



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

MARKET ANALYSIS FOR SMALL MECHANIZATION- Zimbabwe

September 2014

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List of Abbreviations/Acronyms

2WT	Two Wheel Tractor
4WT	Four Wheel Tractor
ADMA	Agricultural Dealers Manufacturing Association
ARDA	Agricultural Rural Development Agency
ATA	Appropriate Technology Africa
CA	Conservation Agriculture
CKD	Complete-Knocked Down
DDF	District Development Fund
FGD	Focus Group Discussions
FI	Financial Institutions
GDP	Gross Domestic Product
HP	Horse Power
IAE	Institute of Agricultural Engineering
JD	John Deere
LSC	Large Scale Commercial
MF	Massey Ferguson
RBZ	Reserve Bank of Zimbabwe
SKD	Semi-Knocked Down
SME	Small Medium Enterprises
SSC	Small Scale Commercial
SP	Service Providers
ZADT	Zimbabwe Agricultural Development Trust

Executive Summary

The agricultural mechanization in Zimbabwe has evolved over time especially amongst the smallholder farmers. The land reform has played a role in the machinery needs of the farmers. The land system used to be dualistic in nature with small scale and large scale farming sectors. The land reform created different category of farms with different land holding sizes and varying machinery requirements.

The agricultural mechanization market is dominated by the 4WT actors. The supply chain actors include importers/dealer, manufacturers, distributors and end-users. The distribution network channels exist cross the country and some actors have field agents. The 2WT market is characterized by few actors and low uptake. The policy environment is supportive of the industry and currently offers free import duty on importation of agricultural machinery.

The 2WT provides services that range from ripping, planting, fertilizer application, boom spraying, transportation, grass cutting, milling, shelling, threshing and water uplifting. They are mainly imported from China and have varying horse power capacity.

Limited financial resources and lack of technology awareness have been noted as some of the main constraints that have hindered utilization of 2WT in the two project sites of Domboshava and Makonde. Interventions and strategic actions required for the 2WT uptake include:-

- ❖ Provision of policy framework document that guides agricultural mechanization;*
- ❖ Enhancing access to mechanization inputs and services for different farmers (groups/end-users);*
- ❖ Service Provider capacity building;*
- ❖ Enhancing access to credit.*

The implementation of the strategic options in conjunction with the business models will therefore enhance technology/product development, usage and adoption amongst smallholder farmers.

CHAPTER 1: OVERVIEW

1.0 Introduction

Agriculture is the mainstay of the country and it contributes 14-18% of GDP. The majority of the rural livelihoods, about 70-80% depend on agriculture. The agriculture sector accounts for about 40-50 percent of export and supplies 60% of raw materials.

The agricultural sector is characterized by a dualistic structure mainly a low input/low productivity smallholder sector (communal and A1 farmers) and high-input/high productivity A2 sector. Most of the agriculture under the smallholder farmers is under rain-fed. Irrigation schemes have been developed for the smallholder farmers mainly operated and managed by group of farmers.

The country has a land area of 39.6 million hectares of which 33.3 million hectares is agricultural land. Zimbabwe is classified into five agro-ecological regions based on soil type, rainfall patterns and other climatic conditions. In the late 1990s and early 2000s the government embarked on the third phase of the Land Reform Programme. The land reform classified farming into the following land holding categories: communal 2-3 hectares, A1 with 5-6 hectares for arable and 6 to 20 hectares for grazing depending on the agro-ecological zone. The A2 small scale have 10-50 hectares and A2 commercial have land holding size ranging from 50-2000 hectares. Close to 300,000 households have been resettled on land acquired by government from former large-scale farmers.

Major sources of farm power in the country include both animate (humans and draught power) and inanimate sources such as diesel engines, tractors and electric motors.

1.2 Objectives

The objective of the study is to identify market actors involved in agricultural mechanization and specifically for two wheel tractors (2WT), determine how the technology will improve farming amongst small holder farmers.

The specific objectives include:-

- Identify final sales market(s) and market segments for 2WT and machinery related technologies;
- Identify market channels and trends within the mechanization sub-sector;
- Identify the primary actors in the sub-sector, their roles, and interrelationships (with emphasis on their linkages with smallholder farmers);
- Identifying constraints and opportunities to intervene in the market;
- Identifying potential strategies/ interventions.

1.3 Methodology

Consultations with the National Project Coordinator, project team and other CIMMYT staff were done for the project overview and main actors.

Literature review

Review of literature provided the context in which the agricultural mechanization sector is operating. It should be noted that, not much has been written about 2WT in the country. Even the general agricultural mechanization information is scarce.

Interviews

Using the checklist developed by CIMMYT and adapted for the different stakeholders, interviews were conducted with main market actors which include dealers, importers, manufacturers, financial institutions, government departments, farmers and prospective service providers.

Focus Group Discussions (FGD)

Two project sites were selected based on pre-determined criteria, which mainly included existence of maize farming systems, adoption of conservation agriculture (CA) technologies, and existence of other CIMMYT programmes to create synergy. Domboshawa and Makonde districts were selected for the project.

Focused Group Discussions (FGD) were carried out in these two districts.

A total of 4 FGD were carried out two per each site. The selection of the FGD participants was based on two structured requirements as follows:-

- (a) farmers or farmer groups currently utilizing agricultural mechanization, and
- (b) Farmers or farmer groups with potential to pay for 2WT mechanization services.

The objectives of the FGDs were to find out the needs of the farmers and what beneficial services they can afford. The information collected and assessed will shape the development of business models.

The study covered activities under Project Output 2.1 which include literature review, market actor interviews, focused group discussions. These activities are critical in market analysis of the small scale mechanization.

1.4 Study Limitations

Information on 2WT is very scanty and including current users of the machinery. Hence the study used the 4WT as proxy for the 2WT in terms of past practices, experiences and lessons learnt. In addition, getting figures from the companies on production/sales trends was difficult and in most cases could not be disclosed for fear of competition and information leakage to competitors. The actors were informed about information confidentiality, but they could not divulge their production operations. Hence, trust building is critical in such studies.

CHAPTER 2: AGRICULTURAL MECHANIZATION IN THE COUNTRY

2.1 General features of the agricultural sector

The agricultural sector is diversified with enterprises ranging from livestock, crops, forestry, fisheries. The crops include both food and cash crops. Food crops include maize, wheat, sorghum, sugar beans and vegetables while cash crops are comprised of tobacco, cotton, coffee, tea, sunflower and horticultural products. Maize dominates crop production, covering more land than all other crops (approx. 1.5 million hectares). Tobacco production has steadily increased since 1980. Small-scale communal farmers favour burley tobacco, mainly because it requires less rigorous labour.

Maize is the staple food. Prior to the land reform third phase the country used to be the bread basket for the Southern Africa region. However, the production capacity has been declining over the years due to a number of endogenous and exogenous factors. Zimbabwe's production of maize improved significantly during the 2013/2014 cropping season from 786 000 tonnes in 2013 to 1,4 million tonnes in 2014, but the country imports from the regional countries to meet the national requirements of 1,8 million tonnes per year (Financial Gazette 2014).

2.2 Historical Context –Agricultural Mechanization

Agricultural mechanization is the application of mechanical technology and increased power to agriculture, largely as a means to enhance the productivity of human labour and often to achieve results well beyond the capacity of human labour (FAO and UNIDO, 2008). Mechanization entails meeting the growing requirements for power and timeliness of operation as agricultural systems attain more intensive production. The selection and usage of hand labour, animal draught and tractors depends on relative costs of labour and capital, the potential for full utilization of the equipment (profitability of the equipment), the cost of acquiring and costs of maintenance. Furthermore, appropriate machinery, power source, relative desirability, availability and technical efficiency are options that determine agricultural mechanization (Starkey, 1997). Mechanization is the pillar for making farm operations efficient and productive since it determines efficiency and productivity of all the other inputs used in crop production such as seeds, fertilizer, water, labour and time (CEMA, 2014).

The evolution of farm machinery and equipment industry in Zimbabwe dates back to 1963 when the Agricultural Engineering Centre was established. In 1976, the Centre was renamed the Institute of Agricultural Engineering with the responsibility of providing agricultural engineering research testing, development, training and extension service. The usage of tractors amongst the smallholder farmers started through the government Group Tractor Programme in 1980 (Mfote, 2004). In addition, during the same time hiring services in agricultural mechanization were offered through government parastatals.

During the past decades, agricultural mechanization has been highly skewed towards large scale commercial production and to a limited extent to the small scale farms prior to the land reform in

1999. Investment in agricultural mechanization has enabled farmers to intensify production and improve their quality of life as well as contributing to national and local prosperity. However, this investment has been limited to large commercial farms or government schemes. Developing agricultural mechanization for economic growth requires public and private partnerships with clearly defined roles and goals (Koza, 2010). Development of appropriate and systematic mechanization systems require selection of power sources, equipment and/or implements that perform the given operations with optimal use of resources (finance, time, inputs) and minimum human labour bringing viability to farm operations (Musoni *et al*, 2013).

Large farms because of collateral can easily access machinery and economies of scale enable procurement of such. However, in small farms mechanization spreads as rented rather than bought (Binswanger, 1986). The country's land reform resulted in changes in land ownership patterns, size of land holdings and cropping patterns. The categories created mechanization requirements since some farmers had acquired virgin land requiring mechanization to turn the land into arable and /or expand the land under production (Mfote, 2004). The sizes of the land holdings had a direct bearing on the size and form of mechanization inputs required (Nazare, 2004).

The large scale commercial farm subsector practices mechanized, high-input high-output farming characterized by agricultural finance and credit. In contrast, the communal farming sector consisting of around 1.8 million households, has limited access to productive resources and infrastructure. These smallholder farmers practice rain-fed agriculture using low-input low- output technologies. Approximately 90% of farmers in this sector utilize draught power for agricultural production from animals, mainly oxen, and at times donkeys and cows.

Most A2 farms, the new resettled farmers lack even the power-driven implements such as ploughs, planters and disc harrows which are some of the pre-requisite equipment expected on a commercial farm. The A1 farms are larger than communal holdings making use of hand tools or animal drawn equipment inappropriate. The same farms are too small to make use of tractors and tractor-drawn equipment economic. Therefore, operations on A1 farms might require more innovative medium sized equipment that matches the needs and landholdings of the group (Hanyani-Mlambo, 2004).

In terms of agricultural machinery importation, the country since 2004 has been experiencing a decline in imports. This is attributable to low productivity that the farming sector experienced. A notable increase in importation was in 2007/2008 due to the government programme. Table 1 below shows the importation of tractor and various implements that include ploughs, planters, seeders, cultivators, rippers, threshers, tractors, trailers, combine harvesters and agricultural machinery parts for past ten years. The number of tractors has been decreasing considering that 10 years ago, the country had a fleet size of 30 000 tractors across the country.

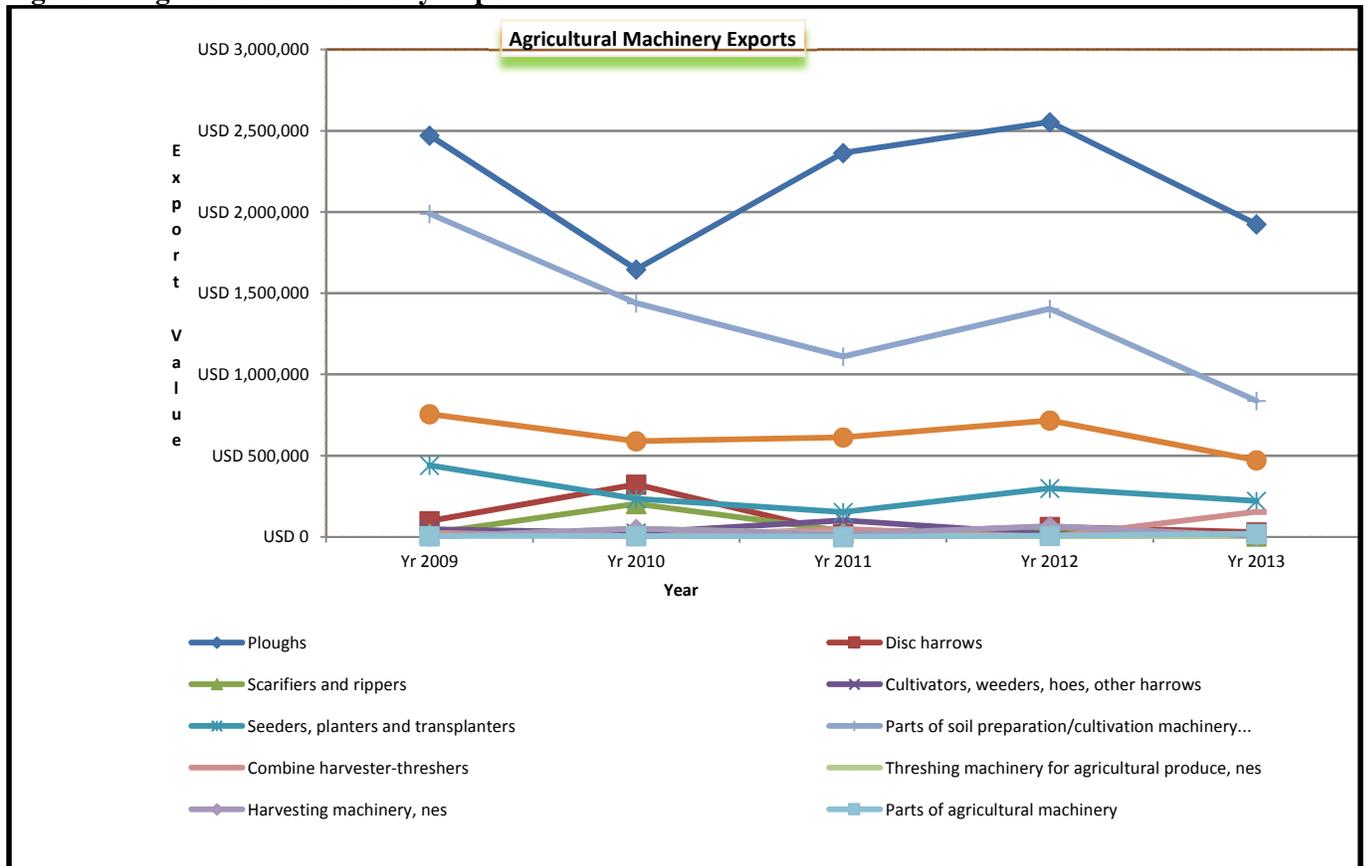
Table 1: Import volumes agricultural machinery

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
HS \ Indicators	QTY	QTY	QTY	QTY						
Single-furrow mould-board ploughs of a weight =< 55Kg	545	247	12	4	5	23	601	1,979	4,515	26,864
Ploughs weighing not less than 55Kgs	295	49	64	803	700	359	627	150	251	680
Mouldboard ploughs of weight not less than 55Kgs	24	11	19	275	6	17	5	59	32	74
Other ploughs, less than 55kgs	26	50	369	216	205	19	28	5,405	46,264	611
Disc harrows with less than 30 discs	26	58	663	1,722	369	180	1,301	8,127	597	419
Disc harrows with more than 30 discs	33	40	29	700	502	105	57	51	172	409
Scarifiers and rippers	315	-	-	-	-	-	-	-	-	-
Cultivators and weeders	1,702	-	-	-	-	-	-	-	-	-
Other harrows, scarifiers, cultivators, weeders and hoes	13	25	390	23	25	2,293	15	147	733	45
Seeders, planters and transplanters	122	28	162	547	976	571	154	787	197	5,802
Manure spreaders and fertiliser distributors	9	217	38	282	221	41	89	497	60	89
Soil preparation or cultivation machinery, nes	63	34	342	133	11	185	4,440	2,482	125	42
Parts of soil preparation/cultivation machinery...	10,263	41,488	69,466	48,320	60,096	37,007	141,608	556,533	473,974	561,606
Mowers (incl. cutter bars for tractor mounting), nes	5	14	514	176	24	11,691	217	1,499	2,504	216
Combine harvester-threshers	5	23	24	106	14	57	11	139	30	24
Threshing machinery for agricultural produce, nes	3	55	11	61	22	5	20	109	4,184	5,280
Root or tuber harvesting machines	-	2	3	2	-	4	3	2	16	32
Harvesting machinery, nes	8	14	26	2,200	132	63	180	151	31	531
Parts of harvesting... machinery	5,043	8,295	4,406	6,640	3,928	29,111	11,506	17,266	16,905	24,442
Pedestrian controlled tractors	35	35	1	12	1	24	7	83	1	74
Road tractors (semi-trailers)	54,509	13,837	8,434	957	9,477	1,150	16,581	75,197	1,068	11,652
Tractors	995	276	2,815	9,978	1,906	27,868	8,829	20,197	875	51,439

Source: ZIMSTAT 2014

Over the past five years the country has also been exporting some agricultural machinery across Africa. Locally manufactured implements include ox-drawn, tractor-drawn equipment and equipment for use by human muscle. The figure1 below shows the export figures. This is evidence that the country has capacity to produce required accessories for agricultural mechanization given the prototypes.

Figure 1: Agricultural Machinery Exports



CHAPTER 3: MARKET ORGANIZATION AND SUPPLY ACTORS

3.1 Supply chain actors

The agricultural mechanization supply chain has a number of actors that encompass importation, manufacturing, distribution and end users. Financial institutions provide credit facilities and the government ensures enabling business environment for the private sector. The industry is dominated by four wheel tractor (4WT), ox-drawn and tractor-drawn implements. The two wheel tractor (2WT) market actors are few.

The agricultural machinery importation business is competitive with a number of players for the 4WT that include: - Northmec, Farmec (both subsidiaries of Zimplow), Bains New Holland, AFGRI and Tarrys as the major players. Other players include Haingate, Motira, Sabata Holdings, and Independent Tractors. Manufacturers of ox-drawn equipment include Grownet, Mealie Brand, Hastt Zimbabwe and many small informal actors. The tractor-drawn equipment manufacturing has few actors; some of the implements are imported.

3.1.1 Importers/Dealers 2WT

The agricultural mechanization market is dominated by the 4WT actors. Currently there are two actors involved in the importation of 2WT, ATA and Bain New Holland Agent (managing a branch in Chegutu). However, it should be noted that Bain New Holland is planning on importation of 2WT and will be a major player in the sub-sector.

Appropriate Technology Africa (ATA) Holdings

Appropriate Technology Africa started operations in Zimbabwe in 1998. The company has offices in Mozambique and South Africa. ATA provides appropriate, relevant, quality, reliable technology and cost effective solutions to meet small business needs. ATA offers a range of equipment that include 2WT, generators, diesel engines, mining and processing equipment.

The company has been importing and marketing 2WT for past 9 years. They import from China and rebrand the 2WT with own company name. On average around 20 units of 2WT are sold each year. The mode of transaction includes cash, over the counter purchases or 3 months lay-by. The company faces no stiff competition on 2WT, no significant new entrants. They provide back-up service and have spare parts workshop, utilize Swift courier facilities to reach out to customers. Company has no retail distribution network in rural areas. The 2WT are sold at US\$2000, since 2005 same price has been charged. The 2WT is not a fast moving product for the company. Furthermore, profit margin is low and the company does not have sales model forecast. Ordering is determined by funds available with focus on products with good margins.

The company employs 50 qualified staff members. They used to have apprentice programmes, but now stopped. Company has no time for Research and Development; they import and sell after assembling. ATA is not involved in 2WT attachments; they can refer customers to manufacturers of 2WT accessories.

The company is unlikely to expand the tractor business. They are interested in mining and farmers in the tobacco sector.

Bains New Holland Agent

The company imported 2 units, 12 horse power (hp) from China (Changfa model) currently being tested. Tractor is priced at \$2,000 and comes with a plough at \$500 or trailer at \$1,000. The Agent had ordered another 10 2WT units (14 hp). The transaction is on cash basis or deposit of 50% with 2-3 month repayment of the balance. The Agent is not interested in setting up branches because of risk of theft, but travels around districts offering back-up services. The product comes with a warranty for 3 months.

As part of the marketing strategy, the Agent will conduct field days and demonstrations. Bulk ordering of imports to be done since it reduces the costs. In Zimbabwe local manufacturing is more expensive than importing. The accessories – trailer and ripper- could be manufactured locally but there is a risk that it would be more expensive than importing because of the excessive labour costs. In addition, imports of finished products are exempted from duty, whilst the manufactured products may utilize imported inputs that are taxed (incur import duty), thereby increasing the cost of the manufactured product. The seeder could also be produced locally by mounting an ox drawn seeder with a draw bar. The 2WT has a life of 5,000 hours or 5 years.

Honda Centre

Honda centre also has 2WT (7hp), Honda brand from Japan pegged at \$5,000 with disc attachment. The 2WT is not a fast moving product, for the past four years imported 3 units and two sold to date.

Bain New Holland

Company planning to diversify into importation of 2WT. The target market will be all smallholder farmers and mining sector. The company will want to promote the use of 2WT for productive and high value crops which include tobacco and horticulture crops.

3.1.2 Local Manufacturers –2WT Attachments

Mealie Brand

Mealie Brand is a subsidiary of Zimplow. The company produces a complete range of animal drawn implements which provides the mechanization solutions for the farmer from land preparation, planting, crop cultivation through to post harvest handling. The manufacturing plant is situated in Bulawayo, Zimbabwe and markets its products in Sub-Saharan Africa. Mealie Brand products include different types of hoes, ploughs, cultivators, harrows, shellers, planters, ridgers and conservation agriculture (CA) equipment.

Currently company's Research & Development is working on boom sprayer, planter/seeder for rice and wheat. It employs 300 workers (fully trained and have yearly education fund) and can harbour 35,000 completed ploughs at any given time.

The company imports some of the steel from Southern Africa and utilizes local steel as well. The company competes with Grownet and Hastt Zimbabwe, but indicated there is no stiff competition. Grownet concentrate on CA hand planter but compete on common products such as ploughs, planters, seeders. The company has 75% market share due to strength in market networks and quality products. Comparative advantage is on experience and product quality. The products are ISO 9001 certified and locally certified by Standards Association of Zimbabwe (SAZ).

The company works with government extension agents, conduct field visits and receive customer feedback, especially on quality and have quality improvement systems. They indicated that new products are uneconomical to conduct due to technological changes and economies of scale. New products should attract huge volumes (perennial or once off) for the product to be economical. The plough is the cash cow and exported to Namibia, Zambia, Malawi, Angola, Rwanda, Burundi and Tanzania.

Grownet Investments

Grownet Investments is a Zimbabwean small-scale agricultural equipment manufacturer, with interests in producing appropriate technologies for emerging smallholder farmers, and related post-harvest equipment. The company manufactures ox-drawn equipment, shellers, and direct seeders for both ox and tractor drawn. Since 2009, Grownet has established collaborative initiatives with research institutes, non-governmental organizations and the national agricultural extension services in efforts to design and manufacture direct seeders and jab planters for CA purposes.

Hastt Zimbabwe

Hastt Zimbabwe is a leading manufacturer of agricultural implements, haulage equipment and plough and harrow discs for both the local and export markets. The company produces animal and tractor drawn implements. Animal drawn products comprise the haka plough, ridger, cultivator, harrow, planter, scotchcart, and the watercart. The implements, together with their spare parts are available countrywide through a network of distributors and agents. The tractor drawn implements are designed for land preparation, fertiliser application, planting, cultivation, as well as post harvest handling. The product range is made up of standard and reversible disc ploughs, disc harrows, tine rippers, fertiliser distributors, station markers, precision planters, ridgers, cultivators, potato lifters, trailers, shellers and hammer mills. Spares for the tractor drawn implements are also readily available. Hastt offers back-up service and spare parts to the customers complemented by a service workshop facility for the repair and refurbishment of equipment. The company is a major global competitor of plough discs in Africa. Exports different types of implements to Angola, Namibia, Zambia, Malawi, Mozambique and Tanzania. Due to the current economic factors affecting the

country, the company is producing according to demand and have stopped stocking products with exception of spare parts.

Local competitors include Zimplow for animal drawn implements and Bain for tractor drawn implements. Products are sold on cash basis there is no credit provision. Distribution is done through dealership model and includes dealers such as Bain, Farmec, Farm and City, N Richards and Shalom Hardware.

The company has achieved ISO 9001 Certification. Formerly Tinto Industries, the company has been operating since 1970. It changed its name to Hastt Zimbabwe in 1997.

Informal Small-Medium Enterprises

Informal Small-Medium Enterprises (SMEs) also manufacture agricultural implements. They are located in both urban and rural settings. This sector offers agricultural machinery repairs and maintenance services to the smallholder farmers.

3.1.3 Financial/ Credit Institutions

Financial credit support is critical for any development. Zimbabwe has around 17 commercial banks. A couple of them have business solutions that address the needs of the smallholder farmers. Lack of collateral makes borrowing to smallholder farmers unattractive. The country is currently facing a liquidity crisis affecting the credit availability to all market segments. Most banks are lending to players along the agricultural value chain, with few considerations for small holder farmers with proven collateral. Hence, registered entities are eligible to receive financial assistance that can be extended to the smallholder farmers. The following are some of the banks that can offer credit to smallholder farmers.

ZB Bank

ZB Bank offers loans with interest rates around 10-15%. Offer loans to smallholder farmers, minimum credit is \$5000. Prefer group lending, interest rate 10% but for agro-bills around 15%. They offer bank guarantees, done through thorough due diligence to the customers to ensure eligibility. The bank guarantee can be 100% guarantee or in-part depending on usage. ZB Bank has Credit Committee sits weekly to assess requests. It takes 2-3 weeks after submission to get final outcome. Offer more working capital loans and asset financing. With asset financing, 30% equity required before accessing the loan. The bank prefers manufacturers and can offer order finance facility. Can offer finance to dealers, may lease out the 2WT to the clients, this can be customized.

Steward Bank

The bank offers loans that range from \$5,000 - \$200,000 with 5 year repayment period and interest of 11.5%. They received funds from Zimbabwe Agriculture Development Trust (ZADT) to support inputs, processors and output markets. The funding window is applicable for both working capital and capital expenditure The working capital is payable within 12 months, but capital expenditure ranges from 2 to 5 years. For individual farmers collateral is a prerequisite, and the

bank will not support start up businesses, business should be in existence for 3 years. It takes 2 weeks to process the loan.

Africa Enterprise Challenge Fund (AECF)

AECF offers competitive grants. They work directly with large scale private enterprises. Average size of awards is \$500,000. They have a Zimbabwe window but this is drying up and future awards will be given through the All-Africa Wide window. They are currently in their third round. The approval process is long at 12 months. The funding window is appropriate for large companies involved with smallholder farmers' out-grower schemes.

UNTU

UNTU microfinance was founded in September 2009. It is a microfinance enterprise that provides credit to the unbanked and under-banked. Untu supports micro and small business owners through provision of loans for business needs. It offers small loans maximum of US\$2000 payable within 18 months at 5.5% interest rate.

Micro King

Micro-King is a division of Afrasia Bank with focus on SMEs and offers working capital loans payable within 12 months. Offer value chain financing which is a special project with 2 years repayment period. Ceiling for loans is \$200,000 and minimum has been \$50. Consider horticulture producers because of the short production cycle. Interest rates range from 1% /month, 2%/month and 4%/month depending on type of loan. Sums above \$5000 will require collateral like land, assets, livestock (should be insured). Do not support start-up ventures, deal with established business and assess viability. It takes a week after submission of all required documentation to get a response. All loans require guarantor, unless have collateral.

Informal Credit and Group Savings

From the field assessment, Domboshava has thriving informal savings groups locally referred to as *mukando* where a group of women or men with common goals contribute and share agreed money on rotational basis. This practice is non-existing in the other district. This forms an alternative way of raising funds for any farm or off farm project.

3.1.4 Government Institutions

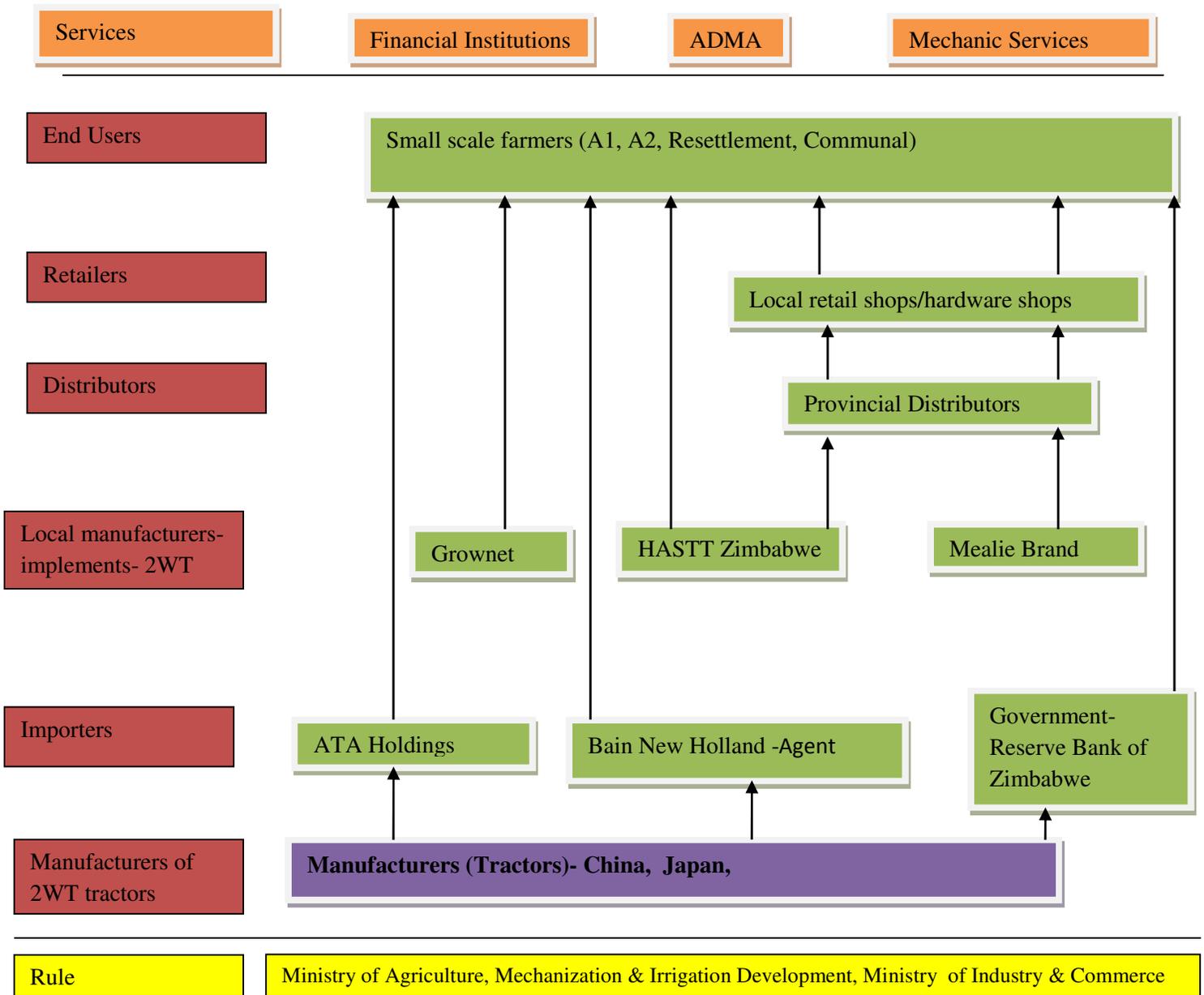
Ministry of Agriculture, Mechanization and Irrigation Development, Institute of Agricultural Engineering (IAE) provide testing and evaluation services for agricultural mechanization. The Extension Officers under Agritex department work directly with farmers. The ward level extension officers play a critical role in technology promotion and adoption by the smallholder farmers.

3.1.5 End Users

The end users of 2WTs are smallholder farmers in the communal areas, A1 and to some extent A2. The service providers can be individual farmers, group of farmers, agro-dealers and/or contractors.

3.2 Mapping of 2WT machinery supply chain

Figure 2: Mapping the agricultural mechanization value chain -2WT



CHAPTER 4: DYNAMICS OF THE MARKET FOR SPECIFIC TECHNOLOGIES

4.1 Existing Demand

4.1.1 4WT

The number of tractors owned and imported in the country has seen a sharp decline. During the 1990s the country used to import around 2000 tractor units per year. The current importation figures are below 500 units/year. The figures exclude tractors imported by the government under the mechanization programme. The importation business has been affected by the current macro-economic factors, mainly availability of credit and the liquidity crunch. The business environment is shaped by the importers, distributors and the commercial farmers who are the main end users. The 4WT market has varied and diversified players. Historically 4WT imports were linked with the West, majority being Massey Ferguson (MF)- British companies, Fiats from Italy, Ford from Holland and John Deere (JD) from America. In the last 4-5 years tractors have been coming from China, 45% of imports received are from China. Massey Ferguson re-located to Brazil; hence Brazil has been a significant source of imports of late.

Tractors are imported into the country in complete form, semi-knocked down (SKD) kits or as complete knocked down (CKD) kit forms. The coordination of agricultural mechanization is done by Agricultural Dealers and Manufacturers Association (ADMA), an umbrella body comprising of members involved in manufacturing of agricultural equipment. Currently ADMA has a membership of 14 organizations. ADMA membership has been declining over the years, due to closure of some companies.

Currently there are 14 000 tractors in the country owned by both private and public sectors. The total number of tractors currently available in the country fall below the national requirements of 40 000 to 50 000 tractor units required to meet the agricultural production targets (Simalenga, 2013). The A2 farmers have significant tractor ownership. This could be attributable to the government mechanization programme undertaken in 2007/2008. In the past, Zimbabwe has received tractors from donors or from concessionary loans the major one being the one run by Reserve Bank of Zimbabwe (RBZ). In 2007 the RBZ imported agricultural equipment to boost farm mechanization for A2 and commercial farms. The target was to empower all farmers by distributing 1 247 tractors, combine harvesters and power driven implements (ploughs, harrows, planters, boom sprayers and vicons). There is a considerable reduction in the number of working machinery now available across provinces under the RBZ programme. This can be attributable to repairs and maintenance not being put into full force and leading to natural attrition of the machinery. The agricultural machinery dealers share same sentiments and have indicated that most A2 farmers do not adhere to the repairs and maintenance schedule for these units. The tractors end up non-functional before the life span or utilization capacity/hours. Mechanization intervention should ensure proper strategies for repairs and maintenance are in place for sustainability of the machinery.

The ownership of tractors across the market segment in year 2011 is as shown in table 2 below.

Table 2: Tractor ownership

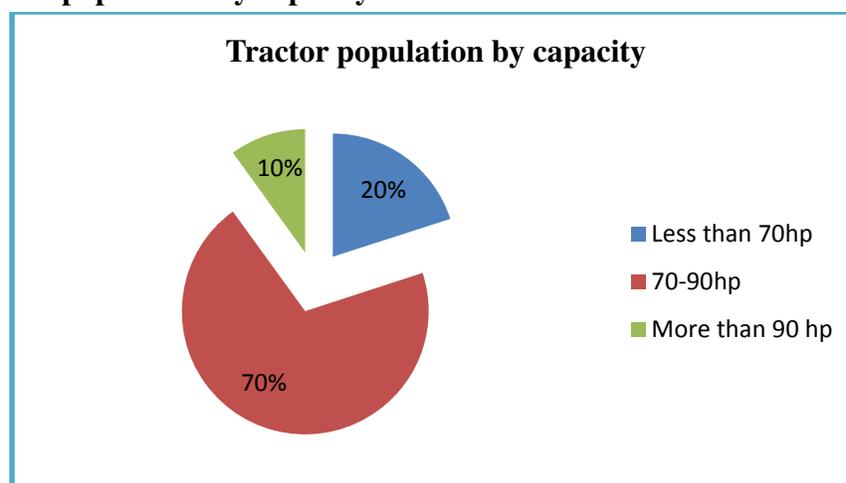
Type of farmers	Number of tractors owned
Large Scale Farmers (LSF)	3 064
Small Scale Farmers (SSC)	601
Communal farmers	1507
A2 farmers	6 575
A1 farmers	1 756
Resettlement farmers	778
Total number of tractors	14 281

Source: ZIMSTAT 2011

The figures in the table exclude tractor ownership by Agricultural Rural Development Authority (ARDA) and District Development Fund (DDF). DDF currently owns 200 tractors down from 700 owned five years ago. Distribution of tractors is confined to high potential areas/provinces i.e. Mashonaland West and Central have highest number of tractors. Mashonaland West used to be the grain basket of the country. Least number of tractors is found in Mashonaland East, Matabeleland and Masvingo. These areas have more of ranch production because of the agro-ecological factors that do not favour crop production.

In terms of capacity the majority of tractors in the country (70%) are of medium engine capacity (between 70 and 90hp) as shown in figure 3 below.

Figure 3: Tractor population by capacity



The government of Zimbabwe has consistently promoted agricultural mechanisation in the past especially the importation of tractors. Local public and private institutions supporting mechanisation development include Ministry of Agriculture, Mechanization and Irrigation

Development, Non Governmental Organizations (NGOs), farmer organizations, ARDA, DDF, Banks, Universities, Farmer Training Centers, private manufacturers and distributors of agricultural machinery and equipment and rural artisans. The government promotes most of the agricultural mechanization programmes for farmers through ARDA and DDF.

The tractor sales per year for ADMA members show low demand for 4WT. The table 3 below shows tractor sales for ADMA members.

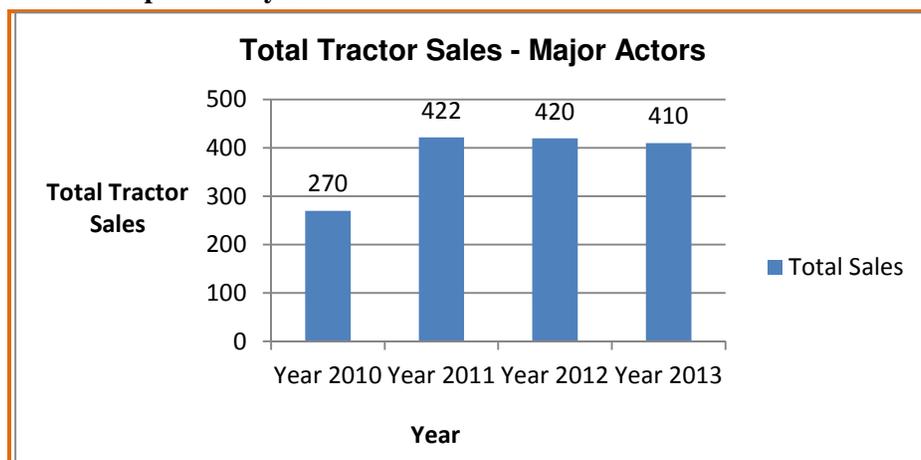
Table 3: 2013 tractor sales -ADMA

Name of Importer	Brand Name	2WD	4WD	Total
BAIN	Case		1	1
BAIN	New Holland	90	69	159
AFGRI	John Deere	54	112	166
FARMEC	Massey Ferguson	10	44	54
TARRYS	Landini	5	12	17
NORTHMEC	Case	5	8	13
Grand totals		164	246	410

Source: ADMA 2013 Tractor sales

There has been a stable but relatively low demand of the 4WT over the past four years. Figure 4 shows tractor sales during the last four years for ADMA members. However, this is low compared to the early 1990s when around 2000 units/year used to be imported.

Figure 4: Tractor sales past four years



The projection for this year will be around 360 tractor units (4 wheel tractors). The 4WT demand has been distressed due to the macro economic conditions. The lack of affordable finance, coupled with reduced productivity has been affecting the demand side of agricultural mechanization. The low sales of 4WT indicate the widening gap in agricultural mechanization. Therefore the availability of 2WT on the market will address the issue of affordability for the smallholder

farmers. Prices for the tractors vary depending on brand and horse power. For the JD brand a 38 horse power (hp) cost \$16,000; 57hp is \$25,000, 80hp is \$36,000 and the 90hp cost \$39,000. They come with two years guarantee or 2000 hours.

The main tractors importers of 4WT are shown in table 4 below. The market share reflected is for ADMA members.

Table 4: Main tractors importers

Name of Importer	Tractor Brand Name	Market Share by brand name (based on 2013 sales)
AFGRI	John Deere	40%
Bains	New Holland	38%
Farmec	Massey Ferguson	13%
Tarrys	Landini	4%
Northmec	Case	3%
Independent Tractors	Deutz	-
Haingate	Agrali tractors from Brazil	-
Sabata Holdings	JD tractors	-
Farmers World	Represent Chinese tractors	-
MOTIRA Private Limited	ITMCO	-
Agro Power		-

Main importers have established dealership networks covering the productive parts of the country. Independent agents are employed by some importers to assist in sourcing equipment for farmers and offer repairs and maintenance services.

Most of the dealers for 4WT are centrally based in Harare with field support service. Functions include:-

- ❖ Importing agricultural machinery
- ❖ Sales
- ❖ Training on operations
- ❖ Back-up services for repairs and maintenance
- ❖ Field support services
- ❖ Linkages with distribution agents such as Farm and City and hardware shops.

The products are advertised through different forms, which include field days, demonstrations, use of magazines, bill boards, and word of mouth.

4.1.2 2WT

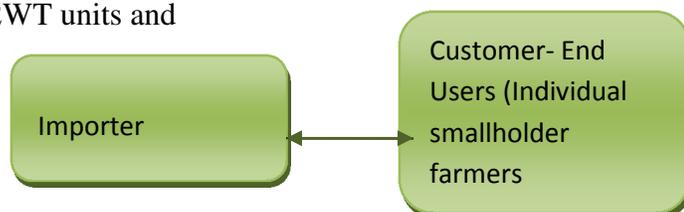
Appropriate Africa Technology (ATA) is the main importer of 2WT. The company imports from China the Changfa brand. The machines are of varying sizes in terms of horse power (12-20hp). The ATA rebrand the machines with company name (ATA) as shown in the picture. ATA has been importing an average of 20 units per year. However, they are other insignificant importing players or dealers. With the general decline of the 4WT sales over the years the 2WT has an estimated market share of less than 5%. The demand for 2WT has been erratic. End users especially most smallholder farmers are not aware of the existence of the 2WT. The 2WT are utilized in agriculture and mining sector. In agriculture 2WT are mainly used in transportation with two-wheeled trailers. Some owners of 2WT are using it for ploughing with different types of ploughs. Usage of 2WT in CA is not there.



Bains New Holland Agent based in Chegutu one of the small towns 105 kms from capital city imported 12 units to date from China.

Under the government program, the RBZ imported 30 2WT units and the distribution and location of the tractors is not clear including the sustainability.

The supply chain for the 2WT is a simple outlay from importer to customer as shown by the illustration.



Honda Center have been importing 2WT but on a very small scale. The company imported 3 units petrol brand for past 4 years.

The supply market has been small since business depends on demand. Some importers wait until farmers start demanding for the technology. Importers will not import when there is no demand, hence technology should be driven by the market. ATA, Bains Holland Chegutu Agent, Honda Centre and government have been the main importers of 2WT. There are no significant new entrants currently due to the low uptake. Other market actors in importation of tractors have the wait and see approach, once demand picks up they will also penetrate the 2WT market.

2WT Importation trends

ATA has been importing an average of 20 units per year for the past five years and selling the same number of units. Hence, for the past five years an estimate of 100 units has been imported. There has been limited importation of 2WT. The table 5 below shows the summary of 2WT imports and forecast.

Table 5: 2WT importation trends

Company Name	Brand/ Source	Horse power	2WT Imports for the last five years	Import Forecast
ATA(~20units/yr)	China-Changfa (diesel)	16-20	100	20
RBZ (once off importation)	-	-	30	-
Bain New Holland Agent	China	12-16	12	25
Honda Centre-Harare	Japan-Honda (petrol brand)	7	3	-
Total units imported/forecast			145	45

Bain New Holland is planning to enter the 2WT market as new player more units will imported in future. The two current market actors import forecast is estimated at around 45 units for the next coming year.

4.1.3 Plough; Seeder; Ripper; Sheller; Thresher

The usage of agricultural machinery especially for tractor drawn implements is skewed towards the large scale farms. In terms of tractor and animal drawn equipment there is variation across the different farm categories. The latest figures available for tractor and animal drawn implements are shown in table 6 and table 7 respectively. Smallholder farmers A1, A2, communal, small scale and old resettlement have more animal drawn implements compared to tractor drawn implements. About 80 percent of smallholder farmers own at least an animal drawn plough. Smallholder farmers constitute about 75 percent of the total farming population in Zimbabwe and they rely mainly on draught animal power (Koza, 2010). Concentration of animal drawn implements is high among the smallholder sector where more sophisticated motorized machinery and equipment are not affordable.

Table 6: Tractor Drawn Implements

Category of farms	Tractor Drawn Implements					
	Ploughs	Cultivators	Planters	Harrows	Trailers	Water Bowsers
A1	1196	365	182	581	1038	306
A2	4566	2142	1718	3263	4166	1716
Communal	1598	428	320	291	779	328
SSCF	694	279	146	303	444	184
LSCF	1091	827	732	1043	2671	1196
Old Resettlement	534	70	60	103	227	187
Totals	9679	4111	3158	5584	9325	3917

Source: ZIMSTAT 2011

Table 7: Animal Drawn Implements

Category of farms	Animal Drawn Implements					
	Ploughs	Cultivators	Planters	Harrows	Scotch cart	Water cart
A1	113516	29205	1606	23731	61658	1952
A2	3075	17116	8085	1173	7691	8822
Communal	813618	179804	6377	134829	364060	15085
SSCF		12858	7457	1504	6286	6723
LSCF	719	394	198	362	474	12
Old Resettlement	72479	24792	1765	18478	40018	2003
Totals	1003407	264169	25488	180077	480187	34597

Source: ZIMSTAT 2011

Ploughs

Ploughs have the highest number of ownership amongst the smallholder farmers. In 2011, the number of ploughs across the country was around 1 million. Mealie Brand is the largest producer of ploughs. The company exports a significant amount of ploughs and other implements to countries such as Malawi, Zambia, Namibia, Rwanda, South Africa, Burundi, Tanzania and Angola. The price of ploughs ranges from \$100-150/piece but also varies with types. Mealie Brand produced a total of 58,535 and 74,113 units in 2010 and 2011 respectively. The units are inclusive of ploughs and other products manufactured by the company. The major competitor Hastt Zimbabwe produces 200 plough discs per week, hence 800 plough units per month.

Seeders/Planters

Local manufacturers such as Hastt, Mealie Brand and Grownet produce seeders/planters. Imported seeders are specifically for CA, direct seeders and jab planters. They are imported from Brazil, but the prices have been prohibitive and the equipment did not come with back-up spares. The first direct seeder prototype produced by Grownet was tested during the 2010/11 cropping season and has undergone modifications based on observations from all stakeholders involved (www.aciar.gov.au/files). There is need to re-engineer and develop seeders suitable for the 2WT. However, there are tractor drawn seeders/planters suitable for the 4WT and adaptation to 2WT is required. Hastt Zimbabwe produces precision planter/ripper which applies fertilizer and covers with soil. The company manufactures 2, 3, 4 or 6 row planters. The 2 row planter cost \$6,000. The company produces 30 units (seeders/planters) per year for the past three years. The production trend has been going down for the past 10 years.

Rippers

Rippers are mainly used in conjunction with CA and are locally manufactured by companies such as Hastt, Zimplow and Grownet.

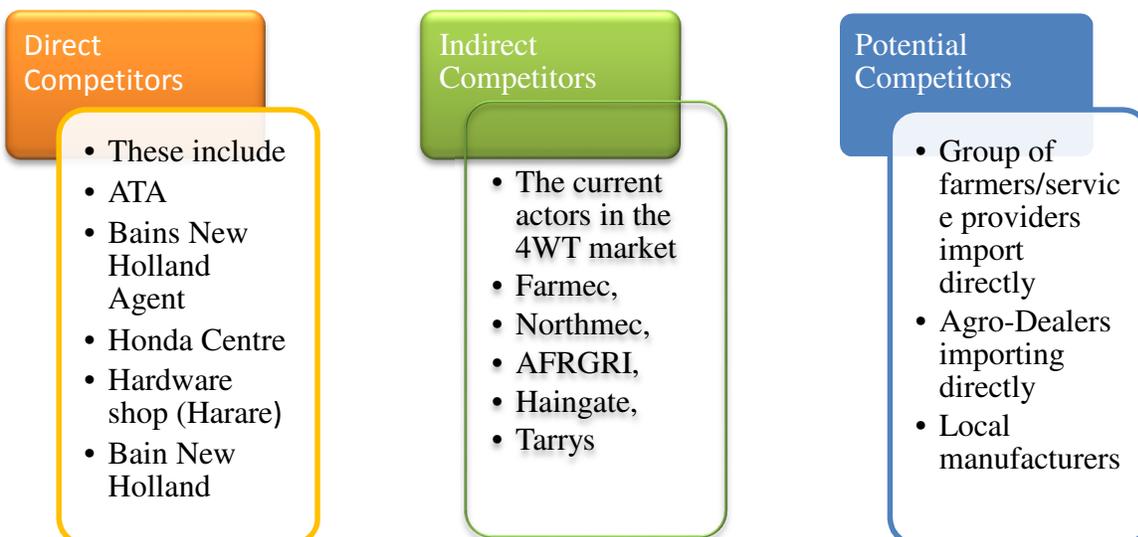
Shellers/Threshers

From table 1 above the country in 2013 imported 5 280 units of threshers and 24 combine harvester threshers. Information on shellers has been categorized but lumped up with harvesting machinery. However, ATA, Grownet and Hastt locally manufacture shellers (groundnuts/maize shellers). The prices of shellers vary depending on size, type of power and range from \$20 the small manual maize sheller to around \$4,700 for a motorized one. Hastt Zimbabwe produces 15 shellers annually sold to local and regional markets.

4.2 Competitor identification

The 2WT sector has direct, indirect and potential competitors. The current players are the direct competitors and the actors involved in general agricultural mechanization will be indirect or potential competitors for the 2WT market. Fig 5 illustrates the likely 2WT competitors.

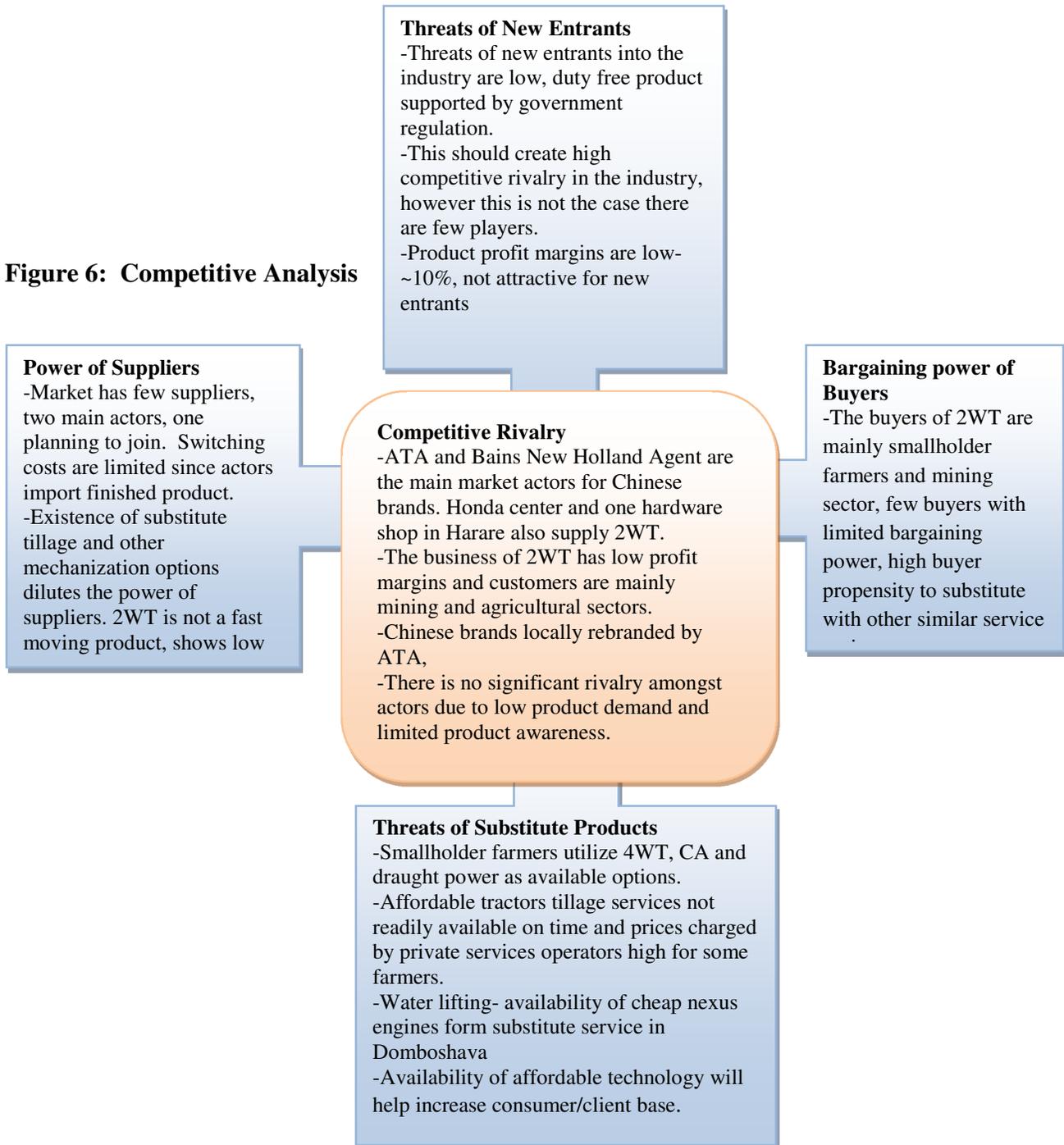
Figure 5: Competitor identification.



4.3 Market performance/ competitiveness

The 2WT competition analysis applying the Porters Field Analysis shows limited competitions. The Porters Field Analysis focuses on five issues, threat of new entrants, threats of substitutes, competition of rivalry, bargaining power of buyers, power of suppliers as shown in fig 6 below.

Figure 6: Competitive Analysis



The competitive analysis shows that the 2WT is an emerging technology/product with a weak market. There is need for market development through product awareness and promotion. This will enhance uptake of the 2WT by the smallholder farmers.

In terms of competitiveness the 2WT will fit in the current custom hire charges but they will compete with ox-drawn services. In Domboshava, farmers are currently utilizing the nexus 5.5 to 6.5 horse power engine for water lifting. The engines are procured from local hardware shops and prices range from \$120-\$180. They utilize diesel and 2-3 litres can be used to irrigate 1 ha for work rate of 3 hours. The 2WT engine has water uplifting as one of its functions which may face competition from the nexus engine.

CHAPTER 5: MECHANIZATION SERVICES AND ENABLING ENVIRONMENT

5.1 Current demand and supply

5.1.1 Supply Side- Hiring Services

Custom Hire Services- District Development Fund

The tillage services offered by 4WT provide lessons that can be applied to 2WT technology. The tractors from DDF programme have been charging \$45/ha (dry rate) with farmers providing their own fuel. The charges are comparable with custom hire charges in Makonde pegged around \$42/ha with 20 litres of fuel for disc ploughing. In Domboshava prices are significantly higher set at around \$65/acre. Clients for DDF include A2 and A1 farmers. In 1994 DDF had 700 tractors unit now it has 200 units. Cost of going around increase tear and wear of the DDF fleet. Fragmentation of land holding difficult, therefore DDF cluster ploughing areas. The ploughing services are required at the same time by the farmers. The 200 units cannot meet the tillage needs of around 300,000 households. The need for timeliness of ploughing operations forces farmers to utilize any alternative ploughing method.

It was indicated that political interference affected the effective operations of the tillage programme and contributed to the downfall of the hire services under DDF programme. Furthermore, the smallholder farmers especially in the communal areas have indicated that the deep tillage by 4WT bring up the sub-soil with fewer nutrients increasing the fertilizer requirements. They indicated that 4WT tillage is appropriate for virgin land, otherwise should be used optimally especially in sandy soils. This understanding has therefore promoted the traditional way of farming through the ox-drawn plough and the conservation agriculture. However, not all smallholder farmers own cattle. In Domboshava one of the project districts, its proximity to the capital city has reduced the area for grazing which in turn has led to a reduction to number of cattle owned by farmers. Ox-drawn hiring services are not timely, since the farmer with oxen first tills his/her own field before offering such services. In addition, the service may be offered to those who pay cash up-front. The 2WT will therefore complement and upgrade the ox-drawn services and fill the gap. During the tillage season farmers want to plough in time and they are normally forced to take any available ploughing alternative.

Agricultural and Rural Development Authority (ARDA)

ARDA provides tillage services (ploughing, ripping and discing), planting, harvesting, transport, repair and maintenance of machinery and equipment as well as land clearance to out-growers close to its estates. In 2004 ARDA had a fleet of 709 operating tractors and 63 combine harvesters. Traditionally they had tillage units that hired out 4WTs. The tillage units are located in two decentralized centres with 15 tractors and 2 combine harvesters. The numbers of tractors have

declined and currently they are utilizing 5 tractors in each hub. The reason for scaling down has been reduction in financing. As a Government scheme, they have been facing governance and management problems. Now payment for mechanization services is on a cash basis – upfront. The numbers of maize smallholders are few and sometimes face problems of not being paid for produce sold to government grain marketing outlets. The delay in payment of output affects payment to ARDA for the services rendered.

Local Private Hiring Services

Within the communal, A1 and A2 farming sectors individual farmers also own tractors. The service operations include ploughing, planting, harvesting and transportation. The custom hire charges vary with area. In Makonde the private service provider charges \$42/ha dry rate whilst charges in Domboshava charges are around \$60-\$65/acre. The private services providers are limited in both districts. In Domboshava, a count of farmers with tractors for hiring services indicated there are around 12 of them but 50% are non functional. The same applies for Makonde in Ward 19-Kasoko there are round 11 tractors but half are functional.

5.1.2 Demand Side

The 2WT is viewed as new technology. The smallholder farmers have been relying on animal draft power and 4 wheel tractors hiring services. The formation of A1 farmers under the land reform created smallholder farmers that require small machinery for farm operations. In addition, the former communal areas are facing dwindling cattle resources due to limited grazing areas especially for the locations near urban areas. The 2WT will complement existing hiring services offered by the ox-drawn equipment and 4WT tractors.

Farmers have been asking information through the IAE about the 2WT, hence there is need to strengthen promotion and awareness of the technology to enhance uptake amongst smallholder farmers. In addition, farmers indicated that the variation in rainfall patterns requires timely ploughing operations, farmers are therefore forced to engage in any form of ploughing they can afford to catch on time. Affordability and climate mitigation strategies are the main determinants in ploughing decisions and in turn affect the market demand.

In Domboshava there are 5 wards with an average of 2000 households, therefore 10, 000 households will be reached through promotion and awareness. The average land size 2-3 acres in Domboshava and 5-6 ha in Makonde. Makonde has 10 wards. In addition, demand will not be limited to the two project sites, but through national demonstrations, interested people in the technology will be will drawn in.

The demand for 2WT has been observed in the two sites. In Domboshava, the small size holdings coupled with limited availability of ox-drawn services will provide the 2WT opportunity for uptake. They currently use wheel barrows and scotch cart for transportation. However, a number of farmers do not own oxen, hence depend on hiring. The 4WT hiring services are limited; farmers

register and queue for services that are normally delayed. In addition, the ox-drawn tillage services are provided after owner has completed own fields. All these factors affect the timeliness of ploughing operations. Some farmers indicated they will then be forced to move into digging basins under CA to catch on time. In Makonde, in one of the wards currently there are no tractors services, farmers rely on ox-drawn. Hence, availability of 2WT will enhance timely tillage operations.

Maize is one of the main crops grown in the two districts. The 2WT offers shelling services. Therefore a great demand is foreseen for maize shelling services. The average yield in Domboshava is 2-3 tonnes/acre under CA and 1 tonne/ha or less for conventional agriculture. It was observed that shelling hiring services are limited in both districts.

Farmers indicated that they are limited by availability of credit which requires collateral. In addition, the credit requirements are punitive for older farmers. Some financial institutions informed farmers that there is no credit provision for clients above 60 years. This affects development as the youthful farmers are not interested in farming and furthermore may not have the required collateral registered in their names.

The calendar of demand for mechanization is yearly for irrigated crops and transportation services. The focused group discussions indicated the following as timelines for some of the activities:-

- Plough ox/tractor drawn -September to December
- Disc harrow -September, November, December –plough
- Cultivator -January, December, February for weeding
- Knapsack sprayer -Yearly (spraying crops and pest control at home)
- Scotch cart/wheel barrow -Yearly transport bricks, manure, produce, farm inputs
- Tractor transport -April to May mainly for harvesting
- Irrigation pumps -April to October for the horticulture production

The target group and/or end-users for the 2WT are the smallholder farmers mainly from the resettlement, A1 and some A2 farmers, with a total population of 239,761 farmers. The land reform created medium-sized A1 farms which are too large for ox-drawn ploughing and not economical for 4WT application, so 2WTs may be the best bet for this niche market. The table 8 below shows, the number of farmers that can be reached throughout the country.

Table 8: Number of smallholder farmers

Category	Period	Number of farmers (market segment)
Old Resettlement (number of families)	1980-1998	71,000
Phase 2 Resettlement	1998-2000	4,697
Land Reform –A1 farmers	2000 and upwards	145,775
Land Reform A2 farmers	“	18,289
Total		239,761

Source- Ministry of Lands and Rural Resettlement 2014

Demand Creation

The 2WT technology will be used for direct planting and fertilizer application to enhance conservation farming. Other uses will include spraying, grass cutting, transportation, shelling, threshing and water lifting. Adoption and promotion strategies for the 2WT will include demonstration sites, trade fairs, agricultural, shows, field days covered by media and promotional materials such as pamphlets, brochures and factsheets. Furthermore, adoption to be enhanced through capacity building, back-up support to farmers and service providers especially in areas regarding operations, repairs and maintenance. There is need to create push demand, thus training prospective farmers on the technology to raise interest and uptake of the technology.

The testing and evaluation will provide work rates and fuel consumption for profitability analysis. However, custom hiring schemes operated by service providers seems to be the more favored and preferred model in Makonde. In Domboshava a number of models can apply. The farmers in the district are engaged in high value crops/livestock therefore some farmers will be able to purchase the units as individuals. In addition, there are different thriving groups that are capable of mobilizing financial resources. The 2WT capacity utilization should not only be for planting but multi-purpose including other operations such as milling, transportation, shelling and water pumping.

5.2 Enabling Environment

The uptake of 2WT is determined by the business environment. The policy framework should support the market actors across the supply chain from the importers/dealers, manufacturers, distributors and the end-users. Currently agricultural mechanization equipment is imported duty free, hence an incentive for the private sector. The existence of ADMA offers coordination and lobbying role to link the private with the public sector.

The Ministry of Agriculture, Mechanization and Irrigation Development has crafted the policy document which is awaiting approval. There are technical departments under the Ministry of Agriculture, Mechanization and Irrigation Development that have critical role in promoting mechanization. These include the IAE and Agritex.

The financial sector needs to offer business solutions that support small holder farmers. They should be favorable terms that are long term in nature considering the seasonality in rain-fed agriculture. However, the financial sector is facing liquidity challenges and few banks that offer credit comes with high interest rates and collateral pre-requisite.

CHAPTER 6: CONSTRAINTS AND OPPORTUNITIES

The 2WT technology offers viability and labour reduction opportunities that need to be explored.

The main constraints faced by the subsector are related to issues of finance and policy.

The agricultural mechanization policy and strategy was crafted in 2005 and 2008, it has not been approved yet to guide the sub sector. Currently limited sources of finance are available for on lending to small holder farmers and this affect product demand. The strengths and weaknesses of the subsector are as illustrated in table 9 below:-

Table 9: SWOT Analysis

SWOT	2WT/4WT dealers
Strengths	<ul style="list-style-type: none"> Government support in terms of duty free to all agricultural implements and tractors. No import duties/taxes for agricultural machinery, promote importation.
	<ul style="list-style-type: none"> Existence of platforms like ADMA created for private sector incentives
	<ul style="list-style-type: none"> Strong spare parts system for tractor technology.
	<ul style="list-style-type: none"> Strong research and testing institute, which evaluates imported and locally manufactured equipment for adoption and acceptance by local end users.
	<ul style="list-style-type: none"> Existence of back-up services for the customers, training on operations by some dealers
	<ul style="list-style-type: none"> Traditionally mechanization positively led to increased productivity and area under production.
	<ul style="list-style-type: none"> Mechanization tools result in precision farming in terms of planting, fertilizer application.
Weaknesses	<ul style="list-style-type: none"> The duty free agricultural machinery and import duty applied to materials/spare parts affect local production. There may be import duty on steel but not on imported agricultural machinery which will disadvantage local manufacturers. Difficult to compete local products made with materials subjected to tax against tax free imported agricultural equipment.
	<ul style="list-style-type: none"> The country is currently facing a liquidity crunch. Unavailability and expensive financing packages affect all players along the chain. The importers, the dealers and the end users. The customers may be interested, but access to finance is prohibitive, hence limits uptake of agricultural machinery.
	<ul style="list-style-type: none"> The country has many brands, spares becomes an issue. Product brands should come with common spares e.g. filters.
	<ul style="list-style-type: none"> None existence of mechanization strategy, draft produced not yet approved.
	<ul style="list-style-type: none"> Government support not cohesive, at times exclude private players in tractor procurement, negative effect on back-up support.

	<ul style="list-style-type: none"> • Smallholder farming not yet business oriented, affect acquisition of machinery
	<ul style="list-style-type: none"> • Shortage of skilled tractor operators, this has led to high incident of tractor breakdowns. The life span of tractors has been reduced from around 8-10 years to about 3-4 years especially amongst new farmers.
	<ul style="list-style-type: none"> • Many extension officers are not aware of agricultural mechanization, not aware of available tools and how they are utilized. Limited farmer promotion
	<ul style="list-style-type: none"> • Distant locations for customers may affect access to spare parts and supplies.
Opportunities	<ul style="list-style-type: none"> • The land reform created the smallholder farmers under the A1 farms, the requirements of this group is not addressed greatly. This is a market that requires small-medium agricultural machinery to match their land size holdings. There is need to develop agricultural machinery for that clientele and suitable packages for such a new niche market.
	<ul style="list-style-type: none"> • Availability of back-up service at reasonable price, service kits critical for any technology especially for the first year of operation.
	<ul style="list-style-type: none"> • Provision of mechanization services as a business. Not every farmer should own a tractor but get services when needed. Need to develop the service provider business and network.
	<ul style="list-style-type: none"> • Many smallholder farmers not exposed to mechanization still using traditional ways.
	<ul style="list-style-type: none"> • There is room for lobbying and dialoguing to bring the private sector into development of agricultural machinery for smallholder farmers.
Threats	<ul style="list-style-type: none"> • Requirements of prototypes for adaptation may affect local manufacturing.
	<ul style="list-style-type: none"> • Importation of raw materials for local manufacturers especially steel may affect business viability

CHAPTER 7: STRATEGIES AND INTERVENTIONS

7.1 Possible Interventions

The constraints affecting the sub-sector present the underlying causes and bring about the possible interventions to address the gaps. Table 10 below describes the possible intervention strategies required for technology/product adoption.

Table 10: Possible Interventions

Key Issues	List of Interventions (Output)
Access to finance	Business solutions that address credit needs for smallholder farmers, custom hire service providers and importers/dealers
Limited 2WT technology awareness	Demonstrations conducted to raise product awareness within the farming community and the general market. Conducting Innovative Platforms on knowledge and skills sharing.
Availability of machinery for smallholder farmers	Adaptation and re-engineering of prototypes to meet the needs of smallholder farmers. On-farm demonstrations to create demand and uptake.
Limited knowledge on agricultural machinery for operators	Training of operators and the local agents on the technical aspects of the technology. Developing lead farmers or mechanics locally to assist in technical back-up issues.
Business management focus	Developing business plans for the 2WT illustrating profitability of different attachments. Training prospective service providers on financial and business management.
Availability of local spare parts	Need to build networks with local agro-dealers or general dealers on stocking 2WT spare parts. Local agro-dealers awareness on the technology critical.
2WT operator certifications	Training of operators and certification on the usage. Regulations on tarred roads operations explored and cleared.
2WT technology reducing labour drudgery	Demonstration plots and recording of operations documented and analyzed. Promoting mechanized operations that reduce labour.
Limited demand for 2WT and attachments	Creating Innovative Platforms, demonstrations, promotional materials
Unavailability of policy document of agricultural mechanization to guide the sector	Need dialoguing and lobbying for the approval of the crafted policy strategy document.

7.2 Strategic Actions

Strategic Action Area # 1

Policy Environment (Policy Dialogue)

Goal: To provide a policy framework document that guides the agricultural mechanization actors.

- The goal for this action is to ensure existence of a policy document to improve and strengthen collaboration and coordination.
- The enabling environment should promote viability and growth of the businesses (importers/dealers, manufacturers and end-users).

Strategic Action Area #2

Enhancing access to mechanization inputs and services for different farmer (groups/end users (FACASI))

Goal: To enhance access and uptake of viable and sustainable mechanization inputs (2WT) and services amongst smallholder farmers and service providers. The objective is to raise awareness and access to mechanization inputs, through:-

- Demonstrations of 2WT;
- Innovative Platforms for knowledge/information sharing;
- Developing business models that promote access to agricultural mechanization inputs;
- Research results of agricultural mechanization that show evidence of reduction of labour drudgery and improved incomes;
- Promoting network of service providers to enhance access to mechanization inputs.

Strategic Action Area # 3

Service Provider Capacity Building (FACASI)

The goal for this action is to improve research, operations and maintenance of machinery and extension services required to support mechanization initiative. Investing in various training programmes for farmers, service providers, extension staff and local artisans will form part of this strategic area. In addition, certification of service providers is critical.

Strategic Action Area # 4

Enhancing access to Credit (FACASI/Policy dialogue)

Goal: To enhance access to inputs credit for the smallholder farmers through contract farming arrangements.

- Establishment and strengthening of networks linking farmers with possible affordable financial institutions.
- Strengthening output market linkages to enhance investment options (purchasing power) in agricultural mechanization by smallholder farmers.

7.3 Conclusion

The agricultural mechanization actors in the country are mainly based on the 4WT, animal drawn and tractor drawn implements. The nascent market for the 2WT requires aggressive awareness and promotion for technology uptake. The low demand of the technology explains the low competitive rivalry unlike the 4WT market. The 4WT has a number of competitive major players who have been in existence for a long time.

The implementation of the strategic options together with the business models will therefore enhance technology/product development and usage amongst smallholder farmers.

References

- Binswanger H., (1986) *Agricultural Mechanization: A Comparative Historical Perspective: The World Bank Research Observer*, Vol. 1, No. 1 (Jan., 1986), pp. 27-56, Oxford University Press Stable URL: <http://www.jstor.org/stable/3986307>.
- CEMA, 2014 Advancing Agricultural Mechanization (AM) to promote farming & rural development in Africa, July 2014.
- FAO and UNIDO. 2008. *Agricultural Mechanization in Africa Time for Action, Planning for Enhanced Agricultural Productivity*. Report for an Expert Group Meeting held in January 2008, Vienna, Austria, FAO, Rome 2008; UNIDO Vienna 2008.
- Financial Gazette, 14 August 2014.
- Hanyani-Mlambo B.T., 2004. *The Status of Farm Level Mechanization ,Facilities, Services, Access Mechanisms and Strategies for Improving Mechanization in Zimbabwean Agricultural Systems*, FAO assessment mission report Harare.
- http://aci.gov.au/files/nodel/13993/developing_and_adapting_mechanised_conservation_ag_20273.pdf
- Koza T., 2010. *The Contribution of Agricultural Mechanization to Economic Growth and Development*, paper presented at The 4th EIZ/ZIE Engineers without Borders International Conference, 11-14 November 2010, Elephant Hills, Victoria Falls, Zimbabwe.
- Mafu V. 2011. *Agricultural Equipment and Implements Zimbabwe*, ZIMTRADE write up March 2011, Harare, Zimbabwe.
- Mfote D., 2004. *Zimbabwe Farm Mechanization Policy and Institutional Analysis*. FAO assessment mission report Harare.
- Musoni S., Raymond M. Nazare, Leonard Mukosera 2013 *Mechanization of Soya Bean Harvesting For Small and Medium Scale Farmers in Zimbabwe*; IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 4, Issue 1 (Jul. - Aug. 2013), PP 51-57 www.iosrjournals.org
- Nazare R.M., 2004. *The Status of Agricultural Mechanization Input Supply Chains in Zimbabwe and Strategies for Improving Input Supply*. FAO assessment mission report Harare.
- Newsday 2014. Newspaper Article, Monday July 18 2014, Harare Zimbabwe.
- Simalenga T.E., 2013. *Agricultural mechanization in Southern African Countries*. In Mechanization for Rural Development: A review of patterns and progress from around the world, *Integrated Crop Management Vol.20-2013 pp 15-43*.
- Starkey P., (ed), 1998. *Integrating mechanization into strategies for sustainable agriculture*. Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands.