model, the operator would provide services to group members and is unlikely to provide services to non members. After planting seasons, the tractor could provide other services like transport and maize shelling.

The best model for service provision would be of that of small and medium enterprises providing owning 2WT tractors exclusively for service provision. This model is preferred because the operator can service as many farmers as possible within a season. In such a model, it would work best if the SME could own several tractors for service provision.
On access to financial services, most financial institutions are willing to lend money to SMEs. What they need is to have a business plan clearly showing their business ideas are viable and in the case of existing businesses, the owner must prove the profitability of their business during evaluation.

To introduce 2WT, NGOs and Government involvement will be important. Many county government are willing to support their farmers in food production and this could be an opportunity to explore. The county Governments needs to work closely with the central government so that they get the right advice on the way forward on mechanization. Hire of experts to study their machinery needs would be good idea to save the governments from buying accessories which could work against the basic principles of good agricultural practices like CA. Urgently needed is a paradigm shift from conventional land preparation methods to minimum soil disturbance, soil cover and crop rotation to conserve soil moisture, health and soil biological components.
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Annex 1- Interviews with various stakeholders

FARM MECHANIZATION AND CONSERVATION AGRICULTURE FOR SUSTAINABLE INTENSIFICATION

SECTOR INTERVIEWS

Introduction
These interviews were conducted between mid 11th of June to 24th of July 2014. The purpose of the interviews was to gauge the overall country situation in 2WT tractors. To identify who the actors are and how they conduct their business. Various actors including importers, dealers, service providers, government ministries and agencies were interviewed. It was observed that the market for 2WT in Kenya is not well developed. The Importers/dealers who imported them stopped after it took long to sell, most of the buyers were in floriculture industry for transporting flowers from field to pack-houses. The few services providers interviewed were mainly providing services using draft animals and 4WT. The existing 2WT service providers were either supported by FACASI through KENDAT to own the tractors and government programmes. Private sector involvement in the 2WT business is limited. Most private sector actors especially dealers are ready to import the tractors but on condition that there is an existing market already. They are not willing to create the market themselves after previous experiences where the 2WT held a lot of their capital for a long time.

IMPORTERS/ DEALERS

CAMCO

Person met: Ernest Kakuli – 0720 827220
CAMCO is a Chinese company that imports and sells various machinery including agricultural. They also imported 30 2WT with Rotovators but it took them long to sell them because of low demand. So far they have managed to sell 20 Units. They sold most of them to flowers
companies for transporting flowers from the field to pack-houses. They stopped importing more unless demand for 2WTs is created.

In 2013 they sold 10 units of 2WT, they project to sell 5 units in 2014 and 7 units in 2015. The company has branches in other African countries including Zambia, Malawi, Djibouti and plans to open more branches in Kenya including at Mombasa, Kisumu and Nakuru.

The main sales period are planting seasons for all farm implements i.e. March to May and September to December.

CAMCO offers after sales services and warranty to its customers for all machinery. They also stock spare parts for all machinery.

Their promotional strategy includes demonstrations and advertising in local newspapers. They also participate in ASK shows in Kitale and Embu.

On financing, a customer can pay for an equipment on instalments while the equipment remains in their hands, the customer picks it once they have completed the payment.

They also work closely with financial institutions like Equity Bank where they can recommend their customers. Due to the risks involved in African Market, they do not guarantee or extend any financial arrangements with customers or with banks on behalf of their customers.

They reported that Kenya Industrial estate (KIE) a government body under the ministry of industrialization brought farmers on a tour to see the kind of machineries they have.

They know of no government subsidy in existence supporting farmers. They expressed willingness to participate in future round table meetings.

Second Interview at Camco Equipment (Kenya) Ltd – Nairobi

Person Met: Yang Pengyu - MD

This is a Chinese farm machinery company. They sell 2WT with other inputs over the counter. Not interested in leasing arrangements/ only cash payment because African market is risky. They do not give credit as the risks are too high. They would expect the project to buy the machines from CAMCO and distribute them to service providers.

They imported 35 units of 2WTs – Changchai 16hp + rotovator @ $2000. 20 units have been sold; 15 units left. The tractors were largely used by smallholders involved in vegetable and flower production and for gardening. In general it is difficult to sell more than 50 units as the demand is low.

Yang clarified that Dong Feng assembles is a machine assembling company. The engine is the Changchai. They have stocked spare parts which are basic (only 20-30 units)

Some other dealers are selling 2WTs. Flying Horse imported 60 units per year. Multi Tools is also an importer but of 7-8 hp JD tractors used for gardening/ green houses.
Their promotion strategy is largely through advertising and brochures. They plan to open branches in Nakuru and Kisumu. In the past they reached farmers through demonstrations but it did not work well. Advertising works better.

In general farmers prefer to buy 50-70 hp although the 2WTs are more suitable for farmers on 1-2 acres.

NONMAN TRACTOR AND FARM EQUIPMENTS

Contact Person: Cosmas Wambua Kaloki - 0723389952
The company imports tractors from UK and Japan. The brand they import are Massey Ferguson, and Cherry. In 2013 they managed to sell 13 Units of tractor. They have never imported 2WT but they can if there was a market for them.
They have a credit arrangement where a trusted customer pays 50% of a customer price then pays the rest on instalments. They keep the tractor until the customer completes all the payments. They also are able to sell 3 hallowers in a year. They have many shellers that they are not able to sell.
Their promotional strategy is advertising in standard news paper. They make no financial arrangements on behalf of their customers. They have after sells services for farm tractors. They do not know of any government subsidy.

. Car and General – Nairobi

Persons met: Joseph Nganga and Mr. Chesone

Car and General have branches in the major towns in Kenya i.e. Nairobi, Nakuru, Mombasa and Kisumu.
They currently sell 2WT as weeders. In stock they have three Garunda 5hp each costing Ksh 150,000. Due to the low demand they appear to be disinterested
Could consider marketing 2WT with 4WT
Import Kubota 4WT – 23 hp retailing at Ksh 1.5 million = $17,647

They had experience in the past with Premier power tiller but found that there was a challenge with acceptance. They conducted demonstrations and tried to develop the market for over 2 years. The price of the machine that they imported was high Ksh. 400-450,000 ($4700). They worked with a different market segment – commercial farmers strategizing to reduce costs through 2WT.They stopped importing the tractors because they were tying in a lot of capital
C&G have branches in a number of regions and are intending to establish workshops and stock spare parts in other regional centers. Car and General also have a workshop where they train private tractor operators. They are the regional training centre for CARMIS. They currently sell 1600 units of motorbikes every year. They also stock Kubota tractors from Japan. In their strategy they sell 30% small equipments (Class B) and 60% Medium and Large equipments (Class M and L).

Joseph is keen to visit the project sites in Laikipia after 1st of August 2014.

A number of partnership options were discussed:

1) C&G buying a number of units of tractors and equipment and leasing them out to service providers that the project would identify and support. A financial organization could be used to manage the financial repayment process. The project would be responsible for creating demand.

2) The project creating demand for machinery and accessories and give an order to C&G to procure the imports. Through an arrangement with C&G getting a financial institution to manage the lease/loan repayment.

3) Cost sharing scheme. Project buys 2 units at cost (with no margin attached). C&G buy 2 units and promote it through a gradual acquisitions scheme.

4) Asset financing: C&G issues customer with a pro-forma invoice to the Family Bank for customers to procure the 2WT. C&G provides a preferential interest rate negotiated by them. Similarly the repayment period and down payment is negotiated. Family bank requires 20 percent equity. A loan is provided for up to 80% of the cost of the asset. The bank provides the loan to the customer who procures from C&G. The latter provides after sales services and spares.

The leasing model appears to be risky for the dealers. They had experience previously with Tuc Tuc buyers who failed to repay loans. In the case of leased assets this issue is what happens if the customer sells the asset? In-house financing may be difficult for the Board to approve.

**BRAZAFRIQ**

Contact Person: 0720 653696

Brazafriq is a Kenyan based Brazilian company that imports and sells Planters, seed classifiers, sub-soilers, disc ploughs, harrow openers, disc harrow, forage harvesters, maize shellers, feed mixers, chaff cutters, chemical application equipments among other agricultural machinery.
In Brazil they buy their equipments from various companies. The consolidate and export the equipments. Because some companies are not allowed by law in Brazil to export, they come in to fill the gap. 
Their strategy is to sell as many equipment lines as possible as a way of diversification and reducing risks associated with equipments. 
They have have not yet started 4WT and 2WT lines in Kenya but are willing to start in future but they already have accessories like planters. 
Their strategy for promotion is through news paper adverts and participating in various show like ASK shows. In ASK shows they exhibit under the Ministry of Agriculture. 
They have sold equipment to KENDAT, EAGC, CIMMYT, EADPP and Farm Concern International among many other customers. 
Their customers can pay for their machines in instalments but the machine must remain in their hands until they are fully paid for. 
They provide one year warrant and after sales services to their customers but not for free. They also train operators 
Their brands are Trapp, Vence tudo, Lavlale, JF maquinas etc

**MASSEY FERGUSON – Farm Mechanization Division (FMD) - Nakuru**

Contact: Paul Korum – 0705175100 and Mike Montet- 0727054579
Contact Person: Zadock Khayumbi 
FMD sells 4WT and implements like ploughs, sprayers and Rotovators. They do not sell 2WT. 
In a good year they sell between 250 and 300 units of 4WT. 
They said the problem with 2WTs is the size of the Engine, it is hard to maintain. They have branches in Nakuru, Eldoret, Arusha (Tz) and a dealer in Uganda. 
They sell their tractors in cash. Customers can make financial arrangements with banks on their own. They provide after sales services and warranty. For tractors the warranty is for one year while for implements it is for 6 months. They have after sales service providers based in Nakuru but after available on call. 
They promote their machinery through flyers, demonstrations, and advertising and through agricultural trade fairs. They also participate in National Ploughing Competition.  
Some of their customers include county governments like Bugoma, Kakamega and Taita Taveta. They have sells network all over the country. 
They import their tractors from Pakistan, India and Brazil. Quality tractors and machinery is their mail strategy.

**SAMETRACK - Nakuru**

Sametrack sells 4WT and equipments. In 2003 they sold 76 4WT units. They have distribution networks in Kisumu, Nairobi, Nakuru and Mombasa.
They promote their equipment through walk ins, trade fairs. Their main sales period is January to April before the onset of rains. They never sell on credit to strangers but to trusted customers like vegepro and finlay they do. They had the view that 2WT are not good for ploughing and only can only be bought and used for small scale farms. According to the one of the challenges in equipment business from 2013 september was high VAT at 16%. This is passed to their customers hence reducing sales.

**Holman Brothers**

Hollman Brothers – Nakuru

Person met: Raja Hollman

Raja was categorical that there was no opportunity for 2WT and therefore had no interest in them. 2WT is a good concept but will take 20 years for attitude of farmers to change. Farmers are lazy and are most likely to employ operators to do their farm work. 2WT work well when farmers operate them themselves.

Attitude of farmers – dependency. Mechanization is critical for agriculture to flourish. Agricultural land is disappearing because of fragmentation.

CA among smallholders will not work because the farmers will not stop livestock from going to the field after harvest and this leads to compaction. CA operations are better in Arid and Semi Arid Lands (ASALS). Land size in Kenya is decreasing due to fragmentation; every member of a family believes they must inherit land from their farmers hence the decreasing land sizes.

The sell tractors between 50-160 hp. Most are 85 hp for farms in excess of 200 acres. Raja was also of the opinion that locally manufactures equipments are more expensive than imported ones because imported equipments do not attract import duty (upto September 2013) while materials do in Kenya.

**John Deer – Nakuru**

TATA are the franchise holders of John Deer tractors in East Africa. They sell about 170 units of 4WT tractors in a year. They do not stock 2WT. Their main sales period is between February to May and September to April every year. They give their customer after sales services for a
year or 1500hrs whichever comes first. Their warranty is for one year. They also have field team for after sales service provision in Nakuru, Narok and Kitale. They also stock spare parts and have sub dealers in Kisumu and Narok. They promote their machinery through advertisements, participation in Ask shows. They work closely with financial institutions like CFC stanbic bank but they do not give credit themselves. CFC are flexible in loan repayment with their customers. It can be seasonally, Biannually or annually.

VAT is a challenge to them because they pass it to their customers, the equipments become very expensive to their customers. They also have a close working relationship with Kenya Bureau of standards in equipment and tractor standards. They have branches in Nakuru, Kisumu, Eldoret, Mombasa and Nairobi. They were of the view that Kenyan farmers are not interested in 2WT. Many farmers would rather buy small 4WT than 2WT.

Farm Mechanization Division of Massey Fergusson Franchise - Eldoret

Met with: Phillip Cheruiyot and Albert Limo

Deal with larger tractors – 46-170 hp. And a range of equipment. They recognize the trend towards fragmentation but most smallholders with < 10 ac. are moving into higher value enterprises (horticulture/ dairying). Many farmers may be interested in smaller tractors to cultivate peas, potatoes, citrus, sorghum. They provide good after sales services (spare, training in repairs and mechanics) and have 9 people in the field. They have small tractors of 22hp. Cost of Ksh 1.2 mill which is high.

Phillip reported that Hardi has in the past stocked 2WT but they had a job selling. The main problem experienced is that the operations with 2WTs are tedious.

Small scale farmers from Kerio Valley, Kapsowar, Kaptumu and Nandi Hills call the office asking for 2WT. University of Eldoret used to sell 2WT way before it became a constituent college of Moi University when it was a technical school.

Mr. Vadmir Shchukin of Holistic Living Farm uses 2WT in his farm. His contacts are 0722 32 87 60. The company sells around 300 units of 4WT in a year.

FMD were to import 2000 units of tractors for Tanzania government from China but were skeptical about the chine products.
Phillip was also of the opinion that group ownership of assets may work elsewhere but not in Eldoret where farmers could afford to buy assets like machines individually.

CMC - Nakuru

Contact person – Joseph Ng’ang’a
CMC sells tractors and implements including Hollows, disc ploughs, Chisel plough, Boom sprayers, Trailers, Mowers, threshers etc.
In 2013 they sold 300 units of 4WT. They do not sell 2WT. They project the sales to increase by between 10 and 15 tractor units in the years to come. Their fast moving products are tractors, disc ploughs and Hallows. They give one year warranty and after sales services. They transport tractors for free and in some cases provide insurance policy for tractors. They also stock spare parts. Warranty for spare parts is 3 months.
They advice customers on financial institutions and what they offer. They require a down payment of 30% of implement price. Most banks would finance the remaining 70%. Normally credit period with banks can be upto 60 months.
They have branches in Mombasa, Nakuru, Kisumu, Nanyuki, Eldoret, Kitale, Uganda and Tanzania. They also have stockist who buy machines from them at a discount. Such stockists are in Nyahururu and Embu.
The most bought tractors are of 75 horse power. Their brands are New Holland from Turkey. They also sell Ford.
If an organization places an order they can import any machine.

Mr. Kim – 2WT importer - Nakuru

There has been experience with a businessman from Korea importing 2WTs but this initiative failed. The company imported 13 units of the Korean Didong make. The machines were expensive at $4 - 4,500. This came together with a wide package of accessories: trailer, pump, plough, rotovator. According to Mr. Kim the failure was due to lack of training in operations. The machines were used by rice and horticulture farmers mainly for transportation (60%) and ploughing (5%). Import taxes are high.

Lessons learnt- local assembly of parts, affordability, need govt. support (subsidies, extension etc.), training of operators and farmers.
MANUFACTURES

Ndume – Gilgil

Contact person: Mr. Brandon and Chris Outram – 020- 2186668/9
Ndume are the largest manufacturers of equipments in the country. Their posho mills have been in Kenya for a long time. Farm implements they manufacture include Disc hallows, cultivators, trailers, seeders, ditch hallows. They are very sensitive to soil health and conservation agriculture therefore they do not manufacture disc ploughs because they create hard pans in soils.
They sell about 300 posho mills, 30 disc hallows and 30 chisel ploughs in a year. The prototype are self designed. Their mail season for high sells is between January and April. They employ about 80 people. They prefer on job training for their employees. To retain staff they maintain a very good working relationship with all employees. They do not have distribution networks and only manufacture on order, therefore they do not stock equipments. They even get orders from CMC and FMD.
They do not provide repair services apart for their own equipments. They give their customers a one year warranty.
They plough back their profits into the business therefore they avoid bank loans because of the high cost of credit in Kenya.
They are currently not manufacturing 2WT but would be a good chain partner in manufacture of accessories.

Second Interview at Ndume manufacturers

Met with Chris – phone 020 – 2186668/9 or 2186671/62

They manufacture equipment and machinery on order. 2WT and seed meters imported from China; planter, sprayer, trailer manufactured locally. Cost of sprayer/ planter (combined) Ksh 420,000. Could work with input suppliers.

Morrison (ripper and planter). This is expensive but the best bet. Just need to reduce the price. Could get the Chinese to copy it and reduce the cost to around $500.

They have just manufactured a 4WT with a Dong Feng 16 hp engine mounted. Estimated cost – Ksh 500,000 = $5,882. More stable than the 2WT. 2wt too small for field operations. Need to calculate the work rates of the machines.
Farmers prefer 4WT because of status. They are interested in manufacturing a maize harvester. Government policy is crazy. Agricultural machinery imports are imported duty free and VAT free. But if machinery is manufactured locally they have to pay duty (the prices of imported steel i.e duty is passed on to the customer) and VAT.

According to them the market for field equipment is not economically viable. The Chinese imports from China are often of poor quality. Chinese trailers break easily. Chang Chai is better than Dong Feng.

SPs are unlikely to promote CA rippers. Their interest will be to maximize profits and they can charge more for ploughing and this is a better income earner.

No need for boom spray for smallholders. Knapsacks are sufficient.

Not interested in having field agents- too expensive

HARDI KENYA LTD

Contact person: Robinson Ngano Walter – 020-2384212/4/6

They are manufacturers of spraying equipments like hand sprayers, motor back sprayers, trolley sprayers, tractor maounted sprayers, central sprayer system installation and special equipments for orchards.

They sell about 700 units of various equipments in a year. They train new users operation, calibration and equipment service at a fee. Their classes usually are for 20 people. In future they plan to stary a spray academy.

They distribute their equipments through curriers like G4s. They provide warranty and after sales services. They provide their staff training on job. They are members of FKE, ASK. Normally they assemble their equipments in Kenya though they manufacture some equipment parts in Kenya.

Their main sales period is April to May and September to October though they are able to sell throughout the year for irrigated agriculture.

Their main competitors are some Agri-Input shops who stock sprayer that are not manufactured by Hardi like Oshow Chemicals. According to them sprayers from other companies are not durable.
They have 40 workers who they train mainly on job. They are regulated by KEBS. They do not have branches. Customers buy directly from them.

Hardi is an international company with branches all over the world like South Africa and USA.

GOVERNMENT INSTITUTIONS

Ministry of Agriculture - Laikipia
Contacts: Anne Kimaita - County Agriculture Director – 0725 210 160
      : Njagi – Divisional Agriculture Officer – Central Division

The country has about 80,000 farmers most of whom belong to various common Interest Groups. Most farmers produce Maize, Wheat, Tomatoes, beans, potatoes and many other Horticultural crops. They also keep animals for milk. The average size of land per farmer is between 3 and 5 acres.

Large scale farmers own 4WT and also provide services to other farmers. Draft animals are also used a lot by farmers and service providers. The officer did not know of anyone using 2WT in the country. AMS also provide services to farmers but there is none in Laikipia country. The nearest is in Naromoru. In Laikipia West the government bought driers for farmers but they have not been in use for three years now. The government also bought three seeders and jar planters that are being used by farmers. The ministry is not promoting any particular agricultural machinery.

CA has been taken well by large scale farmers in the country. Some farmers buy tractors from Meru town while other import them from abroad themselves. After ploughing season in Laikipia service providers move their tractors to Ngarua for wheat harvesting.

They have two main ploughing seasons depending on crops.

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Land preparation and rainy seasons in Laikipia

AMS services at subsidized charges. Private service providers plough at Ksh 5000 for new land per acre, old land at Ksh 3000 per acre. AMS charge Ksh 2000 per acre for old land. AMS also provides wheat harvesting services. Most service providers provide ploughing, shelling and harvesting services.

Many county government buying tractors for service provision but the problem is that they are consulting county Agricultural Ministries.

Ministry of Agriculture – Nakuru
Contact persons: Wilson Ng’eno – 0724593960 – County Agricultural Engineer
Mr. Fredrick Owino 0710 467 777 – cdanakuru@gmail.com

The predominant crops in the country are pyrethrum, potatoes, coffee, tea, wheat, maize, sorghum, cassava, sweet potatoes, beans and horticultural crops.

In the country 2WT are used by flower farms to transport flowers from farms to pack-houses especially in Naivasha region.

Power services are mainly provided using 4WT and draft animals. Agricultural machinery use in the country is promoted through field days, demonstrations and ASKS shows and other trade fairs including ploughing competitions organized by Egerton University.

AMS in the county also provides subsidized services to farmers. The services are mainly ploughing, harvesting and......The rates depend on the grade of machinery used. For D6 they charge Ksh 320 per hour, D4 Ksh 1960 per hour or Ksh 3000 per acre. There are 23 AMS in the country situated in different counties.

There are many other service providers in the county but they are not documented. They provide ploughing, wheat harvesting, threshing and spraying services.

Farm activities are not fully mechanized in the county because of small parcels of land due to land sub-division. Some farmers also cannot afford mechanization services. The average land size is 2.5 acres per small scale-farmer.

**Ministry of Agriculture Kitale**

The persons met were:

1. Prof. Ben Wafula Wanjala: The County Chief Officer for Agriculture (Minister)
2. Eng. Joseph Kipyakwai
3. County Director of Agriculture

**Highlights**

Eng. Joseph Kipyakwai

- 2WT tractors good for on farm transportation
- Were promoted by the MOA in the eighties but project failed
- Project failed because 2WT came without spare parts
- The purpose of traction is to reduce power drudgery which 2WT do not provide because they are hard to use
- Motorcycle industry grew because the government relaxed on rules for using them
- Now very dangerous on road they have been nick named ‘TVS’ – Tuue Vijana Sana (Swahili for let us kill young men’ because of reckless riding
- C.A reduces cost of production
- 2WT good for sloppy terrains where 4WT cannot operate
- Promotion of technologies through government institutions like ATC and ADC not a good idea because not feedback is ever received
- Technologies promoted through users always succeed like Biogas promoted through KENFAP a farmers organization has received good adoption
Main machine dealers are Central Farmers, CMC and West Field Motors. None of the stocks 2WT.

Prof Wanjala
- 2WT introduced in the 80’S had high fuel consumption
- Farmers do not know how to use them
- 2WT have a chance in Transnzoia because of decreasing land sizes
- Promotion of CA excellent to mitigate climate change

ATDC BUGOMA
Met Tom Agwa
- The main planting seasons in the region are March to June for maize and August to September for Beans, ground nut and Maize
- Trial Maize at ATC destroyed by cows belonging to the institution
- Tom willing to participate in TOT training in Business Management – Financial management and Marketing
- Training of CA and Use of 2WT to already trained officers not necessary
- FACASI should separate CA/ Equipments training from Business Management training, the two can run concurrently in the same venue, same period
- Willing to train service providers after TOT
- Tom and team should draw a budget for planting in September

KARI – KAKAMENGA
Met Rosaline
- KARI team should draw a budget for taking data in the field to be planted in Mabaga from September

Rosaline will not be available for TOT training because

Annex 2 Interview report 2

Meeting with Kendat
Present: Dr. David Kahan, Dr. Joseph Mutua and John Mung’oo

The intention of the meeting was to take stock on the work that Kendat has been doing up to now and to review the work of the Agribusiness Development Officer – who has been deployed since the 1st June. It was learned that Kendat has deployed 4 2WT units with accessories to the two project sites. All of the tractor imports were Dong Feng, imported from China:

Table 1: - Equipments distributed in Bugoma and Laikipia

<table>
<thead>
<tr>
<th>Bungoma</th>
<th>Lakipia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 2WT units</td>
<td>2 2WT units</td>
</tr>
<tr>
<td>5 seeders</td>
<td>6 seeders</td>
</tr>
<tr>
<td>Indian National Agro</td>
<td>Indian National Agro</td>
</tr>
<tr>
<td>Chinese 2 BFG (strip till)</td>
<td>Chinese 2 BFG (strip till)</td>
</tr>
<tr>
<td>Morrison seeder</td>
<td>Morrison seeder</td>
</tr>
<tr>
<td>Fiterrelli (single row)</td>
<td>Fiterrelli (single row)</td>
</tr>
<tr>
<td>Fiterrelli (double row)</td>
<td>Fiterrelli (double row)</td>
</tr>
<tr>
<td></td>
<td>+ African Gongli</td>
</tr>
</tbody>
</table>

Kendat believes that there is at present no ‘best bet’ with the exception of the sheller/thresher. They need more time to test the seeder.

Table 2: Cost and work rates of the machines

<table>
<thead>
<tr>
<th>Company</th>
<th>Item</th>
<th>Price (Ksh)</th>
<th>Price (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAMCO</td>
<td>Dong Feng 16 hp 2WT including disc plough, furrower and rotovator</td>
<td>185,000</td>
<td>2,200</td>
</tr>
<tr>
<td>CAMCO</td>
<td>Trailer</td>
<td>100,000</td>
<td>1,176</td>
</tr>
<tr>
<td>-</td>
<td>Ripper</td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>Local Made</td>
<td>Seeder Gongli</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sheller/thresher/chopper</td>
<td></td>
<td>1,176</td>
</tr>
<tr>
<td></td>
<td>Sprayer (boom mounted on the machine)</td>
<td></td>
<td>1,500</td>
</tr>
</tbody>
</table>
NB: If no need for a rotovator could reduce the cost of the package.

According to Kendat the 2WT is not suitable for ploughing but of course can rip. Rotovator can be used for CA for strip tillage. Harrowing can be done with a rotovator by not pulling a harrow.

Preliminary results from KENDAT shows the best performing seeders are the Fiterelli (2 row) – cost $4,120; Morrison (1 row) - $2,826

KENDAT has distributed their machines in Laikipia to operators who are expected to create a demand. They provided a package of two 2WT + 6 seeders + 1 trailer=1 sprayer. These were given to two trained service providers. In Laikipia there are two 2WT and 2 Fiterelli seeders. In Kenya most of the 2WT are used for transportation within the flower industry.

In Bungoma there are some operators (2) with 2WTs provided by Agricultural Technology Development Center (ATDC), a center owned by the Ministry of Agriculture in Kenya (1) and Kendat (1). By the time of the meeting Dr. Mutua and John had interviewed eleven actors in the tractor industry including dealers, MOA, service providers and a manufacturer.

The 2WT were given to the service providers without any formal agreement on how they would pay for the machines. KENDAT was advised to consider leasing out the machines to service providers.

KENDAT reported that Cereal Growers Associations conducts agricultural machinery trade fairs every month where dealers pay to participate. KENDAT was advised to consider doing this for 2WTs and charging the private sector to participate as a way of creating awareness hence enhancing demand.

Meetings with dealers

Financial institutions

Equity Bank

Persons met: Julius Kiluk – Relationship officer – SME – Eldoret
Esther Muiruri – General Manager Marketing - Agribusiness
Julius Kiluk

Equity bank does asset financing including Agricultural machinery loans. They require customers to contribute 30% equity as deposit while the bank gives a loan for rest of 70%. Their interest rates are at 9.5% flat rate. They can give Loans for a maximum of 5 years. Under this scheme the ownership is joint until the client pays back the loan. The terms, however, are flexible and in some cases of credit worthiness 10 percent equity could be provided.

Esther Mururi

Esther supported Julius’s view and explained that preference is given to individual service providers. She was however critical of farmer groups and group management. According to Esther group owned assets lead to breaking of groups when members are not able to pay for the assets or mismanage their operations. They provide finance for all value chain stakeholders – dealers, manufacturers, stockists, and distributors. They look at the cash flow and ability to repay as the most important criteria for lending. One’s ability to pay for a loan is very important to the bank. Group support by credible organization is a factor the bank considers before issuing a loan to a group. She said there was need for the government and NGO’s to focus on creating awareness of 2WT. They have also had experience with warehouse receipts system. This has been operating since 2008.

Esther said the bank is open to new and innovative financial products in financing agribusiness. She was however keen to point out that before they settled on their current financial products they had tried many other that failed. She explained the bank was interested in dealing with service providers directly not third parties so as to assess the risks involved in a financial deal.

Dealers can’t sell on credit – by law as they will not be protected.

Meetings with service providers in Nakuru, Eldoret, Bungoma

Meeting with Tom Agwa – Manager- Agricultural Technology Development Center (ATDC) Mabaga, Bugoma

During the discussions it was observed that Bungoma County grows maize/legumes while Laikipia grows maize/wheat/legumes/potatoes. The 2WT could be used for other crops: threshing legumes, ridging and harvesting potatoes, water lifting.
Can’t sell a partial package that only consists of a trailer/sheller/thresher as it may not be competitive with the smaller engines that can be bought locally. Need only 6 hp to shell and thresh. Need to focus on the comprehensive package but this will require that the seeder becomes a best bet.

**Note:**
Fiterelli can rip and sow at the same time.
Morrison – ripper and planter (Ripper costs Ksh 5,000)

**Maize**

90 percent of farmers sell to National Cereals Board. They buy maize at a price set by government. But payment takes time even a whole season. Private buyers offer lower prices but they pay immediately. Milling might be okay for some farmers who may want to go into the business. Brokers usually sell to millers.

<table>
<thead>
<tr>
<th>Milled maize – Ksh 130 / 2 kg milled maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>After shelling – Ksh 60 / 2 kg.</td>
</tr>
<tr>
<td>Green maize Ksh 15 / unit (4 units = 1 kg.)</td>
</tr>
<tr>
<td>Green maize is more profitable as there is no cost of shelling but the demand is lower than milled maize.</td>
</tr>
<tr>
<td>A bag of maize is 90 kg</td>
</tr>
</tbody>
</table>

**Bugoma Site**

FACASI has 7 demonstration sites in the area. The cropping pattern is maize/legume intercrop and sweet potatoes, sugar cane. Over 90% of the maize crop is sold to private brokers at harvest because they don’t have the volume and additionally, farmers have cash flow problems as they have household expenditures e.g. paying school fees. They then buy maize later in the season once they have the cash. Average farm holding size is 1.5 acres. Yields of maize are low – 10 bags per acre. Most farmers are semi subsistence. Maize has no real commercial value in the area. Beans are also sold locally and sweet potato is used for family consumption. The yield of beans is also low 2-3 bags/ ac. (1 bag = 90 kg). The GM of maize is consequently low. Green maize is more profitable than dry maize. The CA adoption rate in the area is low, it can well be adopted by farmers growing high value crops.
Ploughing – farmers hire animal draft services. Charges – Ksh 1500/ ac. (draft); 4WT 2500-3000/ ac.

Planting – get other farmers to help out as casual labour. 10 persons per ac. @ Ksh 200/ ac. + food (Ksh 100)
The 4WT is large for their plots. Also the demand for services is high at planting time and often there is insufficient supply.

Weeding – carried out with family labour

Meeting with Service Providers (draft animals)

All the service providers were also farmers of various crops and livestock. They provide services to other farmers as a way of supplementing their other incomes. Their main income source, however, is from farming. These farmers have mixed cropping systems maize/ legumes, sugar cane, bananas, nursery/ dairy/ poultry + draft animals. Farm size varies from 2-10 acres. But even the service providers may be better off. One service provider has a repairs workshop and makes Ksh 1200/ day. The service providers have to have enough land to grow fodder for feed. Other smallholders may decide to put all their land in sugar cane – rather than some for fodder. All farmers have some sugar cane. In fact 60 percent of their income may come from sugar. There is a government requirement that at least 20% of their land is for food crop production. The main problem of the smallholders is cash flow.

Monthly revenue from 2 draft animals could be Ksh 5,000. Hiring is around 20 percent of their income.

Some service providers are making good money. One service provider of 2WT (Eric Wekesa Mulungu) all others are animal draft service providers. Draft animals are only used for 4 months of the year and then they have expenses of feeding the animals over the remaining period. Working with oxen for ploughing is tedious. Service provision for draft cannot really be a full time occupation owing to the seasonality of operations as well as the risk that it is too much work for the animals. As such it is only a supplementary source of income. Currently demand outstrips supply.

The service providers are seriously considering moving into 2WT. Why are they interested in 2WT? - Tractors could reduce the costs of production; increase the area under cultivation (plough large area in short time), no need for grazing, they foresee multiple benefits, transport/ seeding less labour.

Eric Wekesa Mulungu - 2WT service provider.
Agricultural Technology Dev. Centre (ATDC) hired out their equipment to the SP – a model farmer. A differential charge system was set with different hiring charges for different operations. Uses: transport of maize, bricks, sugar cane; ploughing, mowing.

Charge rates:

Transport – Ksh 500/ trip
Ploughing – Ksh 1,500/ acre. as introductory price. Now the price has increased to 2000/ acre
The problem with 2WT are that it has no steering and it is not easy to operate, one needs to know how to operate it for ploughing. The machine’s fuel consumption is low at 5 litres to till 3.5 acres. For own labour, Labour average charges are Ksh 150 per day.

How did he develop demand?

Took machine and applied it to his land. Other farmers showed an interest and this developed demand locally. Pricing strategy was to charge less than the 4WT rate to capture demand and then to increase the rate slightly to provide a good profit margin.

Customers:

20 farmers per season; 2 seasons = 40 farmers

He will have to earn 7,000 per month to repay a loan of 285,000 for 4 years @ 17% interest. From transportation alone he should be able to make 2,500/ mth (50 trips per mth x 500) He thinks that there’s a good market for shelling and threshing. With 2WT he could access most farms better than with 4WT because of the state of the feeder roads. As a result there could be a greater demand for shelling/ threshing.

Meeting Tuuti Community Driven Committee

The group received a 2WT from West Kenya Special Programme which is a Ministry of Planning programme established 1.5 years ago. Covers 276 house holds in the group. Government gave the group a walking tractor for rice transportation. Chinese make + trailer, furrower, rotovator. Established a 5 person committee to manage the machine. Members pay cash and hire a service. They have 3 trained drivers. Group fund is now at Ksh 23,500. The machine has been used for 76 hh. For transportation the market rate is Ksh 500 per trip (from farm plot to homestead). However, they face numerous challenges. Difficulty to get spare parts, the roads are rough and the tractor doesn’t work well on the roads, lack of skills in servicing, shortage of mechanics. Most farmers would like to use the machine for ploughing but they do not have the
equipment. They requested the government office to provide a plough. Problem of management/ownership of the common asset.

It appeared that the machine had not been used for a long time. The group was advised to consider leasing the machine to a service provider preferably one of their members that way the machine will be put into better use and will be maintained well.

The 2WT used by Tuuti CDC

Meeting with Eli Mukusu - individual farmer.

Eli is a small scale farmer with 2.5 acres of land in which he has grown Bananas, Maize, Potatoes and Napier grass. He does not own draft animals. He prefers to hire services from other farmers. In part of his farm he is practicing CA.

Asked if he could take a loan to buy a 2WT, he said, could only take it if the repayment installments were Ksh 3,000 per month. But the repayment of the loan package at 18 percent IR is 7,800 per month.
The company is an importer, dealer, manufacturer and provider of mechanization services. The workshop fabricates seed drills and provides support in calibrating machines. The business employs 3 mechanics and 2 assistants to provide support services – repairs and maintenance.

The business consists of four units:
1. The workshop: manufacturing accessories and spare parts
2. Dealer: buying machinery
3. Mechanization services – ploughing, seeding, chiseling, spraying, wheat harvesting and transport
4. Farming – practicing conservation agriculture

The company owns 4WTs in the range of 55-80 hp. He divides farmers in the area as smallholders (1-50 acres) and medium scale farmers (50-100 acres) Most of his business is with farmers of between 5-100 acres (80%) cutting across both smallholder and medium scale farmers categories. 20 percent of his business is with smallholders of up to 5 acres but this is largely with farmers in dairying and horticulture. Among smallholder farmers with up to 5 acres, the 55hp tractor is hard to maneuver. His client pool consists of 250 farmers, 200 of which falls into the 5-100 acre category. There seems to be a rising demand from smallholders as the process of land fragmentation continues and this could provide an opportunity for small scale tractors. Division of land is given to both sons and daughters. There is a need to consolidate to farm efficiently but this will require agreement among family members.
There may be a high demand for shelling and threshing. Shellers are operated with 6hp engines but although this implies a lower cost they will need to purchase a motorbike in order to transport the sheller between farms.

The entrepreneur has imported second hand 4WT machines from auction markets in the UK. (Cheffins and Mitchums.) The engines for 2WT may be available in local markets raising the possibility of manufacturing the remaining machineries. In his experience if tractors are imported consideration should be given to ensuring that spare parts are also made available. He also sells tractors to other parts of the country including Kericho and Kilgoris and in one month he could sell 4-5 tractors. He has also in the past trained farmers in CA and machinery calibration.

It seems easier to work in the Eldoret and Nakuru areas where there is more potential for tractorization and its support services. Consideration should be given to flexibility of sites.

**Hiring charges**

1) Ploughing Ksh 2,500 – 3,000 per ac.
2) Drilling Ksh 1,500/ ac. (maize/ wheat)
3) Harrowing Ksh 1500/ac.
4) Threshing Ksh 50/ bag (exclusive of labour). Labour costs: 12 persons to thresh a bag @ Ksh 20/ bag (200 bags/ day)
5) Spraying Ksh 600/ ac.
6) Wheat harvesting Ksh 1,800/ ac.
7) Transportation Ksh 40/ threshed bag
8) Mowing and baling of grass Ksh8/ bail (100 bails)

Most money comes from harvesting of wheat. Minimum work rate is 20 ac./ day. Maximum of 40 acres/ day.

Springfield Enterprises

Met: Dr.Phillip Chemwok – an Agricultural Economist teaching at the University of Eldoret

He is an entrepreneurial business service provider involved in providing mechanization hiring services and business management training and consultancy. He has two 4WT tractors (65-90HP) with accessories – ploughs, harrow, seed drills, combines and a team of 6 operators. He works in the Eldoret area but could extend to Bungoma (questionable). Is a strong supporter of CA but farmers need more training first. Farmers need to recognize the importance of conserving moisture before they are exposed to no tillage. Need to be more pragmatic and not expect farmers to adopt the whole CA package of technologies immediately. The immediate impact is
cost reduction (only one tillage operation instead of six). Second benefit after 6 years is productivity increases. Finally this would be expressed in terms of income. He is now incorporating CA rippers as part of his service support. Most of his customers are small and medium scale farmers < 100 acres. He has 100 smallholder customers of between 0-50 ha. And < 10 medium scale farmers (50-100 acres). The main demand is from land preparation, harvesting and planting.

2WT would be a new market but he would be willing to take the risks. He suggested that the 2WT package is shown at the Eldoret Agribusiness Trade Fare organized by the university on the 25th – 27th September. They are expecting 50-60,000 farmers attending.

However, according to him Agricultural Society of Kenya shows are not attractive for service providers like himself they are less commercial. However it might be relevant for farmer SPs. He provides business management support but largely to larger farmers (charges SH 5,000/ hr.). Only works with smallholders if NGOs or donors pay for the support. They could provide training in machinery management.

He is convinced that in the Eldoret area individual farmers could afford to buy 2WT. In Bungoma there is a problem of Donor Dependence Syndrome (DDS) and farmers may not buy 2WT unless they are supported by donors.

Advantages of groups

1) Easier to afford to buy a machine – could come from savings and membership fees
2) Could afford to repair and maintain
3) Could market final produce as a group and get higher prices
But should aim at leasing the machine to an entrepreneurial service provider, the disadvantage with group asset owned model is that poor management of resources and services.

Business models
Dealer, branches (C&G)

Met with: Joseph Ng’ang’a.

Car and General Imported 30 2WT and managed to sell them, howbeit it took long time to sell them, the product was not fast moving so they stopped stocking them. Mr. Joseph Ng’anga when
interviewed said the tractors tied in a lot of capital and was not keen to import more however the company will actively observe the achievements of FACASI before they can import the tractors. He will join the project team in August to visit the project site in Laikipia. Just like CAMCO, the market has to somehow be developed before they go back in to the business.

The company is willing to cost share two tractors with FACASI if the project bought two tractors at cost price.

C & G would have been a good business model in 2WT if they did not stop stocking them. An opportunity exists in upgrading from the demand side (service providers) to be linked to them on order bases because they have previous experience.

A follow up will be done to establish whether they can buy other brands of 2WT tractors apart from Kubota if market existed.

6.2: Individual service providers (Laikipia, Bungoma)

In Bugoma, as discussed above, Eric Mulungu hires a 2WT from ATDC to provide services to other farmers. The current tractor he is using was bought by FACASI through KENDAT and given to the ATDC. Eric pay a small fee to the ATDC for every job done.

In Laikipia, two brothers provide service to other farmers using both animal draft power and 2WT. The 2WT was provided to the again by FACASI through KENDAT. The tractor currently is used for seeding and ploughing. This model is a FACASI led trial model.

Farmer group – service provider (Bungoma)

The Tuuti Community driven Centre model is a good example of a group service provider business model. The 2WT was provided by a Ministry of Planning programme. They have a committee that manages the tractor service. At the moment the tractor is not working. This could be a model worth incorporating and studying in FACASI. Upgrading the model to make it function well would be of great interest though uphill task because decisions have to be made by the whole group.

Dealer/ manufacturer/ service provider (Eldoret)

This model discussed above owned by Raymond Ng’eno is of great interest though at the moment he does not provide 2WT services. Because of his experience and contacts it would be worthwhile to work with him to establish demand for 2WT in Eldoret County. Raymond is convinced farmers in Eldoret will buy 2WT if shown how to use them. For the success and better impact of FACASI, it is important to include
Eldoret and Nakuru counties in the project area. This is because these are farmers already experienced with 4WT and produce maize for business not subsistence like most farmers in Bugoma.

BDS provider (Eldoret)

Phillip a Lecture at the University of Eldoret leads this model. Though he provides 4WT tractor services, he is a trainer and consultant being an Agricultural Economist. He is ready to provide his services whenever needed by the project.

Public sector models

To develop demand for 2WT, the public sector and NGO’s needs to play a great part. This is because the private sector is not taking the lead and will only come in to supply once the demand has been created and may participate in expanding their market shares then.

Observations:

From the interviews with various dealers in Kenya, it can be concluded that the market for 2WT is not well developed. Just like in many other products, in Kenya market of tractors is driven by the demand side. Farmers and service providers walk in show rooms to buy 4WT whenever they need them. The best dealers are well known to them through previous purchases and word of mouth from other buyers. Dealers invest little resources in Marketing. Most of the dealers participate in Agricultural trade fairs organized by other organizations like the Agricultural Society of Kenya, University of Eldoret’s Agribusiness trade fair and Cereal Association of Kenya trade fairs.

To develop the market for 2WT tractors NGO’s and Public sector should be actively be involved in training and demonstrating their use to both farmers and service providers. The easiest entry point would be in transport, threshing and shelling.

Currently on 2WT the only BM working at field level are public sector led - Eric at Bugoma and the two brothers in Laikipia. Only one more in Laikipia is private led.
The whole country has imported about 276 2WT and most of them are used for transport in the floriculture industry. The project areas have almost no 2WT in use apart from those provided by the government and FACASI trials.

From the field discussions, 2WT introduction would fit well first in post production operations, for they are more attractive than field operations

Introducing 2WT concurrently with CA is an additional challenge because these are two new technologies not well known to the Kenyan farmers

Farmers in Kenya would consider small 4WT easily than 2WT. Larger 4WT services are more popular

Financial Institutions in Kenya have come of age and are ready to finance Agribusiness. Their financial products are well suited agribusiness including flexibility needed by farmers and other actors to be able to service their loans. Equity bank for example have products where one would either pay installments on monthly basis or once at the beginning of the year. Some products when well negotiated have a grace period of more than six month.

Dealer involved in tractor business have a loose agreement with most financial institutions where they refer their customers to whenever they need financing. Well know and able customers are recommended financial institutions by dealers. CMC helps customers fill loan application forms; they stock the loan application forms in their premises.

To reduce risks most dealer advice their customers to apply for asset financing from banks. The tractors remain joint property of the customer and the bank until the whole loan is served.

Some dealers also negotiate with banks for better deals for the customers. Car and General are in the process of signing a MOU with Family bank where their customers will only pay 20% down payment of the total cost of a tractor at an interest rate of less than 10%.

To develop new financial products through the project, it would be important to study what other markets offer, then bring banks and buyers together and see what is possible. It would be worth while noting that most banks in Kenya have in the past tested many financial products with a lot of failures through defaults before settling in their current products.

One of the best innovative products in the market is venture capitals where an assent is owned jointly with a venture capitalist for some years. The venture capitalist provides the seed money, shares profits with the company being financed and pulls after some agreed years.
In conclusion, the financial institutions are ready and willing to fund investments that are promising

Business Models – the existing business models are few and weak. In upgrading the existing business models a lot of work will need to be done on the demand side. Farmers and services providers have the key to unlock the demand. Farmers need to be convinced that the services of 2WT are as good as those of the 4WT and even cheaper. Demonstrations on use and operation of the tractors will help create the demand.

Recommendations

- The current demand for 2WT in Kenya is not developed. The intervention most needed is critical understanding of the mind of farmers and service providers on 2WT and demand creation. The private sector will not create the demand so this work is left of the government and NGO’S
- provide project funds in procuring tractors, the tractors will be provided to existing service providers in the project area to help create demand.
- more flexible in location – for better impact, it is advisable for FACASI area to be increased to include Nakuru and Eldoret and other regions surrounding Laikipia like Meru and Nyeri Counties
- focus on mechanization rather than CA: 2WT and CA are two new technologies to most farmers and service providers. Introducing the two technologies at the same time is an uphill task. In CA 2WT will mainly be used for seeding. due to the small sizes of farm size, most farmers would prefer family labor in planting, which is cheaper or hire people to plant for them because labor is not in shortage.
- operational: redesign the project funding (CIMMYT objective 2)(David please comment)
Annex 3 Interviews report 3

Chepkoilel Workshop (Eldoret)
Met Raymond Nge’no
- Willing to participate in TOT training
- Willing to train service providers after training
- Will be travelling to US to participate in a entrepreneurship training sponsored by US embassy after TOT
- If dates are changed to the following week he will not be available

ATDC – NAKURU
Met Musa Sang – the Manager
• Sang willing to attend TOT in Nakuru
• Will organize logistics for use of ATC land for practical during training
• Someone manufacturing grass cutting equipment in Nakuru and distributing in other counties at a production cost of Ksh.60,000. Selling 25 units every day?? Making a profit of Ksh.1000 per unit

01 – 06 SEPTEMBER 2014

MOA – Nyeri

Met Edwin Mwangi
• Edwin already knew about 2WT use in Transport, shelling and thrweshing
• No one know was using 2WT in Nyeri county
• One problem with 2WT is that they are not comfortable to use, one has to walk behind them covering many kilometres in a day
• Opportunity for 2WT due to decreasing farm land
• Nyeri county soils are hard, a challenge for use of 2WT
• In kieni farmers have small plots for wheat production (2-3 acres)
• During ASK shows in Nyeri AMS demonstrates use of 2WT to farmers. They get a 2WT from Ruiru AMS
• Nyeri county in the process of buying farm machinery
• Nyeri ASK show to be held from 10 – 13/09/2014
• Jomo Kenyatta University of Agriculture and Technology have been developing 2WT

Titus Wamberi – An Agricultural Consultant
• At Mua in Machakos county a farmer has been using a 2WT in lifting water and spraying pesticides
• Horticultural farmers best to promote 2WT to for light transport
• Asset financing is good for groups with good business plans

AMS –Nyeri County ( Naro-Moru)

Met Mr. Matheri
• 2WT use can be demonstrated together with MOA at ASK shows
• Around Kieni soils are hard for 2WT, around Naro Moru soils are sticky for 2WT use
• Near Mt. Kenya (Muchwiri) soils might be good for 2WT use
• Farm Machinery demand in Naro- Moru is very high
• AMS was established to regulate machinery higher prices
- They charge Ksh.1500 for Hallowing old land and KSH 2000 for old land
- For ploughing they charge Ksh 2500 for old land and Ksh 3500 for old land
- Farmers prefer AMS services to other service providers
- On 2WT – the output of draught animals better than 2WT
- Roads in Kenya no good for 2WT
- Small HP tractors idea may sell faster than 2WT
- 2WT are good in paddy areas that are flat like in rice

**MERU – MOA**

Met:
Kimathi Mugaini – County Agricultural Engineer
Mworia – Country Agribusiness Officer
- The officers were convinced there is an opportunity for 2WT in the county because of decreasing land sizes
- Nearest AMS is at Mitunguu about 45 KM away
- Traction service providers in Meru come all the way from Laikipia
- ATC would be the best place to train farmers on 2WT
- Farmer groups could be targeted to buy tractors as a group for service provision
- Some financial organizations like youth SACCO would fund youths to buy tractors
- At Kianjai market tractors pack in the evenings during planting season after service provision during the day
- Planting season starts in September in Meru. Rains continue from October to December

**AMS – MITUNGUU**

Met Eng. Kariuki and Njeru
- No 2WT tractors in the station
- 2WT were introduced in Kenya without a back-up of spare parts and mechanics and thus the introduction failed
- Not easy to use 2WT in hard and wet soils
- Use of 2WT tractors not easy especially when negotiating corners
- In the eighties at Kirinyaga Country 2WT were used for on farm transportation of coffee beans
- Because of decreasing land sizes, 2WT have an opportunity
• Demonstrations are important to create demand
• There is a great demand for mechanization service which AMS cannot meet
• The model of AMS working under public sector not the best because all the money collected is wired to head office. The money hardly available for future repairs if need be

Charges:
Ploughing new land Ksh 1800 per acre, Old land Ksh 2000 per acre
Hallowing –Ksh. 2300 to 2500/acre
Graders- Ksh 3772/hr
Dam construction Ksh. 3772/ hr – 5000/hr-Ksh 7000/hr depending on assessment report (dry rate – no fuel and operator)
Shelling sh 50/ bag (Market rate Ksh 100)

• The county government wants to introduce market rate for all the services to make the AMS profitable and self sustaining
• Before the county system of governance in Kenya, AMS were serving several districts, now there is a problem of ownership- which county would benefit from the proceeds of the services provided
• Service providers in Mitunguu come all the way from Laikipia, Nakuru and Isiolo
• The Agriculture Minister in Meru could be willing to buy 2WT for demonstration purpose

Service Providers in Laikipia County
Mr. Moses Muriugi Kirare
• He is a retired teacher who bought a 2WT in Meru town in 2005 after with his retirement benefits
• He bought the 2WT at Ksh.230,00 with a chisel and plough. Then the importer had three tractors in stock
• The intention of buying the tractor was for use in distributing corn flour from his processing plant
• He later started ploughing and hallowing using the two 2WT
• He has a 10 acre and he uses his tractor to plough part of the land
• He also provided ploughing services to other five to six farmers per season after ploughing his land – a total of about 6 acres
• Now his major use of the 2WT is transport provision- building materials, potatoes etc
• He is not in business as such because the tractor is for own use
• He does not promote or advertise his services, people come to him
• He is very happy with the services of the tractor. He replaced engine of the tractor four years ago at a cost of Ksh 45,000
• The ploughing work rate of the tractor is 8 hrs per acre
• The fuel consumption of the 2WT is very good. 4 litres for 1 acre for ploughing. Planting and ridging would take 2 L for 1 acre. For transport 6 L would be used for more than one week
• He provides transport for 5 times in a month at a cost of Ksh 300 – 600 per trip depending on load and distance
• The greatest challenge for the 2WT is kikuyu grass and clay soils
• Spare parts is a big problem for his tractors, his operator fabricates rings for the tractor
• Given to choose he would choose the 2WT over draught animals because their work rate is almost the same and he does not have to feed the 2WT

Laikipia Service Provider: Samuel Mungai
• He is bought his tractor in 2010 at Ksh 490,000 from Ndume. He paid a loan from his SACCO through his salary because he is a MOA employee. If it were not that he is working he could not pay the loan from proceeds from the tractor
• The tractor came with a sprayer and planter
• He is based in Maili Nne
• He provides services on to CA farmers
• His high season is from January to April
• Currently he plants 30 Acres in a season
• His charges for planting is Ksh 1500 per acre
• He can plant 2-5 acres in a day
• He promotes his services during field days and uses extension workers
• He thinks fiterreri planter is better than all others
• He is able to get spare parts from Ndume
• He is happy with the machine and would advice other farmers to buy it
• He is planning to upgrade his business by buying a 4WT
• The price of the tractor is too high for most smallholder farmers
• The best way to introduce 2WT is by subsidizing the price by the government
• NGO’s like AGRA hire his tractor whenever they have field days to demonstrate to farmers
• His tractor is 16 Hp

Conclusions
• All service providers using 2WT interviewed are very positive about the use of the two wheel tractors. This means there is a niche market if more operators could be trained
• The price of 2WT is still way too high for most service providers who feel a 2WT would not service a loan
All actors are willing to participate in the CA, Machine use and Business Management Training to be held from 28th September to 4th October 2014 at Nakuru

The most prospective Business Models:

Private sector led:

- Moses Kirare (Laikipia)
- Samuel Mungai (Lailipia)

Public sector led

- Tuuti Community Development (Bugoma)

NGO led

- Mwiti/Muriuki (Laikipi)
- Eric (Bugoma)

Prospective: Chepkoilel Workshop in Eldoret

Annex 4: Questionnaire for dealers

D. Dealers

1. Name and address of the business

2. What are the machines that you sell?
3. What are the names of the brands that you stock?

4. What is the volume of machines sold per annum?

5. Last 5 years: sales for different machines?

### Business Growth

<table>
<thead>
<tr>
<th>Name of machine</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Retail price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 WT</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. What are the prospects for the future? What are your projected forecasts?

<table>
<thead>
<tr>
<th>Name of machine</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
</tr>
<tr>
<td>4WT</td>
<td></td>
</tr>
<tr>
<td>2 WT</td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
</tr>
</tbody>
</table>

7. How do you buy or receive your machines/ implements?

   a. Credit facility

   b. Transport facility

   c. Storage facility

   d. others

8. Which machines will experience growth in the years to come? By how much?

9. Tell us more about 2WT?

   a. How many have you sold?
b. With what accessories?

10. Tell us more about 4WT?
   a. How many have you sold?
   b. With what accessories

11. Is there any seasonality of machines business? What is the peak and off-peak season?

12. Do you provide advice on the size and capacity of the machines? From where do you receive this information?

13. Do you have any functional linkages with the department of agricultural administration, extension service or other government farms? Have you had any orders from them?

14. Do you have any knowledge on government subsidies? Please detail them?

15. Have you sold any machines to any farmer association?

16. Do you sell machines to service providers? Which ones? How many?
17. Credit/installment facility? What do you do when repayment is overdue?

18. Warranty, guaranty and after sales services?

19. Training for machine operation

20. Banking or financing facilities? What are the challenges?

21. Are there any agricultural machinery dealer associations? How do they operate? How do you negotiate with banks and government institutions etc.
Annex 5: Questionnaire for Manufacturers

E. Manufacturers (2WT or spare parts)

1. Name and address of the business

2. Experience in the business

3. Do you manufacture spare parts? For what machines/implements/

3. What is the volume per annum?

4. Last 5 years: sales of spares for different machines?

<table>
<thead>
<tr>
<th>Name of Machine – spare parts</th>
<th>Sales</th>
<th>Retail price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>4WT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 WT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. What are the prospects for the future? What are your projected sales forecasts?

<table>
<thead>
<tr>
<th>Name of Machine-spare parts</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
</tr>
<tr>
<td>4WT</td>
<td></td>
</tr>
<tr>
<td>2 WT</td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
</tr>
</tbody>
</table>

6. From where did you get the design/prototype?

7. What is the capacity of your workshop to produce any machine e.g. how many machines per day/month?

8. What is the retail price of the spare parts?.

9. Is there any seasonality of machines business? What is the peak and off-peak season?

10. How many workers are there in your business?

   a. How do you provide training for the workers?
b. How do you cope with expert staff retention?

11. Are you a member of an Agricultural Machinery Association?

12. From where do you buy the raw materials? Can you buy them on credit?

13. What is your current level of investment?

14. Do you have access to loans? How much can you receive and from which sources? What are the challenges that you face while accessing loans?

15. Do you provide after sales services? What are the modalities e.g. warranty, service with/without payment etc., in field repair)

16. What kind of repair services do you provide?

17. How many large scale orders do you usually get? From whom? What kind of problems do you face when producing at scale?

18. Do you have a distribution network for your produced machines? Draw a map.

19. Which machines do you think will experience more growth in the years to come?
20. How many manufacturers are there in this district?

Annex 6: Questionnaire for MOA

A. District Agriculture Offices (for background information on the project areas and the districts)

1. Number of farmers and categorization
2. Predominant cropping patterns and area

3. Amount of land under cultivation

4. What is the number of agricultural machines in your area?
   a. 4WT
   b. 2WT
   c. seeder
   d. thresher
   e. sheller
   f. grinder
   g. etc.

5. Have there been any agricultural mechanization related programmes, projects and other interventions implemented or planned in your area? Please describe.

6. Are there any machines or accessories that the district office is promoting in this area?

7. What are the key successes that your office can claim regarding farm mechanization?

8. How is your office promoting farm machinery in general, in your area? How does the department provide information i.e. size and capacity of machines, company recommendation etc. regarding the various machines?

9. Which of the private sector companies/manufacturer does your district office work with at local level?
10. What is the government financial/business policy regarding the procurement of machinery? Are there subsidies or tax breaks provided?

11. How does the district office play its role in providing government subsidy on farm machineries?

12. What are the machineries that are locally manufactured? What is the volume of sales per annum?

13. Are there any mechanization service providers in your district? How many and where are they located.

14. Do you have any idea of the type of services that they’re providing?
Annex 7: Questionnaire for Financial Institutions

G. Local micro and other financial institutions

1. Do you provide loan package? Investment or working capital? Up to what limit? Which clients receive loans – farmers, local small retailers and/dealers, etc.?

2. Detail of the package? i.e. interest rate, repayment schedule, mortgage?

3. What is the ceiling amount that a retailer/dealer can borrow?

4. Is there a package for farmers associations? Details…

5. Is there a package to allow you to procure agricultural technologies - large or small?

6. If yes, then what is the detail of technology specific financing?