



NATIONAL AGRICULTURAL MECHANISATION STRATEGY

2024 - 2028





NATIONAL AGRICULTURAL MECHANISATION STRATEGY 2024 - 2028

FOREWORD

This strategy focuses on addressing agricultural mechanisation challenges in the agricultural sector and accelerating progress towards the attainment of the national and global food security goals. The goal is to ensure that everyone everywhere has enough good-quality food to lead a healthy life. Achieving this Goal will require better access to food and the widespread promotion of sustainable agriculture. This is expected to lead to the attainment of the Sustainable Development Goals (SDGs), particularly the targets under SDG 1 “No Poverty”, SDG 2 “Zero hunger”, SDG 8 Decent work and economic growth, SDG 10 “Reduced inequalities” and SDG 13 “Climate Action”.

Further, the strategy is in line with and seeks to contribute to the national development agenda, as outlined in the Eighth National Development Plan (8NDP), the Comprehensive Agricultural Transformation Support Programme (CATSP) and the Vision 2030, which expresses the Zambian people’s aspiration to become “a prosperous middle-income nation by 2030”. It also resonates with the United Party for National Development (UPND) government’s strategic socio-economic development agenda, focused on boosting labour productivity and increasing agricultural production to end hunger and under-nutrition while accelerating economic growth.

Sustainable agricultural mechanisation development is an urgent, important, expensive and long-term investment option. However, due to the constraints on available resources and capabilities, strategic interventions will need to be prioritised. This strategy serves as a blueprint for transforming the agricultural sector through the adoption of modern mechanisation technologies that prioritise sustainability and inclusivity.

In this respect, the main focus will be on developing and dissemination of information on suitable sustainable agricultural mechanisation technologies for smallholder farmers and increasing private sector involvement and participation in the sustainable provision of appropriate agricultural mechanisation technologies and services along the agricultural value chain. This will require revamping adaptive agricultural mechanisation research, strengthening agricultural mechanisation training and extension services, scaling up agricultural financing for mechanisation research and extension and incentivising the private sector to provide sustainable agricultural mechanisation services, by strengthening its leadership and governance, as well as other support systems.

As we embark on the implementation of the national agricultural mechanisation strategy, we must acknowledge the pressing challenge of climate change that the country and the world at large face. The impact of climate change poses significant risks to our agricultural sector, including erratic weather patterns, increased frequency of extreme events, and shifts in ecosystems. Therefore, this strategy places a strong emphasis on climate action, aiming to integrate climate-resilient practices, reduce greenhouse gas emissions, and promote sustainable land management.

Sustainable agricultural mechanisation is a function of not only acquiring machinery and equipment, but also considering other socio-economic factors which play a crucial role in shaping the success and impact of any agricultural strategy. This strategy, therefore, takes into account the diverse social and economic dimensions of our country, aiming to address issues of rural poverty, gender inequality and access to resources and seeking to ensure that the benefits of sustainable agricultural mechanisation reach all segments of society, particularly the marginalised and vulnerable.

The strategy calls for committed and well-coordinated multi-sectoral collaboration and partnerships, in order to efficiently and effectively facilitate and enhance the utilisation and integration of sustainable agricultural mechanisation technologies along the value chain.

It is my wish that, with concerted effort and commitment from the Government, Cooperating Partners, NGOs, the private sector; Civil Society and other stakeholders, the successful implementation of this strategy will contribute to the sustainable transformation of the agricultural sector in the country.

I, therefore, implore all stakeholders involved in the implementation of this strategy to unreservedly dedicate themselves to this noble national duty.



A handwritten signature in black ink, appearing to be 'R. Phiri', written over a white rectangular area.

Hon. Reuben Mtolo Phiri, MP
MINISTER OF AGRICULTURE.

ACKNOWLEDGEMENT

The National Agricultural Mechanisation Strategy (NAMS) 2024 – 2028 was developed through a consultative process, with broad participation and contributions from various individuals, institutions, and stakeholders. We, therefore, wish to extend my sincere appreciation to all those who contributed to this process.

Special tribute goes to the Food and Agricultural Organisation of the United Nations (FAO) and the International Maize and Wheat Improvement Centre (CIMMYT) and the European Union (EU) for the technical and financial support rendered to the process of formulating this strategy.

Furthermore, We wish to express our sincere gratitude to the members of the NAMS Steering Committee, members of the NAMS Technical Working Group, staff from Provincial Agricultural Offices, training institutions, representatives of Non-Governmental Organisations (NGOs), the private sector and other relevant stakeholders for their participation, contributions and unwavering support to this process.

We also wish to commend the International and National consultants, for their dedication and commitment in taking the lead in the development of the strategy.

It is our desire that the aspirations of the National Agricultural Mechanisation Strategy will be realised and shall contribute to positive agricultural mechanisation development outcomes in the agricultural sector.



Yvonne Mpundu
Permanent Secretary (Administration),
MINISTRY OF AGRICULTURE.



Green Mbozi,
Permanent Secretary (Technical),
MINISTRY OF AGRICULTURE.

EXECUTIVE SUMMARY

1.1 Introduction

The National Agricultural Mechanisation Strategy (NAMS) 2024 - 2028 was developed within the context of the national and agricultural sector development planning frameworks. The Vision 2030, the Eighth National Development Plan (8NDP), the Second National Agricultural Policy and the Comprehensive Agricultural Transformation Support Programme guide the Strategy. Further guidance is from other relevant national, regional and international policy and strategic development frameworks and it is aligned to the United Party for National Development (UPND) Manifesto.

The Strategy represents a comprehensive strategic framework and direction for the agricultural mechanisation sub-sector for the next five years. It focuses on achieving national and global food security goals and objectives towards the attainment of targets under the Sustainable Development Goals (SDGs), especially SDG 1 “No Poverty”, SDG 2 “Zero hunger”, SDG 8 Decent work and economic growth, SDG 10 “Reduced inequalities” and SDG 13 “Climate Action”.

The Strategy has been structured along the building blocks of the Framework for Sustainable Agricultural Mechanisation in Africa (F-SAMA). It was developed through a broadly consultative process, involving all the main stakeholder groups in the agricultural sector.

1.2 Background

The Zambian government has positioned the agricultural sector to be a key driver of the economy, complementing mining, which continues to be the main source of national revenue and export earnings. The country has enormous potential to expand agricultural production due to the vast resource endowment in land, water, good climatic conditions and labour. However, Zambia’s agriculture is still characterised by low productivity due to several factors, including low levels of agricultural mechanisation.

The government has demonstrated political will and commitment to make agricultural mechanisation along the value chain a driving force in the agricultural transformation agenda. Over the years, efforts have been made to promote agricultural mechanisation among smallholder farmers through various projects, schemes and initiatives involving various players, including government, development partners, non-governmental organisations and the private sector. These have included providing agricultural mechanisation machinery and equipment to individuals, cooperatives or farmer groups, who were in turn expected to provide mechanisation services to smallholder farmers. However, these efforts have had limited success.

One of the major reasons for the disappointing performance and low contribution of mechanisation to agricultural development in Zambia has been the fragmented approach to agricultural mechanisation issues. This can be attributed to, among others, the lack of a clear sustainable agricultural mechanisation policy/strategic framework, poor coordination within and between government institutions and stakeholders, and over-reliance on unpredictable or unsuitable, one-off aid-in-kind or other external mechanisation inputs.

To enhance coordination and streamline the implementation of agricultural mechanisation initiatives, the Ministry of Agriculture (MoA), embarked on a process to formulate the National Agricultural Mechanisation Strategy (NAMS). The Food and Agriculture Organisation of the United Nations (FAO) and the International Maize and Wheat Improvement Centre (CIMMYT) provided technical support and the European Union, through the project (GCP/ZAM/080/EC) ‘Sustainable Intensification for Smallholder farmers in Zambia (SIFAZ) provided financial support. The NAMS will define the overall action plan to increase and expand the use of agricultural mechanisation by creating an enabling environment for the sustainable development of

agricultural mechanisation in Zambia, to improve agricultural productivity, food security and quality for the benefit of farmers and other value chain actors.

1.3 Vision Mission and Overall Objective

In order to be sustainable agricultural mechanisation actions must be part of a continuous, long-term process and thus, the long-term vision in line with Zambia's Vision 2030 is:

1.3.1 Vision

By 2030, agricultural mechanisation in Zambia will be sufficient, sustainable and adapted to the socio-economic context of stakeholders and environmental requirements, contributing to food security, the competitiveness of agricultural products, the strengthening of agricultural value chains, and increased incomes for agricultural farmers.

1.3.2 Mission

The mission is to create an enabling environment for the sustainable development of agricultural mechanisation that meets the needs of stakeholders, including women and youth, considering economic, social, and environmental sustainability.

1.3.3 Overall Objective

To make agricultural mechanisation and its services more accessible, of better quality, and more efficient for the benefit of different categories of farmers along the agri-food value chain.

1.4 Theory of Change

The theory of change addresses various issues raised in the diagnosis to guide the type of changes that will need to be made in the years to come. The overall objective is to make agricultural mechanisation and its services more accessible, of better quality, and more efficient for the benefit of smallholder farmers along the agri-food value chain.

The first change to be considered is to effectively promote and enhance the adoption of appropriate practices in using and managing agricultural mechanisation machinery and equipment efficiently. The objective is to undertake strategic interventions to develop, manage and disseminate technical knowledge in agricultural mechanisation. This knowledge will serve as the basis for training, extension and advisory services to enable smallholder farmers to choose appropriate agricultural machinery, equipment and practices and for agricultural equipment supply chain actors to provide quality services in agricultural mechanisation. The second change to be considered is strengthening the demand for agricultural mechanisation by making equipment and machinery sustainably accessible to farmers. By accessibility, we mean how farmers can access agricultural equipment and machinery, which can be purchased or hired from entrepreneurs or mechanisation service providers (MSPs). Accessibility also includes access to various mechanisation services, such as maintenance (repairs) and spare parts.

The third change is to improve the role of the private sector in the agricultural mechanisation supply chain so that it effectively and efficiently meets the needs of smallholder farmers by providing good quality agricultural machinery and equipment and related services on a sustainable basis.

The three changes constitute the three thematic areas addressed by the theory of change.

1.5 Thematic Areas, Strategic Objectives and Interventions

The three thematic areas and strategic Objectives are as follows:

Thematic Area 1: Promoting sustainable and efficient agricultural mechanisation practices among smallholder farmers.

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- ◆ **Strategic Objective 1.1:** Promote the development of knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.
- ◆ **Strategic Objective 1.2:** Disseminate knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.
- ◆ **Strategic Objective 1.3:** Strengthen the national education and vocational training system in agricultural mechanisation.

Thematic Area 2: Strengthening agricultural mechanisation demand for smallholder farmers, women and youth.

- ◆ **Strategic Objective 2.1:** Promote access to smallholder land development services.
- ◆ **Strategic Objective 2.2:** Promote financial products/mechanisms to enhance smallholder farmers' acquisition of agricultural machinery and equipment.
- ◆ **Strategic Objective 2.3:** Promote the use of agricultural machinery and equipment among women and youth smallholder farmers.

Thematic Area 3: Strengthening the role of the private sector in the agricultural mechanisation supply chain.

- ◆ **Strategic Objective 3.1:** Strengthen the local manufacture and importation of agricultural machinery and equipment by the private sector.
- ◆ **Strategic Objective 3.2:** Develop a regulatory framework for quality assurance of agricultural machinery, equipment and tools.

1.6 Institutional Framework

The complexity of agricultural mechanisation and its multidisciplinary nature means that many institutions will need to be involved to ensure its successful implementation. The Government will ensure that a comprehensive framework for the effective coordination and implementation of an integrated National Agricultural Mechanisation Strategy is put in place. The institutional framework proposed is based on creating a National Agricultural Mechanisation Steering Committee and National Agricultural Mechanisation Technical Committee.

The National Agricultural Mechanisation Steering Committee shall be the supreme decision-making body for overseeing and providing policy guidelines on the implementation of agricultural mechanisation interventions in the country and shall comprise selected relevant Ministries, representatives from the private sector, farmer organisations and associations, NGOs, Accademia and Cooperating partners. It will be co-chaired by the Permanent Secretary in the Ministry of Agriculture and a representative of the Private Sector. The National Agricultural Mechanisation Technical Committee shall be the main advisory body to the Steering Committee on policy and programme implementation of Agricultural Mechanisation interventions in Zambia. The Director of Agriculture shall chair the Technical Committee.

The Ministry responsible for Agriculture will be the lead institution in overseeing the coordination and implementation of the National Agricultural Mechanisation Strategy strategic interventions.

1.7 Monitoring and Evaluation

The implementation of the NAMS will be monitored regularly by the National Agricultural Mechanisation Steering Committee and Technical Committee by utilising an annual reporting framework to report progress.

Evaluation will be conducted to assess the impact of the NAMS by the responsible ministries establishing base-line benchmarks and indicators in collaboration with key stakeholders.

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The NAMS is underpinned on the principles of integration, collaboration and cooperation with stakeholders, hence monitoring and evaluation shall be undertaken through strong partnership between government ministries, the private sector, development and cooperating partners, informal sector, NGOs, CSOs, academic institutions and other stakeholders.

1.8 Financing

The government will be responsible for mobilising the necessary financial resources and setting up an appropriate institutional framework. To this end, it will be expected to provide an annual budget to fund the line ministries to enable them effectively undertake strategic actions targeted by the NAMS. Development and Cooperating partners will also be expected to participate in implementing the strategy by financing various strategic interventions. The estimation of the NAMS implementation costs was based on an indicative assessment of the resources necessary for the activities planned to attain the results defined to achieve the targeted objectives. The total cost for the five (5) years duration of the strategy is estimated at **ZMW 3,681 billion** (equivalent to **US\$ 184 Million**).

1.9 Communication Plan

The National Agricultural Mechanisation Strategy (NAMS) will need to be disseminated to all relevant stakeholders through a robust communication plan. The National Agricultural Information Services (NAIS) in the Ministry of Agriculture will develop a communication plan for the NAMS. This plan will have strategies to facilitate communication through different media platforms to smallholder farmers and all relevant stakeholders in the sector.

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LIST OF ABBREVIATIONS

ADP	Animal Drought Power
AERs	Agro-Ecological Regions
ADVANCE	Agricultural Development and Value Chain Enhancement AKTC
Agricultural Knowledge and Training Center	
AUC	African Union Commission
CA	Conservation Agriculture
CAADP	Comprehensive Africa Agriculture Development Programme
CASU	Conservation Agriculture Scaling-up
CATSP	Comprehensive Agricultural Transformation Support Programme
CEEC	Citizens Economic Empowerment Commission CFU
Conservation Farming Unit	
CIMMYT	International Maize and Wheat Improvement Centre
CP	Cooperating Partner
DACO	District Agricultural Coordinator
DAZ	Dairy Association of Zambia
EC	European Commission
EU	European Union
FISRI	Farmer Input Support Response Initiative
FAO	Food and Agriculture Organisation of the United Nations
FISP	Fertiliser Input Support Programme
F-SAMA	Framework for Sustainable Agricultural Mechanisation in Africa
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
IAPRI	Indaba Agricultural Policy Research Institute
MCTI	Ministry of Commerce, Trade and Industry
MFIs	Microfinance Institutions
MFL	Ministry of Fisheries and Livestock

MoA	Ministry of Agriculture
MoE	Ministry of Education
MoFNP	Ministry of Finance and National Planning
MLGRD	Ministry of Local Government and Rural Development MSMED
	Ministry of Small and Medium Enterprises Development
MTS	Ministry of Technology and Science
NAIP	National Agricultural Investment Plan
NAMS	National Agricultural Mechanisation Strategy
NAP	National Agricultural Policy
NDC	Zambia's Nationally Determined Contribution
NDP	National Development Plan
SAM	Sustainable Agriculture Mechanisation
SIFAZ	Sustainable Intensification of Smallholder Farming Systems in Zambia
SNAP	Second National Agricultural Policy
SSA	Sub-Saharan Africa
RALS	Rural Agricultural and Livelihoods Survey
TDAU	Technology Development and Advisory Unit
TEVETA	Technical Education, Vocational and Entrepreneurship Training Authority
TWG	Technical Working Group
UNFCCC	United Nations Framework Convention on Climate Change
UNZA	University of Zambia
ZARI	Zambia Agriculture Research Institute
ZamStats	Zambia Statistical Agency
ZCA	Zambia College of Agriculture
ZMW	Zambian Kwacha (Zambian currency) ZNFU
Zambia National Farmers Union	

Chapter 1. Introduction

Rationale

The Zambian government has positioned the agricultural sector to be a key driver of the economy, complementing mining, which continues to be the main source of national revenue and export earnings. The country has enormous potential to expand agricultural production due to the vast resource endowment in land and water, good climatic conditions and abundant labour. However, Zambia's agriculture is still characterized by low productivity, due to a number of factors, including low levels of agricultural mechanisation.

Generally, the use of agricultural mechanisation among smallholder farmers is rather low as most farmers still use traditional agricultural hand tools and animal traction tools and implements. According to a nationally representative survey conducted by IAPRI in 2019, only 1.7% of households used mechanical power in their farm operations and on average, 46.3% used animal traction. The average maize yields among small and medium scale farmers are on average less than 2.0 MTs per hectare compared to an average yield of over 8.0 MTs per hectare among commercial farmers, whose farm operations are mechanised.

It is generally recognised that agricultural mechanisation plays a crucial role in enabling commercial agri-food systems' growth and improving the efficiency of operations along the agricultural value chains. As such, it can significantly influence the availability and accessibility of more nutritious foods, contributing to increased household food security. Agricultural mechanisation also eases and reduces drudgery, relieves labour shortages and improves productivity. In addition, it improves timeliness of agricultural operations, increases resource-use efficiency, enhances market access and contributes to mitigating climate-related hazards. Agricultural mechanisation is key to Africa's ambition to end hunger by the year 2025 as stated in the Malabo declaration of 2014. The Food and Agricultural Organisation of the United Nations (FAO) and the African Union Commission (AUC) launched the Framework for Sustainable Agricultural Mechanisation in Africa (F-SAMA) in 2018, which provides a menu of priority elements for African countries to consider in developing their strategies for Sustainable Agricultural Mechanisation (SAM).

Against this backdrop, the Zambian government has demonstrated political will and commitment by making agricultural mechanisation a driving force in the agricultural transformation agenda. Over the years, efforts have been made to promote agricultural mechanisation among smallholder farmers through various projects, schemes and initiatives involving various players including government, development partners, non-governmental organisations and the private sector. These interventions have included providing agricultural mechanisation equipment to individual farmers and entrepreneurs, cooperatives or farmer groups, who were in turn expected to provide mechanisation services to smallholder farmers. However, the efforts have had limited success.

One of the major reasons for the disappointing performance and low contribution of mechanisation to agricultural development in Zambia has been the fragmented approach to agricultural mechanisation issues. This can be attributed to among others lack of a clear sustainable mechanisation policy/strategic framework, poor coordination within and between government institutions and stakeholders, and over reliance on unpredictable or unsuitable, one-off aid-in-kind or other external mechanisation inputs.

To enhance coordination and streamline the implementation of agricultural mechanisation initiatives, the Ministry of Agriculture (MoA), embarked on a process to formulate the National Agricultural Mechanisation Strategy (NAMS). The Food and Agriculture Organisation of the United Nations (FAO) and the International Maize and Wheat Improvement Centre (CIMMYT) provided technical support and the European Union, through the project (GCP/ZAM/080/EC) 'Sustainable Intensification for Smallholder farmers in Zambia (SIFAZ) provided financial support. The NAMS will define the overall action plan to increase and expand the use of agricultural mechanisation, by creating an enabling environment for the sustainable development of



agricultural mechanisation in Zambia to improve agricultural productivity, food security and quality for the benefit of farmers and other value chain actors.

1.2 Country profile

Zambia is a landlocked country, surrounded by eight countries namely: the Democratic Republic of Congo to the north, Tanzania to the northeast, Malawi to the east, Mozambique, to the southeast, Zimbabwe, Botswana, and Namibia to the south, and Angola to the west. The country covers a geographical area of 752,612 square kilometers and is administratively, divided into 10 provinces and 116 districts, as of 31st December 2021.

The climate is predominantly subtropical and characterised by three distinct seasons: (i) hot, dry season (mid-August to mid-November), (ii) wet rainy season (mid-November to April), and (III) dry, cool season (May to mid-August). Annual rainfall averages 700 mm in the south and 1400 mm in the north. The cool and hot months between May and October are very dry, receiving almost no rainfall. Rainfall in the wet season (November-April) is controlled by the Inter Tropical Convergence Zone, (ITCZ), which oscillates between the northern and southern tropics over the year, bringing rainfall of between 150 to 300 mm per month.

Over the years, Zambia's population has continued to rapidly grow, rising from 13.1 million in 2010 to 19,610,769 (9.6 million males, 10 million females) in 2022 with a growth rate of 3.4 % and an average household size of 4.8 people.

Zambia's youth population is about 50% of the total population. About 60% of the total labour force is directly involved in the agricultural sector. About 78 % of the women labour force is engaged in agriculture, compared with 69 % men. It is estimated that 64% of the unemployed Zambians are youth with the majority moving away from the agricultural sector to fast growing non-agricultural sectors in urban areas. This results in rural-to-urban migration consequently reducing the labour force in rural areas to work in the agricultural sector. In 2020, the average youth unemployment rate was estimated at 19.9 %. It was higher in urban areas at 20.8 % than in rural areas at 18.0 %.

In 2021, the Zambian economy grew by an estimated 3.6%, bolstered by good copper prices, favourable external demand, good rainfall and post-election market confidence. This followed a 2.8% recession recorded in 2020. However, poverty remained high at about 60% of the population and the impact of the COVID-19 pandemic crisis was also high. The medium-term outlook, while positive, faced downward risks from prolonged debt negotiations and low COVID-19 vaccination rates. The Kwacha appreciated by 21% in 2021, reflecting an improved reserve position from the new International Monetary Fund (IMF) Special Drawing Rights (SDR) allocation, high post-election consumer and investor confidence, and increased portfolio inflows from non-resident holders of domestic sovereign debt. (Economic Recovery Programme Report, 2020).

Agriculture, mining, manufacturing and tourism are key drivers upon which the country's economic growth agenda is anchored. These sectors also account for a significant proportion of employed persons. The agriculture sector provides livelihood to more than 70 % of the population. In terms of performance, in the ten-year period between 2011 and 2020, agricultural growth averaged 0.4 % while its share of GDP was 5.8 %. The growth of the Agricultural sector has been lower than the annual national population growth rate, yet it is the mainstay of a larger proportion of the population. (GRZ, 2022).



Infrastructure development remains a major challenge to growth, economic diversification, and human development. Since 1991 it has been the general policy of the Government to provide an enabling environment for active private sector participation in the direct provision of goods and services.

The limited coverage of roads, telecommunications, and infrastructure constrain the effective supply of goods and services. Limited access to electricity is a constraint both for enterprises and individuals; access to electricity is the third largest constraint cited by enterprises in the 2013 Enterprises Survey.

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Only about 4 % of the population in rural areas has access to electricity. The share of the rural population that lives within 2 km of a road in good condition is estimated at 17 %, and it is estimated to take more than 1 hour to travel to the nearest input market. The spread of internet services has improved in recent years, but access remains low in rural areas.

Underdeveloped infrastructure and lack of access to markets hinder agricultural profitability and disproportionately affect smallholder farmers. Poor rail and highway infrastructure, impede smallholder farmers' entry into export markets.

1.3 The Agricultural Sector

Agriculture is the backbone of the Zambian economy, employing about 67 % of Zambia's rural workforce and provides over 15.5 % of formal employment. The sector is, therefore, a key driver for achieving the 10 % annual economic growth envisioned in the Vision 2030. It also has a critical role in reducing extreme poverty and hunger, in line with Sustainable Development Goals 1 and 2. Mechanisation, as a crucial input, has not been fully exploited in the transformation of the agricultural sector and has the potential to significantly contribute to meeting the increasing national and global food needs. The main agricultural subsectors that require mechanisation interventions to boost productivity and improve agribusiness, are crops, livestock and fisheries. The agricultural sector contribution to gross domestic product (GDP) has declined considerably in recent years. The sector contributed 2.7 % to the national GDP in 2020, down from a peak of 15.6 % in 2004. Over the past three decades, Zambia has experienced extreme weather events such as El Niño, resulting in high rainfall variability which has negatively impacted agricultural production and productivity.

The crop subsector significantly contributes to the economy, with industrial crops accounting for up to 70 % of agricultural exports, including maize, sugar, cotton, soybeans, coffee, barley, tobacco and tea. Maize, cassava, wheat and rice are the main staple foods consumed in Zambia, in descending order. At the national level, maize is largely the dominant staple food crop, accounting for more than half of the total caloric intake.

The livestock subsector contributes 3.2 % to the overall national GDP and 42 % to the agricultural GDP. These figures do not include the contribution of animal traction power and manure. The subsector meets national needs for meat, milk, eggs, honey and other livestock products, accounting for about 30% of total marketed agricultural products. The subsector generates foreign exchange for the country by exporting live animals, meat, genetic material, hides, skins and their products, dairy products and processed pork products. It also employs approximately 50% of the country's agricultural labour force. The subsector also provides substantial household income through sells of livestock and livestock products and supplies raw materials to agribusinesses.

The fisheries subsector accounts for approximately 1.24% of gross domestic product (GDP) or 3% of agricultural GDP. This relatively small contribution at the macro level masks the important contribution of fish production to the rural economy through employment, income, and as a food source. The average annual per capita fish consumption is estimated at 6.4 kg, which accounts for over 40% of the animal protein intake of an average Zambian diet.



4. Methodology

The methodology adopted in the formulation of the NAMS took into account the country's context regarding the level of agricultural mechanisation and the diversity of stakeholders. Therefore, emphasis was placed on the importance of maintaining a holistic approach that considered not only the engineering aspects, but also other aspects related to agricultural mechanisation such as the socio-economic, institutional and environmental dimensions.

A team of national consultants was engaged in the following thematic areas: agro-economics, agricultural machinery, agronomy and institutional environment. The national consultants worked under the guidance of an international consultant and supervision of the FAO Lead Technical Officer.



The approach employed was also participatory and involved relevant stakeholders in all the formulation phases. The participatory process include the holding of several stakeholder consultation meetings and workshops and sharing the diagnostic results with the technical working group (TWG) for their review. Two essential phases were conducted:

The first phase included the situation analysis study, which assessed the current status of agricultural mechanisation in Zambia. It used qualitative methods mainly, to collect both primary and secondary data. Secondary data was obtained through literature review of available reports and documents from relevant institutions. Primary data on the other hand was collected through key informant interviews with senior staff from selected departments in the Ministry of Agriculture (National, Provincial and District level) and selected institutions as well as through field visits to selected districts within Zambia. Using a semi-structured checklist, key informant interviews were conducted with public and private extension, research, academic and vocational training institutions, all categories of farmers and the private sector involved in the agricultural mechanisation supply chain.

The situational analysis covered the following themes:

- agricultural production systems. agricultural economics
- dealing with socio-economic aspects.
- agricultural equipment, machinery and equipment situation, focusing on supply chain and,
- Institutional environment dealing with the legal and institutional support.

The final outcomes of the situational analysis phase, presented in the form of SWOT matrices were reviewed by the TWG and validated by stakeholders in review and national consultation workshops held in Lusaka on 31st January 2023 and 1st February 2023 respectively.

The second phase involved the formulation of the draft national agricultural mechanisation strategy based on the findings from the situational analysis and diagnosis of challenges and opportunities related to agricultural mechanisation in Zambia. The draft strategy proposed strategic objectives, required interventions and an Action/implementation plan. The draft strategy was discussed and validated in a national stakeholder workshop held in Lusaka on 24th May 2023.

This document presents the National Agricultural Mechanisation Strategy which provides a strategic direction for enhanced agricultural mechanisation use and development in Zambia among smallholder farmers for the period 2024 - 2028.



PART 1.

SITUATION ANALYSIS OF

AGRICULTURAL

MECHANISATION

IN ZAMBIA

National Agricultural Mechanisation Strategy - 2024 to 2028



Chapter 2. Analysis of Agricultural Production Systems: Demand for Agricultural Mechanisation

2.1 Overview of agricultural production systems in Zambia

The state of agricultural mechanisation in a country is a reflection of its agricultural production systems, which depend on biophysical and socioeconomic factors. In formulating a NAMS, it is imperative to examine the existing agricultural production systems in each of the main agro-ecological regions in relation to the farmer categories, cropping systems and patterns and the type of livestock raised.

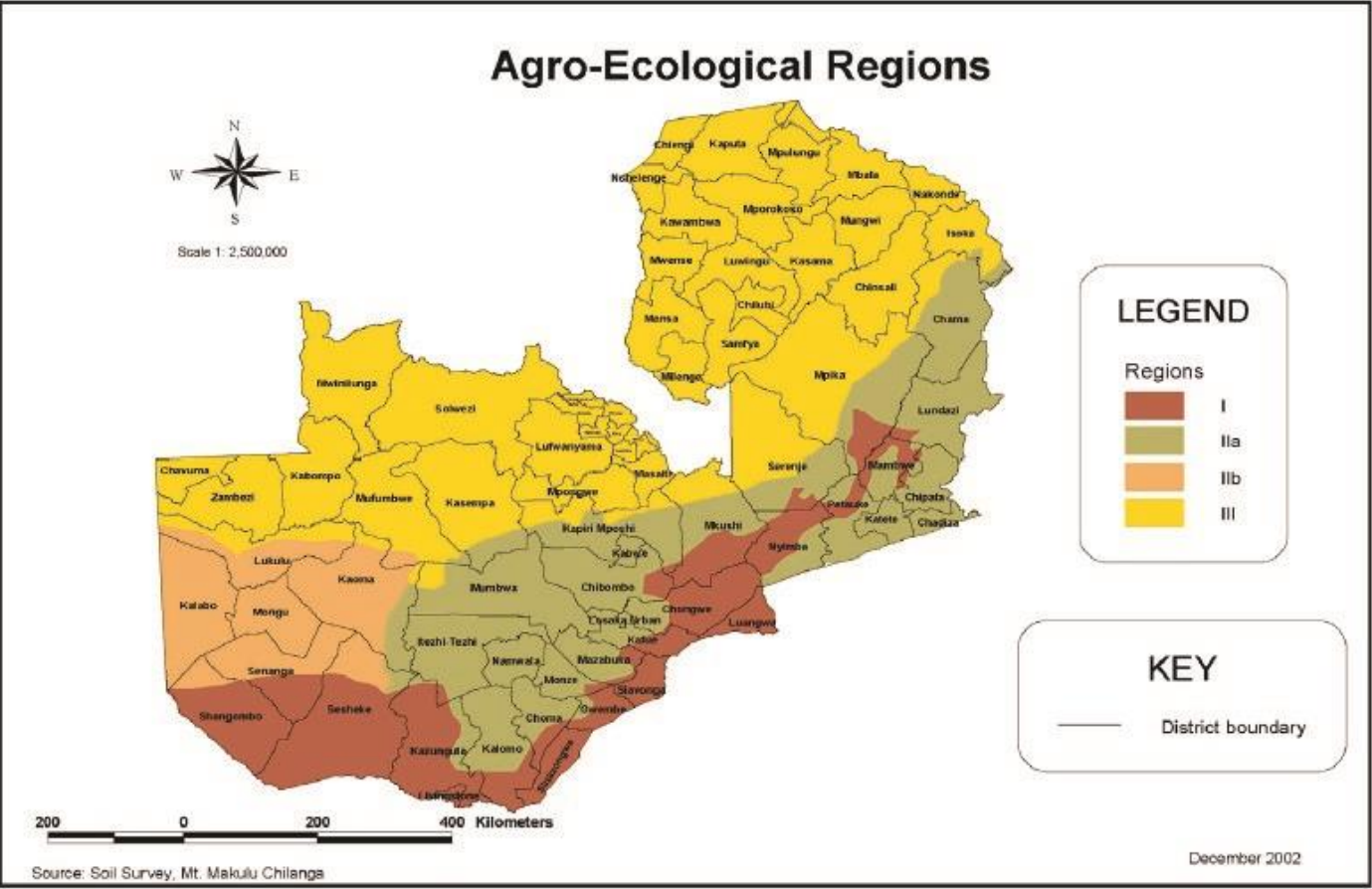
2.1.1. Main Agro-ecological Regions

Zambia is divided into three major Agro-Ecological Regions (AERs), namely I, II and III (Figure 1 below), which are determined primarily by average annual rainfall and to some extent soil characteristics. A detailed



description of each agro-ecological region regarding climatic conditions and limitations for agricultural production is presented in Table 1.

Figure 1. Main Agro-Ecological Regions of Zambia



Source: Soil Survey, Mt. Makulu



Table 1 : Climatic Characteristics of major Agro-Ecological Regions in Zambia

Region	Average rainfall (mm/yr)	Elevation (m)	Growing season (days)	Risk of drought	Occurrence of frost in dry season	Minimum monthly temperature (°c) (Dec -Feb)
I	Less than 800mm	300 - 900; 800 -1,200	80-130	Medium to high	Risk on plateau areas	19-21
II	800 - 1,000	900 -1,300	100-140	Medium to low	Risk on central plateau	17-18
III	More than 1,000	1,100 -1,700 (less than 1,000 in Luapula province)	120-150	Almost nil	Some risk in the south west	14-16

Source: adopted from Saasa (2003)

Agro-Ecological Region I (AER I)

Agro-ecological region I is characterized by a short growing season and low and poorly distributed rainfall, which pose significant challenges for sustainable agricultural production. The average annual rainfall in this region is between 600 and 800 mm, and the length of the growing season varies from 80 to 120 days. Lack of moisture due to low rainfall and frequent droughts is one of the major limiting constraints to agricultural production and productivity. This region has been more affected by the effects of climate change, which have manifested in increased severity and frequency of droughts. In addition to changes in rainfall amounts, there are also associated changes in rainfall patterns that affect rainfall onset and cessation dates. AER I has predominantly smallholder farmers and occurs in the major valley systems mainly.

In the Luangwa and Zambezi Valleys, sorghum, finger millet and maize are the major starchy food crops, while groundnuts, cowpeas and pumpkins are also grown. Farmers use hand hoes for cultivation. Goats and chickens are commonly kept by farm households and some farmers have a few cattle. The major crop production constraints include: 1) moisture limitation as a result of frequent drought occurrence and short growing period exacerbated by high temperatures; 2) low soil fertility; 3) high prevalence of diseases and pests and 4) absence of animal draught power and equipment.

Agro-Ecological Region II (AER II)

AER II has two subdivisions, IIa and IIb. Subdivision IIa covers the plateau areas of Southern, Lusaka, Eastern and most parts of Central and Western provinces, while IIb covers the Kalahari sandy areas of Western province. The region contains the most fertile soils and most of the country's commercial farms. Annual rainfall averages 800 - 1000 mm and the growing season is between 100 - 140 days. Distribution of rainfall is not as erratic as in Region I, but prolonged dry spells are becoming common and reducing crop yields, especially on the sandier soils. The region has been impacted by the effect of climate change resulting in significant reduction of the growing season because of increased variability in the rainfall pattern, late onset and early cessation of rains, making it difficult to grow long maturing crop varieties. Climate change effects have also led to increased flash flooding incidences.



Large commercial farmers are concentrated in AER II. Their farming systems are mechanised and highly diverse, cultivating maize, soybeans, wheat, cotton, tobacco, coffee, sugarcane, vegetables, and flowers, and raising livestock. However, small and medium scale farmers are still in the majority in this region growing maize, beans, groundnuts, cotton, soybean, sunflower, cowpea and sorghum. They also commonly raise cattle, chickens, goats, pigs and sheep.

In the Southern and parts of Eastern, Lusaka, Central and Western provinces, the use of animal drought power (ADP) is a common source of farm power used in farm operations by smallholder farmers, mainly for land preparation and cultivation. This involves the use of such equipment as the moldboard plough, disc plough, disc harrow, ridger ripper and cultivator. There is also a small percentage of small and medium scale farmers using 4-wheeled tractors for farm operations such as ploughing, disc harrowing, ripping, planting, fertiliser application and weeding. These farmers are also increasingly using machinery in post-harvest and processing activities, such as, shelling/threshing, hammer mills and oil expellers to produce mealie meal and cooking oil respectively. The major constraints to increased crop production in AER II are depletion of soil fertility, soil degradation and inadequate capacity to control livestock parasites and diseases.

Agro-Ecological Region III

AER III is classified as high rainfall region, receiving rainfall above 1000 mm per annum on average. The length of the growing season ranges from 120 to 150 days. Compared to regions I & II, this region receives ample rainfall both in terms of amounts and number of rain days. However, the region has also to some extent been impacted by the effects of climate change manifesting in late onset and early cessation of rains. Small-scale farming predominates and the population density remains the lowest in Zambia. The farming systems are dominated by shifting and semi-permanent cultivation systems, low input use and dependence on hand tools (hoe). The level of mechanisation among smallholder farmers is very low compared to AER II. Crop productivity is constrained generally by poor soil fertility, while rearing of livestock is constrained by the prevalence of a number of parasites and diseases.

2.1.2. Types of Farmers in Zambia.

Farmers in Zambia are classified into three main categories, mainly based on the size of farmed land and to some extent the main objective for farming, whether producing for subsistence or for the market. The categories are i) small scale (less than 5 hectares), ii) medium scale (5 to 20 hectares); and iii) large scale (more than 20 hectares).

Small scale farmers

This category of farmers is estimated to be around 3,700,000 (ZIAMIS 2022) representing more than 79 % of all farmers in Zambia and are predominant in all AERs. Although these farmers are generally categorized as those cultivating less than 5 hectares, the majority (62.8%) cultivate less than 2 hectares, while about 30% cultivate between 2 to 5 hectares.

Smallscale farmers are mainly characterised as being largely subsistence producers of staple food crops with an occasional surplus for sale on the local markets. They contribute up to 80% of agricultural production, especially in terms of maize production, the main national staple food crop.

However, their production and productivity levels are low due to a number of factors, among them the low adoption and use of improved technologies, including improved crop varieties, fertilisers and mechanisation. As a result of the low level of mechanisation, the majority of smallholder farmers continue to rely heavily on the use of the hand hoe for their farm operations.



Medium Scale Farmers

This category of farmers cultivates between 5 - 20 hectares and are estimated to be over 150,000, representing about 4 % of all farmers in Zambia. Although a significant part of their produce is retained for consumption, they endeavour to produce for the market. Medium-scale farmers grow maize and cash crops such as cotton, tobacco, soybean and other high value crops. These farmers use more advanced agricultural mechanisation technologies, such as four-wheel tractors and associated implements, including integrated pieces of equipment combining more than one operation, such as planters with fertiliser applicators. Medium-scale farmers tend to use more external agricultural inputs such as fertilisers, certified seed and pesticides, with a higher dependence on hired labour.

Large Scale Farmers

Farmers in this category cultivate more than 20 hectares and are estimated to be over 1,500, representing less than 0.31 % of all farmers. Their sole objective is to produce for the market. These farmers employ high management practices using improved agricultural technologies, including the use of improved high-performing crop varieties, certified seed, pesticides and fertilisers. Their production is mechanised, with tractors and high-precision equipment being used for most farm operations, including land preparation, sowing or planting, weed control and harvesting. These farmers may hire specialised machinery such as combine harvesters. They also employ permanent labour, rely heavily on hired casual labour and rear mostly exotic livestock breeds.

2.1.3. Major Farming Systems in Zambia

Farming systems in Zambia are classified based on the cultivation practices and cropping systems and patterns. There are indications that these farming systems have been evolving under the influence of a number of socio-economic, cultural and environmental factors, including population dynamics, policy changes, climate change and technological advancements. There has also been a shift in the type of crops cultivated, tillage systems used, and livestock reared in most farming systems. There are five major farming systems found in Zambia which include:-

Shifting Cultivation (Chitemene System)

Historically, most of the traditional agricultural production systems are based on this type of farming system. Land is left to fallow after 3 to 6 years of continuous cultivation and therefore, the systems tend to have very high land requirements. Due to a number of factors, including land pressure, a shift from typical shifting cultivation farming systems has been taking place.

This is an extensive system, which is unsustainable, especially with increasing population and relies on the use of hand tools (Axe & hoe) and is not compatible with mechanisation, largely due to the presence of tree stumps and roots in the chitemene system farm plots, which may present serious operational challenges in the use of agricultural mechanisation machinery and equipment/implements.

Semi-Permanent Hoe System

This system is mostly practiced in AER I and some parts of AER II and is based on cultivating the same piece of land using a hand hoe. In AER I, the land holdings are generally small due to limited availability of cultivable land. Major constraints to agricultural production, especially cropping, include harsh climatic conditions, such as moisture limitations and high temperatures. However, significant livestock production does take place.





Semi-Permanent Hoe and Ox-Plough System

This system is practiced in AER II, with maize, finger millet, sorghum, groundnuts and beans as the dominant crops. Some cassava, although not significant, is also grown in certain areas. Livestock plays an important role in these systems. There are four different cultivation systems under this farming system, which are discussed below:

- ◆ Maize/cattle mixed farming system (Central, Eastern and Southern provinces, and Kaoma district) where higher levels of adoption of ox and tractor drawn implements, for land preparation, planting and weeding are found.
- ◆ Central Zambezi Farming system (Zambezi flood plains of Western province) which has adapted to the specific conditions of the Zambezi flood plains.
- ◆ Pearl millet, sorghum, cassava oxen-based farming system (Senanga, Sesheke districts of Western province) where the production is mainly for subsistence, with insignificant maize production but with more sorghum and millet production.
- ◆ Sorghum/maize and cattle-based farming system (Luangwa valley of Muchinga province, Chama district) where the cultivation of sorghum has been declining over the years with maize and other crops, such as soybean taking up more area under cultivation.

Semi- Commercial Farming System

This farming system is common in AER II, although it can also be found scattered throughout the country, with the production systems involving mainly medium scale or emergent farmers. Cash crops, particularly maize, soybean, tobacco, cotton and groundnuts being dominant. The area cultivated is usually above 5 hectares, employing both animal draught power and tractor drawn equipment and implements for ploughing, sowing and weeding. They also use mechanical equipment for threshing/shelling as well as processing.

Commercial Farming System

These are highly specialised farming systems with big variations. Their characteristics are extensive mechanisation, use of high-level technologies and management systems and rearing mostly exotic livestock breeds. More than 60% of large-scale farmers in Zambia are located in the Central and Southern provinces and are mostly concentrated along the line of rail/urban areas.

2.1.4. Cropping Calendar

The cropping calendar is a practical tool that allows farmers to plan and structure the use of agricultural machinery and equipment throughout the year and therefore, their profitability. The cropping calendar considered here is for rainfed field crops generally grown by smallholder farmers in Zambia. In general, most field crops are grown in the rainy season from November to March. There may be no significant differences in crop calendars of different field crops across agro-ecological regions. However, there may be significant differences in the crop calendars of some crops, which may be influenced by the length of the growing period.

Figure 2 below, shows the national cropping calendars for the main field crops cultivated by smallholder farmers. The key farm operations indicated start with land preparation followed by planting, cultivation/weeding and end with harvesting. As most of these farm operations at different stages are time bound, it is imperative that they are completed within a given window in the growing season.

Much as most farmers strive to complete the activities in a given time frame (window) within the cropping calendar, they are in some cases not able to do so due to a number of constraints, including labour shortage and lack of timely access to suitable agricultural mechanisation machinery and equipment/implements.

Mechanisation needs for different farm operations to be undertaken at the different stages of the cropping calendar for each crop should be taken into consideration to promote the development and use of mechanisation among smallholder farmers.

Figure 2. National cropping calendar for different crops

Crop	Activity	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
	Rainfall												
Maize	Land preparation												
	Planting												
	Weeding												
	Harvesting												
Sorghum	Land preparation												
	Planting												
	Weeding												
	Harvesting												
F/ millet	Land preparation												
	Planting												
	Weeding												
	Harvesting												
Cowpea	Land preparation												
	Planting												
	Weeding												
	Harvesting												
Common Bean	Land preparation												
	Planting												
	Weeding												
	Harvesting												
Soybean	Land preparation												
	Planting												
	Weeding												
	Harvesting												
G/ nuts	Land preparation												
	Planting												
	Weeding												
	Harvesting												

Cotton	La nd p re p a ra tion												
	Pla nting												
	We e d ing												
	Ha rve sting												
Sunflowe r	La nd p re p a ra tion												
	Pla nting												
	We e d ing												
	Ha rve sting												
Cassava	La nd p re p n												
	Pla nting												
	We e d ing												
	Ha rve sting	Afte r 18-24 months											

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2.2. Agricultural Production

2.2.3. Crop Sub-sector

Zambia produces a wide range of crops. The food crops are classified into cereals (maize, wheat, sorghum, rice, millet); legumes or pulses (groundnuts, beans, pigeon pea, cowpea, chickpea, green grams), roots and tubers (Sweet potato, Irish potato and Cassava,) and horticultural crops (vegetables, fruits and flowers). The main food crops are maize, rice, wheat, sorghum, potato, cassava, vegetables and beans. The main industrial crops are tea, coffee, sugar cane, cotton, soybean, sunflower and tobacco. The horticultural industry also plays an important role in the national economy.

In recent years, most food crops have recorded increased production. For instance, the 2019/2020 agricultural season recorded a substantial increase in production of most crops with a notable increase in maize production. This was on account of favourable weather conditions, increase in area planted and production,

supported by the early delivery of inputs to smallholder farmers under the Farmer Input Support Programme (FISP).

However, the production of other crops, particularly cotton, legumes and root crops, declined due to a combination of factors such as the effects of heavy rains, increased incidences of pests and diseases and lack of quality planting materials.

2.2.4. Livestock Sub-sector

Nationally the most common type of livestock owned by the majority of households are chickens followed by goats and cattle. According to the Rural Agricultural and Livelihoods Survey (RALS) conducted in 2018, on average, more than 80% of the households own at least one chicken, 41% own goats, 32.7% cattle and only 15.5% reported owning pigs (IAPRI, 2019). As is generally known the percentage of households raising cattle is highest in four provinces, Southern with 59.5%, followed by Eastern with 49.7% Central with 45.1% and Western with 41.2%. Luapula and Northern provinces have the least number of households rearing cattle, with only 1.2% in Luapula and 7.9% in Northern.

There are a number of commercial processing facilities for various livestock products, which include meat and dairy products. The major commercial companies involved in the processing of livestock products include Zambef Ltd, Majuro Investment Ltd and Parmalat Ltd. There is an increase in the number of small and medium commercial livestock processing enterprises that have emerged over the last few years. **2.3.**

Profitability of Selected Agricultural Enterprises

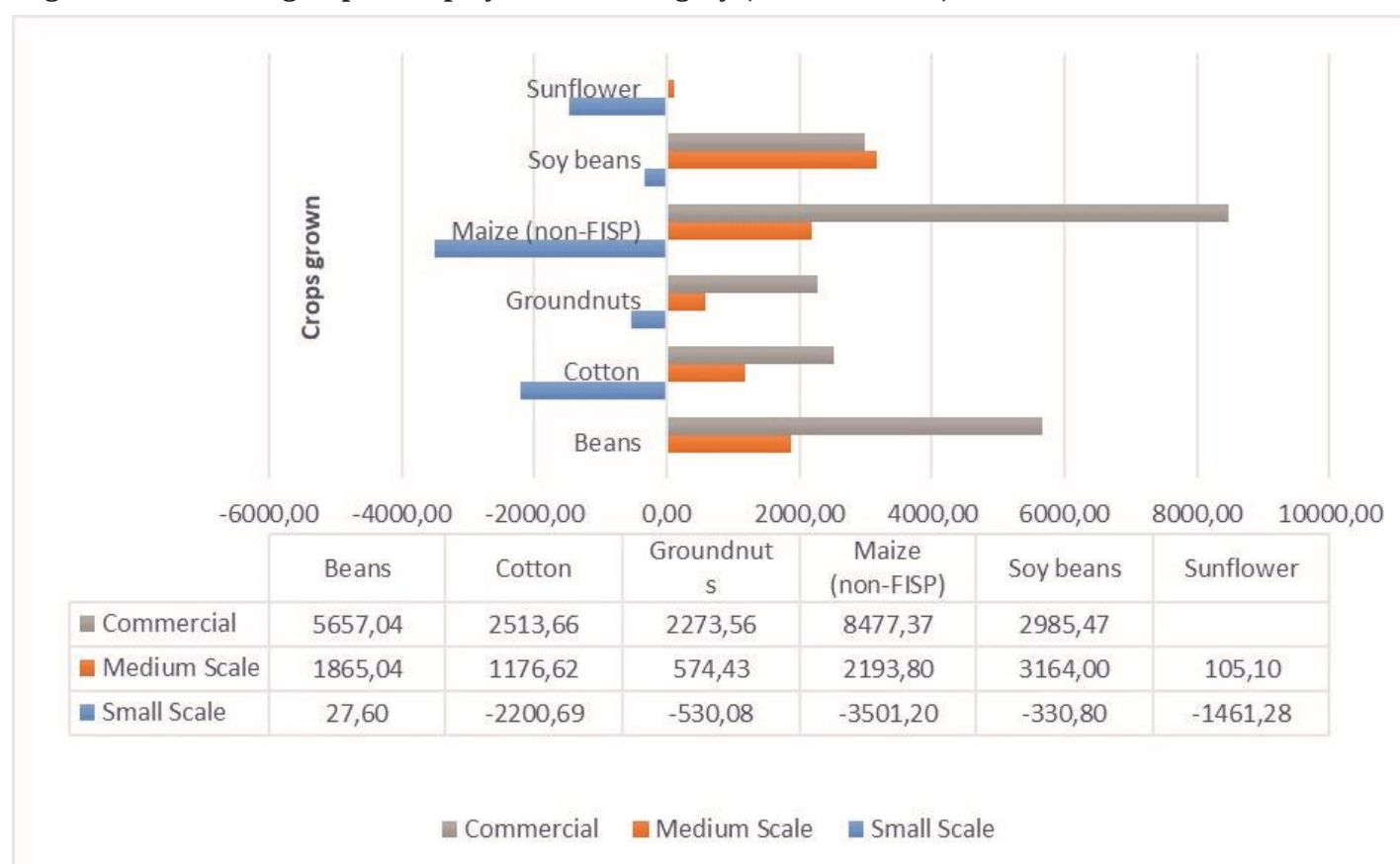
Gross margin analysis is a simple model that is used to estimate the financial returns to a production process. It is used as a simple proxy for the profitability of a production process. Because of its simplicity, and the lack of data to compute profits, especially under smallholder farm conditions, it is widely applied as part of the evaluation of the economic performance of smallholder agricultural production systems.

The capability of farmers to maintain or acquire agricultural machinery depends on the profitability of the farm enterprises. In this review, gross margin analysis was used to evaluate the profitability of the production of some of the most commonly grown crops in Zambia. Gross margin was defined as the difference between revenue and the total cost incurred along the value chain from production to marketing the product.

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Figure 3 below presents the gross margins for beans, cotton, groundnuts, maize, soybeans and sunflower

Figure 3. Gross Margins per Crop by Farmer Category (ZMW/Hectare)



Source: Ministry of Agriculture, 2019/2020 farming season

The gross margins discussed in Figure 3 show that smallholder farmers get negative gross margins per hectare for all the crops except beans. On the other hand, medium-scale and commercial farmers have positive gross margins for all the crops implying that they are able to make profit per hectare for all the crops. Statistics from

the Ministry of Agriculture show that smallholder farmers cultivate less than two hectares of land which is subdivided into fields for all the crops they grow. With these small fields, smallholder farmers incur losses and fail to break even. However, medium-scale and commercial farmers cultivate larger hectares per crop that enable them to enjoy economies of scale. As a result, they are able to make a profit.

2.4. Agricultural Mechanisation among Smallholder Farmers

2.4.1. Mechanisation in Crop Production Systems

Agricultural mechanisation in crop production systems among smallholder farmers is low. Land preparation and planting usually are done manually and access to tractor hire services is very limited. The percentage of households using mechanical power is about 2 % nationally while that of animal draught power is at 46%.

The Southern, Central, Western and Eastern provinces have the highest rates of animal draught power use with 93%, 68%, 60.5% and 57%, respectively. Farmers under the commercial farming system usually own specialised and custom-built machinery and equipment and keep abreast with technological advancements. Farmers in the medium-scale farming system mostly hire machinery and equipment.

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The tractor ownership rate among smallholder farmers is 0.2%. The IAPRI 2019 survey showed that the most common assets owned by smallholders are ox-drawn ploughs (24.1%), trained oxen (22.7%) and backpack sprayers (21.9%). Other farm equipment owned by households were handcarts (10.8%) and wheelbarrows (9.3%), while the remaining farm assets were owned by less than 5% of households (see Table 2 below).

Table 2 : Percent of Household Ownership of Farm Assets/Agricultural Machinery

Asset	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Trained Oxen/Cows	22.7	35.2	7.7	36.1	0.3	16.7	0.7	5.1	7.4	52.4	23.1
Ox-drawn plough	24.1	38.0	9.7	31.3	0.3	18.2	0.7	4.4	5.2	63.5	27.1
Disc plough	0.7	2.9	0.8	0.5	0.1	1.8	0.3	0.1	0.0	0.4	0.5
Harrows	4.5	11.8	3.4	0.2	0.4	5.7	0.0	0.0	0.0	17.9	1.2
Cultivators	3.0	4.7	0.7	0.4	0.4	1.4	0.5	0.0	0.1	15.6	0.0
Rippers	2.0	3.9	0.5	4.7	0.1	2.9	0.0	0.0	0.1	3.7	0.2
Ridger / weeder	2.9	2.3	0.7	12.6	0.1	1.2	0.1	0.0	0.0	1.5	0.0
Planter	0.3	1.2	0.0	0.1	0.1	0.5	0.0	0.0	0.0	0.4	0.7
Fitarelli	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Tractor	0.2	0.8	0.5	0.1	0.0	1.4	0.0	0.0	0.0	0.3	0.0
Hand driven tractor	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scotch carts	10.8	14.8	3.8	18.6	0.3	11.3	0.6	0.7	4.4	21.9	14.9
Wheel barrow	9.3	13.3	17.0	5.6	9.2	43.3	10.2	3.5	10.5	8.3	3.4
Water pump / treadle	2.2	6.1	5.8	0.9	0.7	8.3	0.4	0.5	1.9	2.4	1.7
Other irrigation equipment (e.g.	4.5	7.0	6.8	11.6	2.8	8.1	0.3	0.3	0.9	2.4	1.7

irrigation pipes)											
Knapsack sprayer	21.9	40.6	33.1	27.0	4.3	49.0	13.4	4.3	14.4	35.9	7.2
Boom sprayer	1.1	2.4	0.0	3.0	0.1	0.2	0.6	0.2	0.4	0.8	0.2

Source: IAPRI 2019

Land Preparation Machinery and Equipment

The agricultural assets ownership pattern shows that rural households mainly own agricultural machinery and equipment used for land preparation, crop protection and to a lesser extent product transport. Ploughing is mainly done by oxen and in a few cases, four-wheel tractors using implements such as ploughs, rippers, ridgers and harrows.

Planting Machinery and Equipment

Most planting operations are undertaken using human labour. Mechanised planting is done for major food crops only such as maize and soya beans. The equipment/implements used for planting are ox-drawn or tractor-drawn planters which are either owned or hired. The lack of mechanisation of planting is generally related to the lack of appropriate machinery or financial resources to purchase the equipment/implements on the local market.

Weeding Machinery and Equipment

Weeding is a labour-intensive operation that is relatively rarely mechanised. It is in most cases a poorly performed operation that contributes to reduced crop yields. The maize value chain is the most prevalent, but less than 3% of smallholder farmers use weeders or cultivators. In contrast, a relatively high number (21.9%) use knapsack sprayers (herbicides) for weed control. With limited mechanised weeding services available, most farmers engage in manual weeding which is very tedious and considered to be more expensive than mechanised weeding.

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Irrigation Equipment

Most smallholder farmers depend on rain-fed agriculture. However, some do irrigate crops during the dry or off-season to increase crop production options and income. The results from the 2019 RALS survey show that ownership of irrigation equipment is very low, implying a high dependence on rainfed agriculture. Very few farmers own irrigation equipment (4.5%) and treadle pumps (2.2%). The limited irrigation activities of smallholder farmers are mainly concentrated in the horticultural (Vegetable) value chains.

Harvesting Machinery and Equipment

Harvesting in smallholder production/farming systems is mostly done using manual labour and because of the high cost of labour, it makes this an expensive undertaking. There is no significant mechanisation in harvesting of field crops. This may be explained by the lack of appropriate mechanisation technologies and services on the market for smallholder farmers.

Transportation Machinery

Transportation is significant and is relatively mechanised among small-scale farming households. The machinery used in transportation for food and other crops includes Ox/donkey drawn carts, tractor drawn

trailers, bicycles, motorcycles, wheelbarrows, and motor vehicles. Smallholder farmers, as indicated in Table 3, often own the machinery.

Table 3: Percent of household ownership of other farm assets/agricultural machinery

Asset	National	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western
Trucks / lorries	0.7	2.6	0.7	0.3	0.2	2.9	0.2	0.1	0.4	0.8	0.0
Pickups / vans / cars	3.4	5.1	4.0	2.9	1.7	17.5	1.8	1.7	4.8	3.6	1.2
Trailer	0.2	0.3	0.8	0.0	0.3	0.3	0.0	0.0	0.0	0.4	0.0
Motorcycle	3.9	1.6	0.5	5.5	1.8	1.8	1.9	3.1	14.6	5.7	0.3
Bicycles	59.5	77.5	68.7	62.1	69.3	56.1	58.9	60.8	60.4	52.0	29.0
Boats / canoes	5.1	0.0	1.4	0.0	14.9	0.7	2.4	7.3	7.8	3.0	14.3
Fishing net	6.0	1.2	2.4	1.1	19.3	1.0	2.6	9.4	7.4	1.9	15.0
Cattle dip / crush pen	0.5	0.8	0.6	0.4	0.1	0.5	0.1	0.1	0.0	1.8	0.2
Hand mills	1.3	0.4	0.0	0.0	0.0	0.3	0.5	0.1	2.0	7.3	0.0
Hammer mills	1.8	3.3	1.1	0.9	0.4	2.2	1.3	1.9	4.1	3.1	0.4
Rump presses / oil expellers	0.3	0.2	0.2	0.3	0.0	0.0	0.1	0.0	0.0	1.7	0.0
Hand operated maize sheller	0.1	0.2	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.1	0.0
Motorized maize sheller	0.1	0.5	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.3	0.0
Hand operated groundnut sheller	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Motorized groundnut sheller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solar panel and equipment	40.1	51.7	39.9	44.4	27.8	59.4	39.2	36.0	36.9	40.6	31.1
Generator	2.3	5.4	3.6	1.7	1.3	3.1	1.4	1.5	5.8	1.1	1.3
Water Tank	0.8	0.6	1.7	0.2	0.3	6.5	0.0	0.0	1.4	1.7	0.1
Standard well (protected)	4.3	16.9	12.2	2.2	0.7	2.9	5.6	0.8	0.0	2.2	2.4
Borehole	1.3	1.7	2.3	0.6	0.0	8.9	1.1	0.2	1.5	0.7	3.0
Spray race	0.2	0.6	0.1	0.4	0.0	0.2	0.3	0.4	0.0	0.0	0.0

Source: IAPRI 2019

Value Addition Machinery and Equipment

Value addition, although emphasised in policy/strategic documents, there appears to be little tangible effort in its promotion as is evident from the value chains studied. The limited mechanisation in value addition in the food value chains analysed among the smallholder farmers included the use of hammer mills, oil expellers, and peanut butter making machines.

2.4.2. Mechanisation in Small Scale Livestock and Fishery Systems

Mechanisation in livestock systems is limited and mostly concentrated in animal health care practices such as use of spray races (0.2%) and cattle dips/crash pens (0.5%). Mechanisation in hay baling, forage and feed production are almost nonexistent among the smallholder farmers. Mechanisation in fishery systems is divided into capture and aquaculture. Under the capture system, smallholder fisher-folk usually use artisanal techniques such as non-motorised boats and nets, with use of motorised boats being low. Under aquaculture, small scale fisher-folk utilise manual labour during excavation, pond lining and harvesting while large scale fisher-folk use motorised machinery and equipment including excavators, feeders and aerators in their operations. Constraints faced by smallholder fisher-folk and mechanisation service providers include high cost of appropriate machinery and equipment as well as insufficient operational skills and inadequate information on the availability of appropriate machinery and equipment.

2.5. Mechanisation among Medium and Large-Scale Farmers

The use of machinery and equipment in medium and large-scale agricultural production systems is very high compared to the small-scale agricultural production systems. Farmers under the large-scale system usually own specialised and custom-built equipment and keep abreast with technological advancements. Farmers in the medium scale farming system mostly hire machinery and equipment. Mechanisation services in this category are mainly provided by private service providers.

If one uses tractors as a proxy to assess the demand or degree of mechanisation among farmers, it can be noted that mechanisation among medium and large-scale farmers is relatively high in Zambia.

There are no reliable figures for the total number of working tractors in Zambia, but it is estimated at around 6,000 tractors, which means that hypothetically there are about 21 tractors per 100 square kilometers of arable land. In comparison to other African countries, this number seems high, but for Zambia it must be recognised that the tractors are mainly used by large and corporate farms, whereas access to mechanisation services among smallholder farmers is still extremely limited in most parts of the country.

2.6. Summary of the Situation Analysis: SWOT Analyses

The conclusions of the SWOT analysis of the demand for agricultural mechanisation are summarised in table 4 below:

Table 4: SWOT Analysis for the Demand for Agricultural Mechanisation

Status of Farming and Crop Production Systems	
Strengths	Weaknesses
- Large numbers (>90%) - Predominant across all AERs - Contribute up to 80% of agricultural production. - Use of fertiliser improved and increasing	- Cultivate small areas (63% cultivate less than 2 ha). - Small farm holdings and fragmented land parcels. - Poorly stumped and levelled farm plots/fields. - Low productivity. - Low levels of mechanisation. - Limited knowledge and skills in advanced farming technologies/practices. - Inadequate access to mechanisation extension services. - Lack of access to finance and financial services to acquire agricultural machinery.
Opportunities	Threats
- Availability of markets for agricultural produce. - Availability of financing schemes for mechanisation machinery and implements /equipment. - Development of farm blocks - Establishment of cattle breeding centres. - Implementation of cattle stocking and restocking programme.	- Over dependency on government input subsidy programmes such as FISP. - Vulnerability to adverse effects of climate change due to over dependence on rainfall - Increasing cost of agricultural inputs (Machinery, fertiliser, labour etc). - Changes in agriculture and related policies.
Medium Scale Farmers (5 – 20 Ha)	
Strengths	Weaknesses

- More commercially oriented (produce mainly for market).
- Higher levels of use of mechanisation.
- Use more of external inputs (e.g improved seed and fertiliser)
- Greater use of hired labour.
- More knowledgeable and skilled in farm management.

- Concentrated in some parts of the country (AER II)
- Inadequate access to agricultural/ mechanisation extension services
- Inadequate access to specialised mechanisation machinery and equipment

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Opportunities	Threats
• Availability of financing initiatives for mechanisation machinery and implements/equipment. • Establishment of cattle breeding centres. • Development of new farm blocks. • Expanding markets for agricultural produce.	• Concentrated in some parts of the country (AER II) • Poor agricultural mechanisation extension services • Limited access to specialised mechanisation machinery and equipment • Vulnerability to adverse effects of climate change due to over dependence on rainfall • Increasing cost of agricultural inputs (Machinery, fertiliser, labour etc). • Changes in agriculture and related policies. •
Large Scale Farmers (more than 20 ha)	
Strengths	Weaknesses
• Cultivate larger areas (up to thousands of hectares). • Commercially oriented (produce solely for market). • Highly mechanised (all farm operations). • Employ permanent and casual labour. • Highly knowledgeable and skilled. • •	• Fewer and concentrated in some parts of the country (<1.0% and mostly in AER II).
Opportunities	Threats

• Expanding markets for agricultural produce, including export markets. • Development of farm blocks in all AERs and provinces. • Favourable agricultural related policies e.g promotion of value addition).	• Increased cost of farming (electricity tariffs fuel, spare parts etc). • Change in agriculture and related policies.
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Status of Farming and Crop Production Systems	
Strengths	Weaknesses
• Shifting cultivation system is a well-adapted traditional practice in AER III. • Relatively higher levels of ADP under semi-permanent hoe and ox plough system. • Higher levels of mechanisation under semi-commercial ox and tractor plough systems. • Extensive use of mechanisation - including advanced specialised equipment under commercial farming system. • Emerging diversification of crop value chains among small and medium scale farmers. • Expansion in cropped area over the years. •	• Shifting cultivation is an extensive system not compatible with mechanisation. • Poorly stumped and levelled fields under the semi-permanent hoe system. • Planting on ridges contributes to low plant population and low yield under semi-permanent hoe and ox plough system. • Limited access to mechanisation implements and equipment. • Limited numbers of commercial farmers who are concentrated along the line of rail. • Predominance of maize value chain • High post-harvest crop losses among small and medium scale farmers. • Over dependence on rainfed cropping. • Low crop yields among smallholder farmers. • Poor land management and crop husbandry practices among smallholder farmers.
Opportunities	Threats

- Increased access to soil improvement technologies by smallholder farmers practicing shifting cultivation. - Government cattle stocking and restocking programme - Proximity of semi-commercial ox and tractor plough to commercial farming systems provide opportunity for knowledge and skills transfer. - Development of farm blocks will lead to expansion of commercial farming systems	- Population increase has the potential to limit shifting cultivation system. - Increased cost of farming (cost of inputs such as fertilisers, operational cost of machinery due to increased fuel prices and cost of labour). - Increased incidences of adverse effects of climate change. - Pest and disease outbreaks. - Over dependence on maize production.
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Status Agricultural Production, Intensification and Climate Smart Practices and Technologies

Strengths	Weaknesses
- Appropriate Ox and tractor drawn implements (rippers, direct planters etc) for CA practices. - Increased adoption of strip cropping and mechanisation technologies/practices.	- Poor weed management under CA systems among smallholder farmers. - SIP technologies not widely adopted and applied on large scale.

- Planting on the flat reduces labour required for making ridges. - Use of permanent ridges and raised beds suitable for AER III.	- Lack of appropriate mechanisation implements for some SIPs recommended for AER III. - Limited access to appropriate conservation agriculture machinery and equipment. - Gender inequalities and cultural barriers in agricultural mechanisation.
Opportunities	Threats
- Interest by government and development partners to support promotion of SIPs. - Interest by government and development partners to support promotion of agricultural mechanisation initiatives.	- Low interest to adopt SIPs by farmers. - Low empowerment of young women to take up decision making roles. - Change in government and development partners priorities to support to promotion of SIP and mechanisation interventions.

Chapter 3. Agricultural Mechanisation Supply Chain

The supply of agricultural mechanisation services in Zambia, is diverse and includes all types of agricultural equipment, be it manual, animal-drawn or motorised. Understanding the existing supply chain for agricultural machinery and equipment is essential in analysing the agricultural mechanisation situation. This involves data collection of importers, domestic manufacturing, artisanal manufacturing, national, regional, and local distribution, retail systems, maintenance and repair facilities and hire service providers.

3.1. Imports of Agricultural Machinery and Equipment

The importation of agricultural machinery and equipment is limited to a few companies, which include SARO Agro Industrial Ltd, CAMCO Equipment Ltd, Growmore Technologies Ltd, Danatrac Ltd, Tata Zambia Ltd, Agricon Equipment Zambia Ltd and AGCO Zambia Ltd. These companies import a variety of agricultural machinery and equipment, particularly tractors ranging from 25 to 250 hp and agricultural equipment such as ploughs, planters, sprayers, combine harvesters, forage harvesters, balers and other hay and forage handling equipment. They also import machinery and equipment for crop processing/value addition for both commercial and smallholder farmers.

SARO Agro Industrial Ltd on average sells 300 tractors and 1,000 pieces of equipment per year. The sales volume of tractors and equipment was US\$19 million in 2019, US\$18.5 million in 2020 and US\$23.1 million in 2021. The increase in sales volume was mainly attributed to farmers' accessing financing through leasing companies and government-led empowerment initiatives. Demand for tractors was so high that some demand was unmet.

CAMCO equipment Ltd, during the same period recorded an increase in the total volume of tractor and equipment sales per year from 202 in 2019 to 277 in 2022. This increase in the sales of tractors and farm equipment was also attributed to farmers' mainly accessing lease financing. At the moment SARO Agro Industrial Ltd and CAMCO Equipment Ltd appear to be the main players in terms of supplying agricultural machinery and equipment in Zambia. In 2021 Tata Zambia took over the franchise of John Deere from AFGRI making it one of the other major players in providing agricultural machinery and equipment. AGCO Zambia Ltd supplies the Massey Ferguson tractor brand and provides after sales services to farmers for this brand of tractors and equipment.

SARO Agro Industrial Ltd has presence in Lusaka, Kitwe and Mkushi and through its network of dealers extends its presence to many parts of the country. While CAMCO Equipment Ltd has presence in Lusaka, Kitwe, Choma, Kapiri Mposhi, Chipata and Solwezi. The other companies have presence in no more than two districts. This implies that farmers in areas far from these districts have to rely on agents and agro suppliers to access mechanisation services and goods. In addition, they encounter challenges in terms of higher costs and a longer time period to wait for and access the needed mechanisation services. This does negatively impact production as most agricultural operations are time sensitive.

Agricultural machinery suppliers stock a range of machinery and equipment such as tractors, implements and post-harvest and processing equipment. Most of the machinery and equipment is imported and only commonly used machinery and equipment is usually stocked in the shops. Specialised equipment or tractors beyond 150 hp have to be ordered upon request. Therefore, buying a piece of equipment might take three to six months even if the payment is made on demand. The availability of machinery and equipment has been exacerbated by the COVID 19 pandemic which has made importation of certain parts rather difficult, consequently requiring long lead time periods to acquire.

In Zambia, there are also a number of suppliers of used tractors and equipment. The largest Internet presence is TRACTORPROVIDER.net, which imports used tractors from Japan. The other supplier is Tractor/farm Equipment which buys used tractors within Zambia and sells them locally. Tractor/farm Equipment normally deals in John Deere, Massey Ferguson and TAFE brands of tractors. In rare cases they deal in the New Holland Tractor. They are able to sell 10 tractors and about 100 agricultural implements in a year.

3.2. Manufacturing of Agricultural Machinery and Equipment

There are two major local manufacturers of machinery and equipment in Zambia and these are SARO Agro Industrial Ltd and CAMCO Equipment Ltd, which also supply imported machinery and undertake repairs and maintenance.

Very little data is available on the manufacturing of agro-processing machinery in Zambia, including grain-milling machinery. Established firms such as CAMCO Equipment Ltd receive assistance in R&D from entities such as the China National Machine Heavy Industry Group to design and manufacture large and more complex milling systems that require installation.

CAMCO Equipment Ltd also manufactures small-scale mills, as do established firms such as SARO Industrial Ltd, which specialises in hammer mills. Other agricultural manufacturing firms import parts from India and China, which they assemble for the market.

Toyo Agro & Motorcycles Assembly parts are imported from Chinese companies in China that hold international certificates of quality and standards. The large firms manufacture not only machinery used in farming and agro-processing but also machinery for the mining, construction, forestry, and utilities (electricity and water) sectors to diversify their income streams. Other large firms like Tata Zambia Ltd also supply various agricultural processing equipment such as hammer mills and oil expellers (Chigumira, 2019).

The other important manufacturer in Zambia is SARO Agro Industrial Ltd, which is a multi-faceted supplier and manufacturer of agricultural machinery and equipment. SARO Agro Industrial Ltd has a state-of-the-art laser cutting machine which enables it to manufacture products which include rippers (ox and tractor drawn), hammer mills, threshers and feed mixers. It can produce upto 100 hammer mills per month, which translates to 1,200 pieces per year. 60 threshers per year and 20-30 feed mixtures per year. It has also innovated by providing a platform for the two wheeled tractor which allows the operator to seat while undertaking farm operations. SARO Agro Industrial Ltd also does fabricate/manufacture basic machine parts like gears and feed augers.

Local steel is very expensive and most of it does not meet the quality standards for high grade steel. This implies that high grade steel has to be imported, making it expensive for local products to be competitive as the cost is also influenced by the foreign exchange rate. While complete machinery are tax exempt, most spare parts and parts like motors are not.

Table 5 shows the types of machinery and equipment manufactured in Zambia, some of which are exported. It is clear that manufacturing has been tilted towards maize processing which is the crop that has received massive support from the government.

Table 5 : Manufacturers and Suppliers of Agricultural Machinery in Zambia

Firm, year of establishment and nationality	Type of machinery manufactured
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SARO Group (1998) , Zambian	Rippers, hammer mills, threshers and feed mixers and other soil engaging tools for two wheeled tractors. They also manufacture trailers
CAMCO (1998), Chinese	Maize dehullers, combined rice mills, roasting cylinders, feed mixers oil filters, oil expellers, stone separators, rice mills, hammer mills, corn flour processing machines, peanut butter machines, sugar cane squeezers, maize shellers.
Growmore Technologies (2009), Indian	Dehullers, hammermills, maize grinding mill and maize shellers.
Zamcapital Enterprises , Zambian	Hammermills, windmills, maize shellers, milk buckets and milking cages.

3.3. Maintenance and Repair of Agricultural Machinery

Buying machinery or equipment should not be the ultimate aim, the main aim must be to acquire a piece of machinery or equipment and be able to use it when needed. This means that spares should be available when needed and so should the capability and capacity to repair them. The 4 main agricultural machinery and equipment suppliers in Zambia have mechanical workshops, warehouses stocked with different spares parts and teams of technicians who provide repair machinery and equipment in the field. These companies operate under franchises of renowned brands like FARMTRAC, LOVOL, and New Holland. The franchises entail that the local companies provide aftersales services/support to their clients.

In addition, the four companies provide training in the appropriate use and maintenance of machinery and equipment supplied by respective companies. However, it was observed that sometimes the people trained are not the ones who operate the machinery and equipment, thereby defeating the purpose for training. It was also noted that there are very few trained tractor and machine operators in Zambia and the demand for this skilled labour force is very high.

In some areas where local expertise is available, the clients just buy the spare parts and the local technicians/mechanics undertake the repairs, however, the presence of competent local expertise is far and wide. The presence of maintenance and repair facilities provided by mechanisation service providers is found in just a few places across the country, mainly in areas near and adjacent to commercial or corporate farms. This, therefore, means that it takes time for clients far away from the main towns or commercial and corporate farms, to access the necessary mechanisation services and spare parts.

3.4. Mechanisation Hire Services Providers Business Models.

Private Entrepreneurship Business Model: is the most common and viable form of mechanisation hire service provision in Zambia. It is seen to be the most efficient way to provide mechanisation services to smallholder farmers. When offered by local entrepreneurs as a full time hire service business or a vertically integrated business together with sales of machinery and equipment, the business model was more profitable. The most common form of hire service provision is a farmer providing services to other farmers living within the same proximity. In this model, the hire service business tends to be a supplementary source of income to their farming operations. Farmers who provide custom-hire services tend to buy the machinery and equipment primarily for their use, but because of the high capital costs of the machinery they offer hire services to recoup some of the cost. However, the downside is that this service is only provided once they have finished their own farm operations. Consequently, the timeliness in providing the mechanisation services to other farmers does often get compromised.

Group or Organisation Business Model: was seen to be the most prone to inefficiencies. In theory, farmer organisations and cooperatives are perceived to be useful organisational structures through which mechanisation services can be provided to members. Groups can take different forms, they can either be formal cooperatives or less formal farmer groups. The latter tend to be attractive for including the more vulnerable members of the rural community. In practice, however, their performance has been generally weak. The farmer organisational models for mechanisation service delivery should offer an advantage in terms of affordability of the machinery as the assets are purchased by members as a collective good. In this business model, the cooperative owns machinery and equipment and provides services to farmers, whether they are members or not. In most cases, if the farmers requesting for the mechanisation services are not members of the cooperative, they pay higher rates and members pay nominal rates.

Private Sector Importer/Manufacturer led Hire Service: This business model has been developed by CAMCO Equipment Ltd to offer machinery and equipment hire services to farmers in Mkushi district through its branch office. Farmers of all categories such as small-scale, emergent and large-scale can hire tractors and equipment as long as they are able to pay for the services. However, farmers in need of ripping and ploughing services are the target customers of the business.

Multi-purpose Hub Business Model: This business model is one that functions as a one-stop shop, providing mechanisation services (2WT and 4WT based), together with complementary bundles of management and economic services. These include finance, training and advisory services, marketing with links to market outlets. The model is intended as a one stop shop to demonstrate technologies, provide spare parts and provide repairs and maintenance support. The contract farming and mechanisation hub models are clustered as corporate led.

Contract Farming or Outgrower Schemes: Are a business model promoting mechanisation in various value chains in Zambia. Contract farming is the generic term that covers various types of contracts between companies and farmers. Agricultural production is undertaken according to a prior agreement in which the farmer commits to producing a given product in a prescribed manner and the buyer commits to purchasing it. The vast majority of contract farming projects are out-grower schemes. Under one of the most common forms of contract farming, a centralised processor and/or packer buys from a large number of local farmers where products often require a high degree of processing (crops grown under such schemes include tea, vegetables, cotton and tobacco).

Another form of contract farming is a variation on the centralised model; here the company has a nucleus plantation estate but also buys from local small-holder farmers. Crops often associated with this type of scheme in Zambia are perennial crops such as oil palm and sugar cane. The terms of the contract – for example the price of the product and the supply of extension services – will vary from scheme to scheme. Under the Outgrower scheme at Magobbo in Mazabuka, the Zambia Sugar Company as Outgrower operator provides mechanised services for field preparations, as well as harvesting to the beneficiary farmers.

3.5 Summary of the Diagnosis: SWOT Analysis

The conclusions drawn from the SWOT analysis on the state of the agricultural mechanisation supply chain are summarized in table 6 below:

Table 6: SWOT Analysis of the Agricultural Mechanisation Supply Chain

Agricultural Mechanisation Supply Chain for Importers and Dealers	
Strengths	Weaknesses
• The main distribution and supply companies have a presence in Zambia of more than 10 years. • The main distributors and suppliers are registered companies with an established organisational structure. • There are few second-hand dealers of agricultural equipment from renowned manufacturers. • The main distributors and suppliers provide good after-sales and repair services. • Most of the companies have dealerships with renowned manufacturers. • Distributors and suppliers provide training on the use of the products they supply.	• Lack of transport-to-transport machinery and equipment from one end of the country to the other. • Lack of visibility of some suppliers in needy areas. • Prolonged delays in acquiring spares. • Failing to meet customer demand due to supply chain challenges. • Some equipment supplied is of sub-standard not suited for local use. • Some equipment for certain operations is not available. • Delayed production from suppliers. • No agricultural mechanisation quality assurance systems and standards, • Limited incentives for machinery importers and distributors/suppliers.
Opportunities	Threats
• Growing number of emergent farmers who cultivate areas of 10-20ha requiring mechanisation services. • Presence of leasing companies which have improved access to finance for small holder farmers. • Drive by local farmers to meet the domestic needs for vegetables.	• Farmers have not appreciated the need for value addition. • There is stiff competition for skilled engineers and technicians. • VAT charged on agricultural equipment ie forage harvesters and bailers but not on other equipment. • Change in Government policy on importation and supply of mechanisation machinery and equipment

Agricultural Mechanisation Supply Chain Manufacturers

Strengths	Weaknesses
• Main manufacturing companies have a presence in Zambia of more than 10 years. • Main manufacturing companies have established organisational structures. • Manufacturers produce machinery and equipment used in farming and agro-processing but also machinery for the mining, construction, forestry, and utilities sectors. • Manufacturers have teams of trained engineers and technicians. • Some of the companies have well equipped manufacturing workshops (e.g. laser cutting).	• Limited manufacturing capacity in terms of scope of products made. • Limited distribution networks. • Quality of products sometimes do not meet the clients' expectations. • No agricultural mechanisation quality assurance systems and standards.
Opportunities	Threats
• Growing number of emergent farmers requiring mechanisation services. • Presence of leasing companies which have improved access to finance for small holder farmers. • Growing demand for grains on the world market. • Drive for local farmers to meet domestic demand for vegetables	• Limited market for agricultural machinery. • Local steel is very expensive and most of it does not meet the requirements for high grade steel. • High grade steel is imported making local products expensive and uncompetitive on the market. • Stiff competition for skilled engineers and technicians. • Change in policy which does not support local manufacturing of mechanisation machinery and equipment.

Maintenance and Repair of Agricultural Machinery and Equipment

Strengths	Weaknesses

• Main machinery suppliers have established mechanisms to provide repair and maintenance services. • Main players operate under franchise of renowned brands (manufacturers). • The main players have well-trained cadres of engineers and technicians and offer various types of after-sales services which include repair and maintenance.	• Most of the artisans have very limited knowledge and no competency to handle complicated agricultural machinery and equipment. • Most spare parts are imported, hence when they are out of stock some machines can be out of service for months. • Service providers are very few and cannot cover the wide expanse of the country. • Spare parts have to be sourced from Lusaka or the nearest main town and transported over long distances.
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Opportunities	Threats
• Growing number of emergent farmers requiring mechanisation services. • Leasing companies have made it easier for small holder farmers to access finance for agricultural machinery and equipment.	• Transportation costs have gone up. • Poor maintenance of machinery and equipment among smallholder farmers, • Some areas have poor roads and may be inaccessible at critical times. • Stiff competition for skilled engineers and technicians.

Agricultural Mechanisation Supply Chain -Hire Services

Strengths	Weaknesses
• Hire services are provided by individual farmers and organisations like CAMCO. • Farmers exist all over the country that own agricultural machinery for their own use and hire it out part of the time. • Farmers and entrepreneurs provide services for value addition like milling, vegetable oil extraction and peanut butter production.	• Competent tractor operators are difficult to find. • Often the quality/competency of farm workers is poor. • Generally, machinery operators have a bad working culture which is neither time sensitive nor target oriented. • Lack of skills to calibrate sprayers and planters. • Machinery and equipment are not available when needed. • Quality of work provided by MSP is often not consistent. • Business and management skills are limited.
Opportunities	Threats

• Growing number of emergent farmers requiring mechanisation services. • Presence of leasing companies which have improved access to finance for small holder farmers.	• it is difficult and expensive to access finance from banks and financial institutions. • Lack of working capital. • The roads in most farming areas are generally in a bad state. • Supply of electric power is often unreliable. Most small-scale farmer's fields are uneven, have tree stumps, roots and stones which makes mechanisation difficult. • Some machinery/equipment imported does not perform to expectations. • Change is policy which does not support Mechanisation hire services •
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Chapter 4. Institutional Environment Situational Analysis

4.1. Policies and sectoral policies with a direct or indirect bearing on agricultural mechanisation.

Although Zambia has experienced strong economic growth recently, agriculture has not performed as well. To exploit the agricultural potential, government has developed well-articulated agricultural policies and strategies that focus on, among others, ensuring food security, maximising farmers' incomes, promoting sustainable agriculture and strengthening the role of the private sector in input and output markets.

The leading national policies that reinforce or support mechanisation interventions/innovations include the following:

4.1.1. Vision 2030

The National Vision 2030, launched in December 2006, outlines the government's medium to long-term development agenda to transform Zambia into a prosperous middle-income nation by 2030. It aims at creating a "strong and vibrant middle-income industrial nation that is resilient to external shocks and offers opportunities to improve the well-being of all". (Zambia Vision 2030, Government of Zambia).

4.1.2. Eighth National Development Plan

The Eighth National Development Plan (8NDP) sets Zambia's strategic direction, development priorities, and implementation strategies for the period 2022-2026. The plan is the fourth in a series of five-year national development plans (NDPs) to realise the Vision 2030. Economic transformation and job creation is the main strategic development area of the 8NDP and aims to facilitate trade and increased private sector investment for higher production, value addition and diversification of goods and services. The main drivers of economic transformation and job creation will be the agriculture, mining, tourism, and manufacturing sectors, supported by strategic energy, transportation and water interventions.

4.1.3. National Agricultural Investment Plan (NAIP)

The National Agricultural Investment Plan (NAIP) under the Comprehensive Africa Agriculture Development Programme (CAADP) aims to identify and prioritise key investments and policy changes essential to enhance the desired growth in agricultural productivity. The NAIP is a five-year roadmap for agricultural and rural development that identifies priority investment areas and estimates the funding requirements to be provided by the government and cooperating partners (including the private sector).

In the NAIP (2014-2018), which still constitutes the investment framework, the promotion of mechanisation of agricultural production systems is one of the main policy objectives, with the goal of increasing the area of

mechanised agriculture from 375,000 hectares to 3,000,000 hectares by 2018. The government is currently preparing the second-generation National Agriculture Investment Plan (NAIP)/ Comprehensive Agricultural Transformation Support Programme (CATSP) in the context of the Comprehensive Africa Agriculture Development Programme (CAADP).

4.1.4. Second National Agricultural Policy

The Second National Agricultural Policy (SNAP, 2016) provides a framework and guidelines to stimulate sustainable agricultural development. SNAP provides a framework for promoting sustainable agricultural diversification, commercialisation, private sector participation and inclusive agricultural growth. The policy encourages competitiveness, boosts efficiency, increase in productivity and profitability of the agricultural sector and thus effectively contributes to food and nutrition security, employment generation, income growth and rural poverty reduction.

4.1.5. Intended Nationally Determined Contributions (INDC)

Zambia's Nationally Determined Contribution (NDC) to the Paris Agreement identifies the importance of the agricultural sector in reducing vulnerability to climate change, including measures to increase yields and strengthen research, knowledge, extension services, and agricultural infrastructure to target climate action.

Zambia submitted its revised and updated Nationally Determined Contributions (NDC) to the Paris Agreement on Climate Change on 30th December 2020. This is in line with decisions 1/CP.19, 1/CP.20 and 1/CP.21 of the Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), for countries to strengthen their climate ambitions and update their nationally determined contributions by 2020.

Zambia's INDC includes both adaptation and mitigation elements based on the country's national circumstances. The adaptation measures focus on strategic production systems (agriculture, wildlife, and water), strategic infrastructure, and health systems, as well as improved capacity building, research, technology transfer, and financing for adaptation.

Mitigation actions focus on three programmes: (1) **sustainable forest management**, (2) **sustainable agriculture** and (3) **renewable energy and energy efficiency**.

4.1.6. Tax Incentive on Agricultural Mechanisation

In the 2021 national budget speech, the Minister of Finance proposed improving productivity through agricultural sector mechanisation to zero-rate added tax on specific agricultural equipment and accessories. These included the following equipment: - (a) manure spreaders; (b) balers; (c) combines; (d) commercial sprinkler irrigation systems; (e) feed grinder-mixer; (f) pelleting machines; (g) sprayers; (h) trailers of a specific HS code and (g) dryers for agricultural products of a specific HS code.

4.1.7. National Lands Policy and Land Tenure

Land is the most fundamental natural resource in any society. It is the space under and above which all human activities take place and provides for the continued existence of all life forms and minerals. The National Lands policy provides for the administration and management of the land resource for the benefit of the present and future generations. It further provides a comprehensive framework that guides how land in Zambia should be administered and managed. The policy also seeks to provide equitable access to land on both state and customary land, regardless of status. It endeavors to strengthen land tenure security and enhance sustainable and productive management of the land resource by upholding transparent and cost-effective systems of land administration including land disputes.

In Zambia, land rights and agricultural land use rights are enshrined in traditional and customary land law and practices. They are part of the 1995 Lands Act, which provides a framework for regulating and governing land administration.

Lands Act 1995

The Lands Act vests all land in the president and explicitly recognises both statutory leasehold and customary tenure. The Lands Act also provides for converting customary tenure into statutory (leasehold) tenure. Statutory Tenure (Leasehold) Leasehold tenure is usually held on land known as state land. State land is owned under statutory lease/tenure depending on the period of tenure. Currently, land in Zambia is leased for 14 years for unsurveyed land; 30 years for occupancy license in residential plots or settlements and 99-years for surveyed lands. Customary land and tenure Customary land is owned by indigenous communities (tribes), held in trust by the chiefs for the benefit of members of a particular ethnic grouping (tribe). It is administered by the Chiefs in accordance with traditional customs and norms applicable to different jurisdictions and subject to Zambian laws and natural justice. Customary rules provide the basic framework of customary land law for the tribes and small holder farmers.

Agricultural Land Rent/Local Lease Tenure System

In a rent/lease tenure system, a tenant pays a set sum to the landlord for the privilege of utilising the land for a defined length of time. The local land rent/lease is an agreement between the property owner (leaser) and leasee that stipulates the terms of use for that piece of farmland. The rent/lease tenure system can be entered into on land under statutory (leasehold) or customary tenure. The tenancy may be either long or short-term.

The agricultural land rent or lease tenure system usually hinders tenants from making long-term plans and investments to improve the land.

With regard to Land Tenure and Investments, Smith (2001) conducted a field study in Southern Province with the aim of answering the question whether different land tenure conditions affected the organisation and performance of small farmers and whether customary land tenure must be converted to statutory tenure as a pre-requisite for investment in farm improvements and obtaining credit. His findings did not support the thesis that land tenure was a pre-requisite for investment in farm improvements and obtaining credit for investment.

There is a lack of systematic information in Zambia on the use of land as collateral for investment credit. It is difficult to conclude from the available data on existing mortgages and agricultural charges placed on titles that land titling has had a significant effect on improving access to agricultural credit.

4.1.8. National Gender Policy

The National Gender Policy is aimed at ensuring the attainment of gender equality in the development process by redressing the existing gender imbalances. It also provides for equal opportunities for women and men to actively participate and contribute to their fullest ability and equitably benefit from national development.

In view of the cross-cutting nature of gender, the implementation of the National Gender Policy is undertaken in a comprehensive and broad-based decentralised manner. This assists all the implementing institutions to effectively mainstream gender in their development policies, plans and programme and facilitate the attainment of the national Vision on gender.

The Gender policy implementation plan emphasises that in recognition of the role that women play in the agricultural sector the Ministry of Agriculture shall invest in women to improve their productivity through simple mechanisation technologies and improved access to agricultural inputs.

However, the acquisition and ownership of land both under statutory and customary tenure continues to be a major hindrance to women's effective participation in national development. In order to liberalise land acquisition and its usage, the Lands Act 1995 guarantees both women and men the possibility of being landowners with security of tenure for up to 99 years.

4.2. Past and Existing Agricultural Mechanisation Programmes and Projects

The following are some of the development programmes and projects which have or have had a mechanisation component.

4.2.1. 2007 KR II Japanese Grant Aid Tractor Programme

The KR-II 2007 Japanese Grant Aid Tractor (KR-II) programme was implemented from 2007 to 2013. The main objective of the KR-II programme was to contribute to poverty alleviation among disadvantaged farmers in developing countries by providing affordable agricultural machinery to increase cultivated areas and production.

Under this programme, 20 Kubota tractors and related spare parts were loaned to viable farmers, cooperatives, and farmer groups, and the loan was to be repaid over four years. In the first two years, the availability of tractors contributed significantly to the increase in land under cultivation and productivity for the beneficiary government institutions and smallholder farmers around these institutions. However, loan recovery performance was not satisfactory and in some cases, loans were not repaid at all. Therefore, Zambia could not benefit from continued support under this facility.

4.2.2. Farmer Input Support Response Initiative (FISRI) Project

The Farmer Input Support Response Initiative (FISRI) project was funded by FAO and the European Union under the Food Facility and implemented by the Ministry of Agriculture between 2009 and 2012. The project's overall objective was to contribute to greater food security through increased food production and more sustainable use of environmental resources. Specifically, activities aimed to increase food production by improving access to agricultural inputs and promoting conservation agriculture principles to mitigate the effects of soaring food and input prices. The project provided support (including electronic vouchers, affordable access to machinery and mechanisation equipment and training) to approximately 58,800 farmers in 28 districts of Zambia.

4.2.3. Conservation Agriculture Scaling Up (CASU) Project.

The Conservation Agriculture Scaling-up (CASU) Project (June 2013 to 2017) was implemented by FAO and financed by the European Union, via the 10th European Development Fund (EDF). It was implemented in 48 districts in nine provinces of Zambia, in the three agro-ecological regions {AER I, II (IIa and IIb) and III}. The largest concentration of CASU farmers was in the Eastern and Southern Provinces, in AER IIa, where CA has been practiced for many years, following its promotion by various organisations.

To promote the adoption of agricultural mechanisation in the CA system, CASU facilitated access to inputs, including mechanisation services, by providing electronic vouchers to farmers. The e-voucher system/facility provided a percentage subsidy to beneficiary farmers. In addition to these farmers, Ministry of Agriculture staff, agro-dealers, financial institutions, research institutes, agri-businesses and other traditional agricultural stakeholders were among the direct and indirect beneficiaries of the project interventions.

4.2.4. Agriculture Productivity and Market Enhancement Project (APMEP)

The Agricultural Productivity and Market Enhancement Project (APMEP) was a stand-alone investment project that aimed to contribute to the Government efforts to increase crop diversification, productivity, processing, and improved market linkages. APMEP was implemented over five years in Sinazongwe, Gwembe, Chongwe, Rufunsa, Serenje and Chitambo districts. The project aim was to develop irrigation and aquaculture, promote crop and livestock production and productivity, agricultural processing and value addition, market linkages, participation of men, women and youth, and improve household income, food

security and nutrition. APMEP purchased 13 TAFE tractors and related equipment, including ploughs, planters, boom sprayers and four mini-PTO harvesters, which were distributed to 11 project sites.

4.2.5. Enhanced Smallholder Agribusiness Promotion Programme (E-SAPP)

The Enhanced Smallholder Agricultural Promotion Programme aimed to increase income and enhance food and nutrition security of rural Zambian households engaged in market-oriented agriculture. More than 61,000 smallholder farmers were targeted by the programme in 10 districts across the 10 provinces.

To achieve its objectives, the programme used a number of strategies to increase agricultural production, strengthen the delivery of agricultural extension services, increase the area of irrigated land and levels of mechanisation among smallholder farmers, improve the efficiency of agricultural markets, and promote access to finance. The programme purchased 11 tractors with accessories such as ploughs, rippers, planters, etc which were distributed to selected beneficiary farmer groups in project districts.

4.2.6.Sustainable Intensification of Smallholder Farming Systems in Zambia (SIFAZ) project

Sustainable Intensification of Smallholder Farming Systems in Zambia (SIFAZ) is a four-and-a-half-year project to intensify sustainable farming systems in Zambia. The €12 million project is funded by the European Union and is expected to benefit over 16,000 farmers in 27 districts.

The project implements a research-for-development approach in which applied research is conducted in parallel with scaling up sustainable and climate-smart agricultural production and sustainable land management practices in selected pilot areas representing the three agro-ecological regions of Zambia. The objective is to test, promote and enhance the adoption of sustainable intensification practices, including agricultural mechanisation among smallholder farmers while fostering market linkages and creating an enabling environment for sustainable agricultural growth.

4.2.7.Agricultural Development and Value Chain Enhancement (ADVANCE)

The Agricultural Development and Value Chain Enhancement (ADVANCE) project is an initiative designed to harmonise the development, programming and implementation of economic empowerment efforts targeting especially the women and youth across the country using the Chiefdom as the basis for eliminating hunger and rural poverty. The project identified 20 commodities for production and value addition and is being implemented in 288 chiefdoms of Zambia. It has procured and distributed tractors, trailers, ploughs, combine harvesters, Egg incubators, oil expellers to women farmer groups/associations in all the chiefdoms for use in enhancing production and productivity in selected value chains.

4.3.Relevant Institutions with a Mandate to Promote Agricultural Mechanisation Initiatives.

4.3.1.Agricultural Mechanisation Section

The Ministry of Agriculture is responsible for developing and coordinating all agricultural activities in Zambia. Of the eight (8) departments in the Ministry of Agriculture, the Department of Agriculture (DoA) is the largest and is responsible for promoting agricultural mechanisation activities, among others. It comprises three branches: Technical Services, Agricultural Advisory Services and Crops. The DoA has a devolved operational structure from national up to the camp level.

The responsibility for promoting agricultural mechanisation is vested with the Technical Services Branch (TSB) which comprises the Agricultural Mechanisation, Land Husbandry and Irrigation Engineering sections. The Agricultural Mechanisation section is responsible for spearheading the promotion of agricultural mechanisation in Zambia.

It comprises three Units namely, Animal Draught Power Technology; Motorised Mechanisation and Farm Structures and Post-Harvest Technology. The section is led by a Chief Engineer – Agricultural Mechanisation and supported by the three Principal Engineers who head respective units. At each provincial agricultural office is a Senior Engineer-Agricultural Mechanisation and each district office is supposed to be led by a District Agricultural Engineer supported by one or two Technical or Assistant Technical Officers.

4.3.2. Education Institutions

There are three major education institutions in Zambia, that offer programmes in agricultural mechanisation and these are the University of Zambia, the Natural Resources Development College and the Zambia Colleges of Agriculture in Mpika and Monze. Mulungushi University recently introduced a BSc programme in agricultural engineering and will be graduating their first cohort of students in 2025.

The University of Zambia (UNZA) is the leading institution of higher learning in Zambia and one of the region's market leaders in higher education. It offers over 157 undergraduate and postgraduate programmes in 14 faculties.

Students are admitted to the School of Engineering on a competitive basis after completing the first year in the School of Natural Sciences, where they consolidate their knowledge in basic sciences. The Bachelor of Engineering (BEng) degree in Agricultural Engineering is awarded after a five-year programme of study.

Recognising the importance of practical training, the Bachelor of Engineering in Agricultural Engineering curriculum includes a mandatory fourteen-week industrial training period. Through this programme, the students observe the practical application of principles taught in the classroom, experience some of the responsibilities assigned to engineers, and learn engineering techniques.

The training provided by the University of Zambia is aimed at training agricultural engineers. However, the training is inclined to more theory than knowledge application. It also does not seem to adequately capture and reflect the emerging changes in innovation in the agricultural engineering technological landscape.

The Natural Resources Development College (NRDC) is a public agricultural training institution (ATI) under the Ministry of Agriculture. It offers diploma-level training programmes underwritten by the University of Zambia. NRDC is one of the main sources of human resources for the Ministry of Agriculture. The Department of Agricultural Engineering offers a three-year diploma programme in agricultural engineering with 3,260 hours of academic courses, including two (2) months of field attachment (work experience), which is usually completed during the third year. Students pursuing the Agricultural Engineering diploma are trained in

agricultural machinery, surveying, engineering design, agricultural structures, electrification, and post-harvest technologies. The department shares most of its courses with students enrolled in the Water Engineering Department. The department also trains students from other departments in agricultural machinery courses.

The Zambia College of Agriculture (ZCA) - Mpika and Monze offer a two-year certificate programme in general agriculture and three-year diploma courses in sustainable agriculture, among others. The certificate programme in General Agriculture is provided under the auspices of the Ministry of Agriculture, while the diploma programmes are underwritten by the Copperbelt University (CBU) and the University of Zambia (UNZA), respectively. Agricultural machinery is one of the courses taught to students in the Sustainable Agriculture Diploma and General Agriculture Certificate programmes. The focus is on enhancing basic knowledge of agricultural machinery and equipment and understanding their use and application fundamentals. Courses include hands-on practicals, but this is limited to machinery and equipment available at the respective colleges which often does not adequately expose students or provide them with the necessary field application experience.

Graduates of the ZCA colleges as well as NRDC are trained as technicians with a practical orientation towards being field staff. However, the training appears to be more academic than practical because the farm machinery and equipment required to facilitate appropriate training is not available and the little that is available is outdated and not in the best operational condition.

In general, the field attachment included as part of the training in all education institutions (universities and colleges) just exposes students to operations of agricultural mechanisation machinery and equipment used by the establishments (companies and institutions) they are attached to and not necessarily the ideal/basic machinery and equipment that they may need to know about and be able to handle/operate. All the training Institutions are constrained for resources and therefore, do not regularly invest in new/modern training aids (machinery and equipment).

Vocational Training

Very few vocational training institutions offer agricultural mechanics training programmes. These institutions are accredited by the Technical, Education, Vocational and Entrepreneurship Training Authority (TEVETA). Nkumbi International College is the only one that offers a course in agricultural mechanisation while the other TEVETA-accredited institutions offer automotive mechanics.

The Agricultural Knowledge and Training Center (AKTC) in Chisamba was established in 2014 as a bilateral cooperation project between the German Federal Ministry of Food and Agriculture and the Zambian Ministry of Agriculture. It is located at the Golden Valley Agriculture Research Trust (GART) farm in Chisamba.

AKTC provides hands-on training in modern agricultural machinery and equipment, and production systems for cereals and potatoes. The center offers hands-on training and demonstrations in sustainable production methods and the professional use of agricultural machinery and equipment for tractor operators and agricultural service providers. Through these training activities, the center aims to increase the technical and managerial skills of the target groups and contribute to the sustainable development and modernisation of the Zambian agricultural sector.

AKTC has access to 110 ha of farmland on which it conducts practical training and commercial farming operations. It also has a range of modern agricultural machinery and equipment used for agricultural operations and practical training courses. It further, boasts of a modern workshop run by a competent agricultural engineer, assisted by mechanics and machine operators.

4.3.3. Agricultural Mechanisation Research

The Zambia Agricultural Research Institute (ZARI) is the largest public agricultural research institution in Zambia and one of the eight (8) departments in the Ministry of Agriculture (MoA). It is mandated to undertake research, development and adaptation of technologies related to the promotion of agricultural machinery and equipment among smallholder farmers. However, no research on agricultural mechanisation is currently being undertaken. The agricultural machinery testing center in Magoye was dissolved in 2005. This may have significantly contributed to losing momentum for research and development in agricultural mechanisation. Only the Nanga Irrigation Research Station has activities related to research in water supply systems. Research related to post-harvest storage and processing technologies is conducted by the Food Storage and Processing Unit at Mount Makulu Central Research Station.

At present, ZARI does not have the institutional capacity and apparatus to fulfill its mandate of developing and adapting agricultural mechanisation technologies, nor does it have the capacity to test or validate agricultural machinery and equipment imported into the country or locally developed/manufactured for use by smallholder farmers.

However, ZARI is in the process of reviving its agricultural machinery research and development mandate by re-establishing an agricultural mechanisation unit staffed with the necessary agricultural engineering expertise. It will also provide the infrastructure and equipment required to facilitate appropriate research and development protocols/initiatives in agricultural mechanisation research.

The Technology Advisory and Development Unit (TDAU) of the University of Zambia (UNZA) operates as a semi-autonomous engineering research and development unit. TDAU was established to link the university's expertise with the needs of society at large. It is a unique institution in Zambia, connecting the public and private sectors and capitalising on state-of-the-art innovation techniques. All products and services offered by the unit are demand-driven and client-inspired. TDAU was actively involved in developing and adapting agricultural engineering innovations and solutions until the late 1990s when the Netherlands government stopped its support. Since the cessation of this support, very little work has been done in this area. Currently, TDAU does not have modern facilities to undertake appropriate R&D initiatives in agricultural mechanisation.

4.3.4. Agricultural Extension Services

The Agricultural Extension section is part of the Agricultural Advisory Services branch in the Department of Agriculture (DoA) which is responsible for overseeing, coordinating and superintending over the delivery of agricultural extension messages for all the technical disciplines in the Department including agricultural mechanisation.

Historically, agricultural extension service delivery in Zambia has been dominated by public actors. However, the government recognises the important role of non-public sector actors in providing agricultural extension and advisory services. Following the economic liberalisation undertaken by the government in the early 1990s, other extension and advisory service providers have come on board, including private sector actors and non-public sector actors such as non-governmental organisations (NGOs), international development partners and farmer organisations. However, many private and non-public sector actors use the public extension system, through the DACO's office and agricultural camp staff, to effectively deliver their extension interventions/messages.

The promotion of agricultural mechanisation services falls under the mandate of the agricultural mechanisation section. However, the dissemination of extension messages is done through the operational hierarchy of the agricultural advisory services branch, i.e., through the block and camp extension officers. The ratio of agricultural extension worker to farmers is currently 1:1,248. This ratio is rather low and is about three times lower than the internationally accepted ratio of about 1:400 extension worker to farmers.

The promotion of agricultural mechanisation among small holder farmers is seriously constrained as there is no clear agricultural mechanisation extension message and approach/strategy to effectively promote agricultural mechanisation in Zambia. Further agricultural mechanisation subject matter specialists (SMSs) and extension staff in the MoA lack the technological competencies to effectively promote agricultural mechanisation technologies and interventions.

4.4. Farmer Organisations and Agricultural Mechanisation.

Farmer organisations have great potential to promote and influence the adoption of agricultural mechanisation in farming systems along the value chain among their members. However, activities dedicated to this purpose appear weak or are non-existent for various reasons, including misguided motives for establishing organisations such as cooperatives and a lack of business acumen among members and leaders of primary cooperative societies.

The National Union for Smallholder Farmers in Zambia (NUSFAZ) a non-profit organisation, that has not implemented any programmes in the past to improve access to mechanisation and/or provide agricultural mechanisation services to its members. It currently has no ongoing programmes that support or facilitate agricultural mechanisation technologies or services among its smallholder members.

Zambia National Farmers Union (ZNFU) is a national membership-based organisation, with countrywide coverage, representing the agriculture industry. Specifically, ZNFU represents small and large-scale farmers and agribusinesses. ZNFU in the past linked with organisations such as FAO, Conservation Farming Unit (CFU), AFGRI and Musika to enhance access to mechanisation and/or provide agricultural mechanisation services to its members. Currently it has no programme running that supports or facilitates agricultural mechanisation technologies or services among its small holder farmers' membership.

The Zambia Cooperatives Federation (ZCF) is the Apex body of the Cooperative movement in Zambia and the secretariat for the movement. It is estimated that about 95% of the more than 60,000 registered primary cooperative societies merely exist on paper with no tangible activities. Most of the cooperatives registered are agricultural cooperatives driven by the FISP subsidies that the government provides to members of primary cooperative societies. The motivation for creating these cooperatives is usually to access subsidised agricultural inputs and not to engage in tangible and viable businesses, as the case should be.

Local Farmer Associations (LFA) which are formed because of a felt need/common interest among the farmers are quite common among smallholder farmers in the Zambian farming landscape. The law provides for the formalisation of such associations through registration with the registrar of Societies. The agricultural extension system both public and private sector has increasingly been using farmer associations to provide targeted agricultural extension services and catalyse (incubate) business innovations/ development among members of the local farmer associations. Governance issues are often a common challenge among farmer associations and therefore, extension service facilitators/providers are often involved in refereeing or arbitrating Governance problems among farmers associations.

Farmer Groups (FG) an amorphous grouping of farmers usually formed because of a common interest or purpose. The farmer group has no formal registration requirements. It exists and operates informally using its own by laws and its formation can also be influenced by the extension service provider.

4.5. Financial Sector & Financing Mechanisms for Agricultural Mechanisation

Access to credit by farmers is still a major challenge despite the fact that Zambia has a relatively well-developed banking system. Risks associated with agribusinesses coupled with customary land tenure systems that limit the use of land as collateral make financing of agriculture unattractive to the formal banking industry. In addition, limited competition in the banking industry despite the large number of banks also ensures interest rates remain high. The cost of credit from the bank and the limited number of banks in rural areas are some of the factors that make it difficult for farmers to access credit from the bank which can be used for investment in agricultural mechanisation machinery and equipment.

4.5.1. Commercial Banks and other Financial Institutions

There are currently 19 commercial banks in Zambia. The main lenders to agriculture are ABSA Bank (formerly Barclays Bank), Stanbic Bank, Standard Chartered Bank, and Zambia National Commercial Bank (ZANACO), Citibank, Atlas Mara Bank (Formerly Finance Bank) and First National Bank. Three commercial banks (Stanbic, FNB and ZANACO) together held about 60 % of the total agricultural lending assets in 2017. (World Bank, 2012; World Bank 2019).

Commercial banks provided almost all the loans for large scale farmers, whereas Microfinance institutions (MFIs) and other non-banks dominated the small holder agriculture category in terms of numbers. According to the Credit Market Monitoring Report (CMMR) 2016 and 2017. About two-thirds of the loans for smallholder agriculture were from MFIs. However, in terms of the value of the small agricultural loans, commercial banks had the largest share, with over 70 % of the loan portfolio.

Microfinance institutions in Zambia are not major providers of agriculture credit, but a select few are active in the sector. The leading MFIs in the sector include Vision Fund, Madison Finance, Agora, and EFC. The MFI Loans are typically in local currency with high interest rates ranging from 35 to 75 %. The loans are secured mostly by movable assets and group guarantees, though immovable assets are required for larger loans.

The Development Bank of Zambia (DBZ) and the National Savings and Credit Bank (NatSave) have substantial portfolios in the agriculture sector too, but their share of total financing to the sector is negligible. The DBZ and NatSave together had a share of just 2.6 % of total financing to the sector in 2017. The DBZ lends to large farmers and agribusiness companies in select value chains. In addition to its direct lending, the DBZ partners with development finance institutions such as the African Development Bank and technical assistance (TA) providers such as Rural Finance Expansion Programme (RUFEP) to provide wholesale loans to MFIs and other financial institutions for rural and agriculture lending.

NatSave provides savings products and small loans (of up to US\$5,000) to agricultural SMEs and smallholder farmers. The bank has presence in all the provinces in the country with a total of 38 branches, of which 17 are in rural areas. It provides some of the financial services through partnerships with the Food Reserve Agency (FRA), the Farmer Input Support Programme (FISP), MUSIKA and other partners.

In Zambia, to obtain a loan from a commercial bank, the borrower must provide collateral (usually in the form of land backed by an independent valuation report, but sometimes also in the form of the asset being borrowed for). They also need to provide three years of audited financial records, including profit and loss statements, cash flow statements and balance sheets, proof of business registration and a detailed repayment plan for the loan. This documentation and information is provided together with other documents as requested by the bank. These requirements make it very difficult for smallholder farmers to access finance. The current portfolio of bank investments in agriculture primarily consists of commercial farmers. Banks are also aware and cautious of the culture of poor loan repayment in Zambia, which (coupled with the risks associated with financing agriculture) does not incentivise the banks to offer services to the sector. In addition to constraints on the supply side, there is also the issue of demand-side barriers among smallholder farmers who are not regarded as bankable owing to their low incomes and lack of awareness about financial services.

Interest rates for most borrowers, both nominal and real, are very high. In 2018, the interest rates of commercial banks to the agriculture sector on local currency loans usually exceeded 25 % and could reach 50 %, depending on the risk profile. After considering inflation, the real interest rate is about 17-42 %.

The US dollar loans cost around 8-10 %. Reflecting their higher unit transaction costs owing to smaller loan sizes and high-risk client profile, MFIs charge even higher interest rates ranging from 35 to 75 % (with a real interest rate of 27-67 %). The reasons for exorbitant interest rates are well known and much debated in Zambia. From the bankers' perspective, agricultural lending is both risky and expensive. The banks are reluctant to lend without adequate collateral coverage and a high-risk premium (World Bank, 2019).

The Citizens Economic Empowerment Commission (CEEC) is a body corporate, under the Ministry of Micro, Small and Medium Enterprises Development (MSMED), established through the enactment of the Citizens Economic Empowerment Act No. 9 of 2006 to foster broad-based economic empowerment to targeted Citizens, Citizen influenced companies, Citizen empowered companies and Citizen owned companies through several integrated socio-economic strategies. CEEC is a vehicle by which government would like to transform Zambia into a nation where citizens play a key role in economic activities.

In 2022 CEEC introduced an agricultural mechanisation loan product targeting to empower at least 100 Agricultural MSMEs and Cooperatives per province with viable and established businesses. The maximum loan amount was set at K 2,000,000.00 and the loan would attract 12 % interest and maximum loan tenure shall be 60 months. A Six (6) months grace period shall be given to all loan beneficiaries to set up and operationalise their projects. Sufficient collateral must be provided to cover the loan. The Commission will accept movable and immovable assets as collateral, including machinery, company stock, motor vehicles, landed properties and account receivables.

4.5.2. Agribusinesses and Equipment Suppliers

The largest source of credit to smallholder farmers in Zambia, outside informal credit, are cotton ginners. The out-grower scheme in the cotton sub-sector is one of the largest input credit schemes in Africa. The cotton sub-sector mainly consists of several cotton ginning companies that comprise about 90 % of the cotton market. Before the planting season, over 99 % of cotton farmers receive inputs from ginning companies on credit under contract. The companies advance high-quality inputs to cotton farmers, including seeds, fertilisers, pesticides, sometimes tools or other equipment, and occasionally technical support. In return, the farmers agree to sell to the out grower companies the entire crop at a previously agreed price. Contract farming can be an effective means of providing services and credit to farmers.

The dairy sub-sector is another relatively well-organised sub-sector where some suppliers offer inputs on credit. The Dairy Association of Zambia (DAZ) links milk producers with input suppliers that provide chemicals, equipment, medicines and animal feed, sometimes on credit. The main suppliers are Livestock Services, CAMCO Equipment Ltd, SARO Agro Industrial Ltd and National Milling Ltd. In most cases DAZ facilitates payments and in other instances farmers deal directly with the suppliers. DAZ facilitates payments in two ways, firstly, through the processors who pays the milk collection center for the dairy farmer's milk sales, less the amount owed to the supplier and secondly, it pays the suppliers on behalf of the members and receives post -dated cheques in favor of DAZ.

4.5.3. Lease Financing

Lease financing can play a major role in agricultural finance in developing countries. It is particularly appropriate as a method for financing agricultural machinery and equipment such as tractors, post-harvest and processing; as well as irrigation equipment, as it allows the farmer to use and possess capital goods while formal ownership is still with the leasing company. In Zambia, lease financing is regularly used by the milling subsector, particularly for the purchase of milling equipment and trucks.

Some Zambian leasing finance companies have launched an initiative to extend lease financing to small scale and emergent farmers. The Agricultural Leasing Company Ltd (AgleaseCo) is one of the leasing finance companies improving small holder farmers' access to agricultural mechanisation by providing lease financing to acquire agricultural mechanisation machinery and equipment.

AgLeaseCo has partnered with reputable companies such as CAMCO Equipment Ltd, SARO Agro Industrial Ltd, GrowMore Zambia Ltd and AFGRI to establish a financing scheme to supply agricultural machinery and equipment to smallholder farmers. The scheme is based on fixed interest (interest does not change), a down payment of 20% and the leased asset represents the collateral. The current interest rate is 28 % without any associated charges. The scheme comprises an arrangement in which AgLeaseCo and partners share the risk up to a value of 50 %.

A number of commercial banks have also partnered with CAMCO Equipment Ltd to establish a financing scheme to supply agricultural machinery and equipment to farmers in the country. These are ZANACO, Natsave and STANBIC Bank. In the case of ZANACO and STANBIC, the leasing arrangement provides for interest rates of 35% to 40% and a down payment of 25%. In the case of Natsave, the leasing arrangement provides for an interest rate of 35% and a down payment of 30%.

4.6. Summary of the diagnosis: SWOT Analysis

The conclusions drawn from the SWOT analysis of the existing Institutional Environment for agricultural mechanisation are summarized in table 7.

Agricultural Mechanisation Enabling Policies and Strategies	
Strengths	Weaknesses
- Supportive policies and strategies to enhance promotion and adoption of agricultural mechanisation technologies among smallholder farmers. - A number of agricultural development projects (past and present) promoting elements of mechanisation along the value chain	- Implementation of agricultural mechanisation strategies and plans not clearly and coherently articulated. - The scale of project interventions is rather small and the approaches employed are diverse. - Project interventions usually do not employ a comprehensive agricultural mechanisation value chain approach.
Opportunities	Threats

- Private sector recognised as vital player. - Some incentives for private sector participation provided for - Private sector willing to actively participate in enhancing mechanisation service provision and utilisation. - Donor good will and support to promote mechanisation interventions among smallholder farmers	- Government involvement through projects distorts private sector investment dynamics. - Government support to implementation of agricultural mechanisation strategies lukewarm - Change in policy which does not support agricultural mechanisation
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Agricultural Mechanisation Extension Services	
Strengths	Weaknesses
- DoA has clear mandate to promote agricultural mechanisation technologies among small holder farmers - MoA has a fairly robust national operational structure for promoting agricultural mechanisation	- No clear extension message for promoting agricultural mechanisation among small holder farmers - Inadequate/Poor Mechanisation Staff Complement - Poor technical and practical knowledge among staff in agricultural mechanisation technologies for smallholder farmers - Inadequate knowledge and capacity of technical staff to promote sustainable agricultural mechanisation technologies. - No Induction/Orientation/Refresher training for staff - Low Extension Officer-to-Farmer Ratio - Lack of Agricultural Mechanisation Centres of Excellence - No budgetary allocation to agricultural mechanisation extension. - Poor extension staff mobility
Opportunities	Threats

• Vibrant private sector engaged and promoting agricultural mechanisation services. • Willingness and collaboration by private sector to provide targeted mechanisation training for extension staff, small holder farmers and service providers. • Improved private sector coverage/network of service provision (aftersales services and spares) • NAES strategy – could be used to harmonise mechanisation promotion among the public and private sector players	• Government changes Policy and strategic direction which do not provide incentives to the private sector involved in provision of extension services. • Private sector disinvests from promoting agricultural mechanisation. • Inadequate government budgetary allocations • No recruitment and placement of extension staff.
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Agricultural Mechanisation Training –Academic and Vocational

Strengths	Weaknesses
• Key education institutions providing academic training in agricultural mechanisation (professional and Technical)	• Training curricular revision done every 3-5 years but not responsive to changing technological dynamics.

• Some TEVETA training institutions provide vocational training in agricultural mechanisation. • Curricular provides adequate basic agricultural mechanisation training	• Practical/attachment of students rather limiting as it does not expose them to desired complement of mechanisation machinery and equipment and scenarios. • Training Institutions do not regularly invest in new/modern training aids (machinery and equipment)
Opportunities	Threats
• Willingness and collaboration by private sector to provide targeted mechanisation training for smallholder farmers and service providers. • Extensive national network of Farm Institutes and Farmer Training Centres for training staff and farmers in agricultural mechanisation	• Inadequate Government Budgetary allocations to support mechanisation training. • Training Institutions change curricular and do not include agricultural mechanisation

Agricultural Mechanisation Research

Strengths	Weaknesses
• Clear mandate for ZARI to undertake adaptive research in agricultural mechanisation technologies. • TDAU at UNZA capable of undertaking technology development and adaptive research. • Private sector interest and involvement	• No defined mechanisation research programme/ agenda. • No dedicated Government staff and infrastructure structure for mechanisation research. • No legal framework to support and enhance mechanisation research. • No budgetary allocation to agricultural mechanisation research
Opportunities	Threats
• Government willingness to fulfil adaptive research mandate. • Government to provide Infrastructure and staff. • TDAU structures and staff exist. • Enhanced private sector demand for mechanisation adaptation research.	• Government commitment to facilitate and enhance mechanisation research not fulfilled. • Change in Policy which does not support mechanisation adaptive research.

Farmer Organisations Promoting Agriculture Interventions

Strengths	Weaknesses
• A number of vibrant farmer organisations supporting smallholder farmers exist in the sector. • Have membership through which agricultural interventions are promoted. • Able to mobilise resources to promote agricultural interventions	• Farmer Organisations inclined to FISP. • Lobbying of Government rather weak • Project type implementation approach and usually influenced by sponsor's agenda. • Does not use membership to mobilise operational resources

Opportunities	Threats
● Mobilised membership targeted to promote agricultural mechanisation interventions. Mobilised resources employed to enhance spread of mechanisation messages and adoption.	● Donors do not continue sponsorship. ● Organisations continue to promote agricultural interventions sponsored by donors

PART II.

AGRICULTURAL

MECHANISATION

STRATEGY

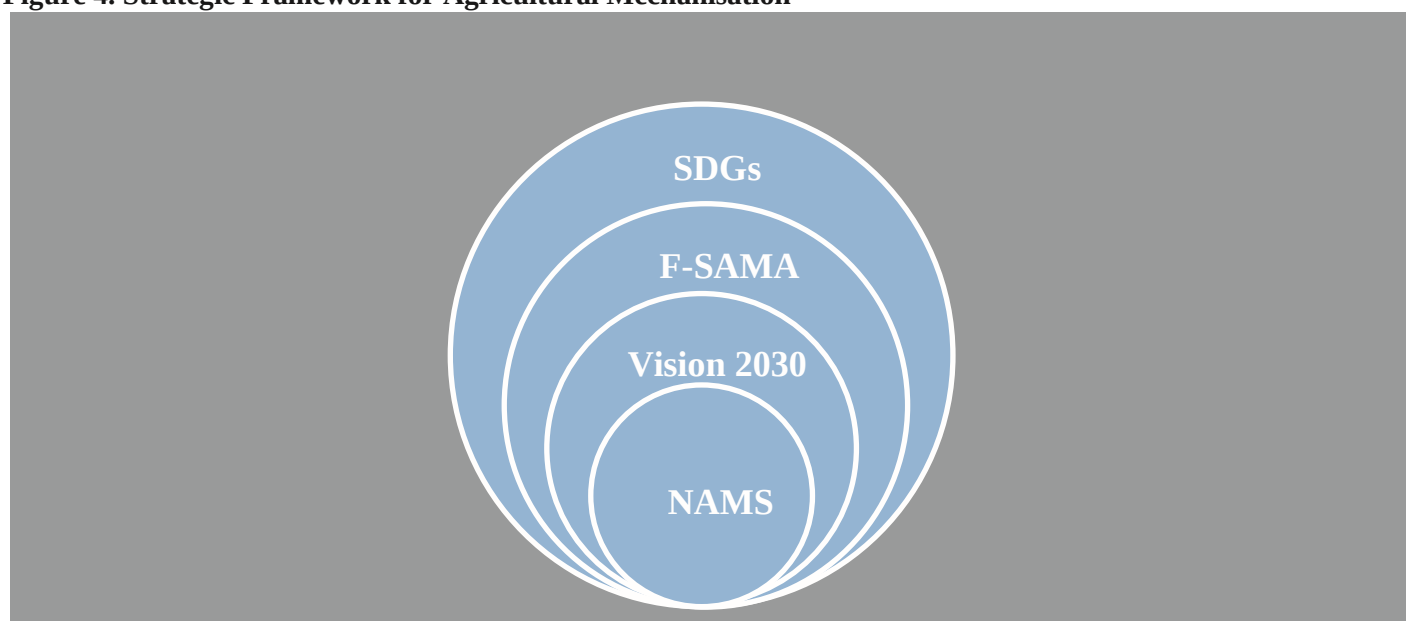
AND ACTION PLAN

Chapter 5. Strategic Framework and Objectives

5.1 Strategic Framework

Agricultural mechanisation in Zambia, has always been of particular interest to the government, as evidenced by the various agricultural policy documents. The documents portray a political will to transform agriculture through agricultural intensification in response to the country's significant challenges in the years to come, such as the fight against poverty and unemployment. Thus, the National Agricultural Mechanisation Strategy is guided by the major policy orientations formulated at the national, regional and international levels (Figure 4).

Figure 4. Strategic Framework for Agricultural Mechanisation



At the national level, there are policy statements on agricultural mechanisation contained in several agricultural policies and plans. In line with the Vision 2030, the Eighth National Development Plan (2022 – 2026), Second National Agricultural Policy, the National Agriculture Investment Plan (2013 – 2018) and the Ministry of Agriculture Strategic Plan (2022 – 2026), the implementation of the National Agricultural Mechanisation Strategy (NAMS) will result in a significant increase in the use and adoption of agricultural mechanisation technologies among smallholder farmers, women and youth. Mechanisation will play a critical role in bringing more land into agricultural production, improve efficiency of farming operations, increase production and productivity, and enhance food and nutrition security at household and national levels.

At the continental level, the NAMS responds to aspirations/ambitions of the AU Agenda 2063, the Malabo Declaration and the CAADP Framework. It has also internalised the ten priority elements of the Framework for Sustainable Agricultural Mechanisation in Africa (F-SAMA).

The F-SAMA provides a mechanism for concerted action on sustainable agricultural mechanisation by all key stakeholders on the African continent.

The NAMS is also in tandem with the country's commitments to the 2030 Agenda for Sustainable Development adopted by the United Nations, in particular, SDG1 aimed at eradicating poverty and SDG2 aimed at eradicating hunger, ensuring food security, improving nutrition, and promoting sustainable agriculture.

Recognising the role that agricultural mechanisation can play in agricultural and rural development, the National Agricultural Mechanisation Strategy is an essential component and its integration into the development agenda becomes imperative.

5.2 Future Scenario for Agricultural Mechanisation in Zambia

In Zambia, three agricultural mechanisation systems coexist, manual, animal, and motorised. While the first system remains the most dominant, the transition to motorised mechanisation must be made in harmony within the local socio-economic and environmental context and according to the political orientation. Several factors will influence the development of agricultural mechanisation in the years to come.

Increased adoption of agricultural mechanisation will lead to a significant shift in the transformation of smallholder farming systems towards more sedentary (permanent) cropping systems, promoting the intensification of agricultural production systems. This will also alleviate the increasing seasonal labour constraints faced by small and medium-sized farmers, particularly women farmers. The adoption of a wide range of agricultural mechanisation technologies along the value chain, from land development and preparation to post-harvest, processing, and irrigation, will mitigate some of the barriers that hinder the full realisation of crop diversification, among smallholder farmers, and thus contribute significantly to improved household and national food and nutrition security.

Zambia has been impacted by the effects of climate change, which have manifested in increased severity and frequency of prolonged dry spells and droughts, and changes in rainfall patterns that affect rainfall onset and cessation dates among others. Therefore, the need for agricultural mechanisation to increase productivity is crucial to enhance adaptation to these changes.

Finally, there is a real need to benefit from agricultural mechanisation to reduce the drudgery of work and make farming an attractive enterprise for future generations of farmers.

5.2.1. Status of Motorised Mechanisation

The use of motorised machinery, implements and equipment, which currently stands at about 2 % nationally and is particularly very low among smallholder farmers, is projected to increase to about 30 %. Increased use of motorised mechanisation is expected to go beyond land development and preparation operations to include farming operations such as weed control, harvesting and post-harvest handling and processing. However, the sustainable development of motorised mechanisation is rather complex and can only be achieved if certain conditions are met. The following should be considered:

- ◆ The transition to sustainable motorised mechanisation will only take place with intensification of agriculture and its development will not take place in the same way and rate for different regions of the country and the different value chains.
- ◆ Motorised mechanisation will only lead to sustainable increases in yields if, in parallel, farmers adopt other production factors such as high-yield crop varieties and associated good agricultural practices. Promotion of motorised agricultural operations should be accompanied with robust capacity building activities for extension staff, mechanisation service providers and operators of machinery and equipment.
- ◆ Motorised mechanisation can only be profitable if the rate of use is high. Consequently, the periods of agricultural activity as well as the operations requiring motorised mechanisation must be sufficient for the number of hours of annual use to be significant. The use of tractors and equipment can only be effective if the farm plots are leveled and free of obstacles such as tree stumps, roots and stones.
- ◆ Motorised mechanisation should not be based solely on thermal energy, but should also be extended to renewable energies, particularly solar energy.
- ◆ Motorised mechanisation will have to develop over the long term by relying on policy, legislative and structural investment reforms.

5.2.2. Potential for Increased Animal-Drawn Mechanisation

The use of animal draught power (ADP), which currently stands at about 30 %, is concentrated mainly in Southern, Central, Eastern and Western provinces and is adapted to the small-scale farming systems. Animal draught power is still generally affordable and accessible to smallholder farmers. The availability of ADP enables farm labour (own or hired) to increase production efficiency and productivity. Given the increasing labour shortages in most rural farming communities, the limited supply of tractor services, the size and condition of most smallholder farm plots and the relatively low capital investment costs, the use of animal draught power is still appropriate and viable in the short to medium term.

ADP has the potential to increase to about 60 % and could extend to areas where there is currently limited or no use of ADP as there is potential for smallholder farmers to acquire draught animals and equipment.

5.2.3. Role of Manual Mechanisation

Manual tools are still dominant in Zambian agriculture and are found on all farms, regardless of their size, location, and technological level. Indeed, there are still agricultural activities where the use of hand tools remains important: from land preparation to harvesting, including post-harvest operations. Most smallholder farmers (about 60 %) are still using manually operated tools, to undertake most of their farm operations. It is however, foreseen and desired that this changes into a situation where the use of such manual tools declines to less than 10 %. Given the current context, manual mechanisation will be compelled to develop through diversification and improvement of the quality of equipment (manual tools) to meet the agricultural operations needs of smallholder farmers.

5.3 Strategic Direction for the Sustainable Development of Agricultural Mechanisation

Zambia has great potential to increase agricultural production. The diagnostic analysis highlighted several constraints related to the development of agricultural mechanisation which will need to be addressed, including those, at the various levels such as mechanisation services demand and supply and the institutional environment.

5.3.1 Vision, Mission and Overall objective

Agricultural mechanisation actions must be part of a continuous, long-term process to be sustainable. Thus, the long-term vision in line with Zambia's Vision 2030 is: By 2030, agricultural mechanisation in Zambia will be sufficient, sustainable and adapted to the socio-economic context of stakeholders and environmental requirements, contributing to food security, the competitiveness of agricultural products, the strengthening of agricultural value chains, and increased incomes for agricultural farmers.

Mission

To create an enabling environment for the sustainable development of agricultural mechanisation that meets the needs of stakeholders, including women and youth, considering economic, social, and environmental sustainability.

Overall Objective

To make agricultural mechanisation and its services more accessible, of better quality and more efficient for the benefit of different categories of farmers along the agri-food value chain.

5.3.2. Guiding Principles

The strategy is based on the following Guiding Principles that are essential for the orientation of all proposed strategic actions, namely:

Sustainable agricultural mechanisation technologies:

All agricultural mechanisation actions and technologies employed along the value chain shall be sustainable, environmentally friendly and positively contribute to national economic growth and social development objectives.

Accountability:

The Government and all stakeholders shall ensure that they will be accountable for all actions, programmes, activities and decisions undertaken in the implementation of the Strategy.

Equity:

The Government and all stakeholders shall ensure fairness and impartiality in the implementation of the Strategy.

Transparency:

The Government and all stakeholders shall ensure openness and employ a consistent framework that creates an enabling environment.

Integrity:

The Government and all stakeholders shall ensure that the Strategy is implemented in an honest and credible manner.

Inclusiveness:

It is the Government's intention that all stakeholders are involved in the implementation of the Strategy.

Consultative and collective approach:

All agricultural mechanisation actions shall be undertaken using an integrated, consultative and multi-stakeholder approach with special consideration for private sector participation/ involvement

5.4 Theory of Change

The theory of change addresses the various issues raised in the diagnosis to guide the changes to be made in the coming years. The overall objective is to make agricultural mechanisation and its services more accessible, of better quality, and more efficient for the benefit of smallholder farmers along the agri-food value chain (See Figure 5 below).

The first change to be considered is to effectively promote and enhance adoption of appropriate practices in using and managing agricultural mechanisation machinery and equipment efficiently. The objective is to undertake strategic interventions to develop, manage and disseminate technical knowledge in agricultural mechanisation. This knowledge will serve as the basis for training, extension and advisory services to enable smallholder farmers choose appropriate agricultural machinery, equipment and technologies and for actors in the agricultural machinery and equipment supply chain to provide quality agricultural mechanisation services.

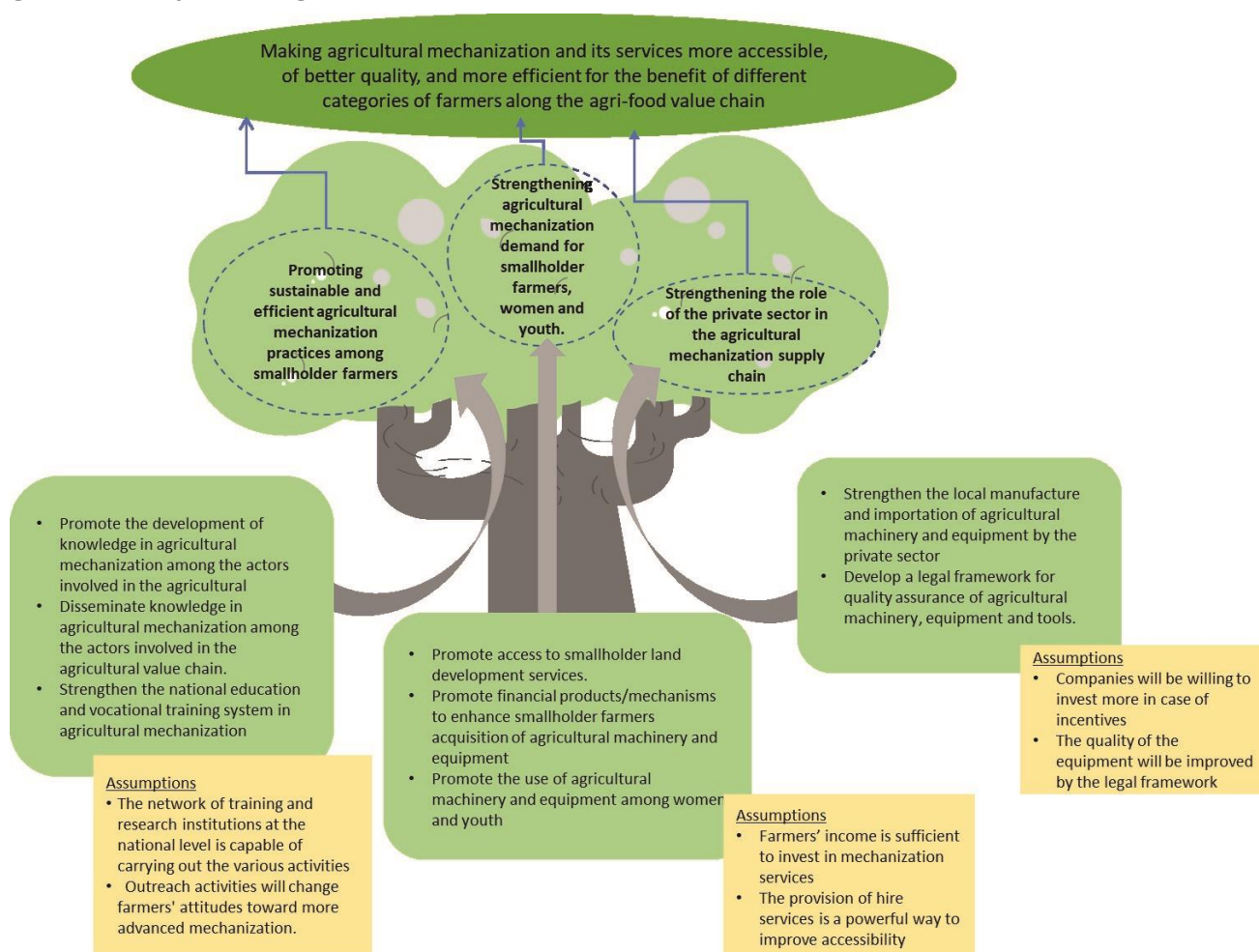
The second change to be considered is to strengthen the demand for mechanisation by making equipment and machinery more accessible to farmers in a sustainable manner. By accessibility, we mean how farmers can access agricultural machinery and equipment, which can either be purchased or hired from entrepreneurs or mechanisation service providers (MSPs). Accessibility also includes access to various mechanisation services, such as repairs, maintenance and spare parts.

The third change is to improve the role of the private sector in the agricultural mechanisation supply chain so that it effectively and efficiently meets the needs of smallholder farmers by providing good quality agricultural machinery and equipment, and related services on a sustainable basis.

The three changes constitute the three thematic areas addressed by the theory of change.
The thematic areas are:

- ◆ **Thematic Area 1:** Promoting sustainable and efficient agricultural mechanisation practices among smallholder farmers.
- ◆ **Thematic Area 2:** Strengthening agricultural mechanisation demand for smallholder farmers, women and youth and
- ◆ **Thematic Area 3:** Strengthening the role of the private sector in the agricultural mechanisation supply chain.

Figure 5. Theory of Change



Chapter 6. Action Plan and Implementation Framework

6.1 Introduction

The action plan is designed based on the logical framework for strategy formulation (annex 1). It is presented by Thematic Areas, Strategic Objectives and interventions. It includes indicators, timeline, cost estimates and responsible implementing institutions.

This action plan does not replace the operationalization plan but should be considered a preliminary document providing an outline for implementation. Approaches to implementation must be tailored and adjusted according to the requirements of the funding sources. It is, therefore, important that prior to the implementation of the action plan, a process of ownership and internalisation within the structures of government, private sector actors and agricultural and farmer organisations is initiated. To enhance and coordinate implementation of the strategy, an institutional framework is proposed with a monitoring and evaluation system.

The implementation of NAMS will require strong political will and commitment. It is envisaged that the strategy will cover the period 2024-2028 (4 years).

6.2 Thematic Areas, Strategic Objectives and Interventions

6.2.1 Thematic Area 1: Promoting Sustainable and Efficient Agricultural Mechanisation Practices among Smallholder Farmers.

Focuses on mobilising knowledge through research, extension and advisory services, education and training. By providing a framework for building and transferring knowledge adapted to the context of farmers, this thematic area recognises the small holder farmer as a critical component of human capital in the agricultural sector. The thematic area includes three strategic objectives and each strategic objective is divided into strategic interventions.

Strategic Objective 1.1: Promote the development of knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.

Rationale

Agricultural mechanisation research and development in Zambia has received very little or no funding at all for a long time. ZARI research stations thus have focused research and development activities in other areas of agriculture. This has resulted in a paucity of national evidence/information on agricultural mechanisation that could be used for policy formulation.

To successfully introduce and promote agricultural mechanisation machinery, equipment and technologies, it is important for research to verify and validate the functionality and adaptability of such machinery and equipment (especially for imported ones) and technologies to the country's local conditions and develop technical data sheets on the performance of the machinery, equipment and technologies.

Strategic Interventions

- 1) Strengthen agricultural mechanisation technologies adaptive research and development systems
- 2) for climate smart technologies in plant production, post-harvest handling, animal husbandry.
- 2) Create platforms for effective stakeholder linkages and data sharing in climate smart agricultural mechanisation research and development.
- 3) Strengthen collaboration among public institutions involved in agricultural mechanisation research and extension.
- 4) Enhance budgetary funding for agricultural mechanisation research and development.
- 5) Enhance the staff technical capacity for agricultural mechanisation research and development.
- 6) Establish regional agricultural mechanisation centres of excellence.

Strategic Objective 1.2. Disseminate knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.

Rationale

Disseminating knowledge in agricultural mechanisation requires an organised and effective agricultural extension service with appropriately packaged messages and defined delivery mechanisms. There are no clear agricultural mechanisation extension messages for small holder farmers and no defined delivery mechanisms. This scenario is further compounded by apparent inadequate technical competencies in agricultural mechanisation among professional and technical staff in the Ministry of Agriculture. Whereas there is an elaborate crops extension services delivery structure and mechanisms, this will need to be adjusted to internalise or include the delivery of agricultural mechanisation extension messages.

Access to information in agricultural mechanisation and its merits is very low among smallholder farmers, which could in part be attributed to the low extension worker-to-farmer ratio.

To enhance agricultural mechanisation extension service provision/delivery, government will need to improve the technical competencies of extension staff, develop/formulate an appropriate agricultural mechanisation extension delivery mechanism and technical messages and increase the extension worker to farmer ratio among others.

Strategic Interventions

- 1) Conduct a baseline survey for agricultural mechanisation along the value chain - status and demand.
- 2) Establish and maintain a National Agricultural Mechanisation Data bank.
- 3) Formulate an agricultural mechanisation extension manual to guide the effective packaging and delivery of agricultural mechanisation extension messages and services.
- 4) Enhance the technical capacity for agricultural mechanisation extension services.
- 5) Promote climate smart and environmentally friendly agricultural mechanisation production and processing technologies along the value chain.
- 6) Develop the capacity of smallholder farmers to adopt good agricultural mechanisation practices such as stumping of trees to facilitate the efficient use of agricultural machinery and equipment.
- 7) Build capacity of rural artisans, mechanics and service providers in the design, maintenance and repair of agricultural machinery, equipment and tools.
- 8) Conduct sensitisation for stakeholders to nurture business opportunities in small and medium scale agro processing along the value chain.
- 9) Build capacity of primary agro processing and service providers along the value chain.
- 10) Facilitate the establishment of a National Agricultural Mechanisation Association to serve as a platform for information exchange among agricultural mechanisation service providers.
- 11) Enhance budgetary funding for agricultural mechanisation extension services.

Strategic Objective 1.3. Strengthen the national education and vocational training system in agricultural mechanisation.

Rationale

The role of training in improving human capital for the effective implementation of development policies and programmes is no longer in question. There are four main education institutions in Zambia which offer academic programmes in agricultural mechanisation. However, the training provided is inclined to theory more than knowledge application. It also does not seem to adequately capture and reflect the emerging technological advances in the agricultural mechanisation landscape.

Only one (TEVETA) vocational training institution in the country offers a training programme in agricultural mechanics, the rest offer programmes in automotive mechanics.

Strategic Interventions

- 1) Strengthen the capacity of universities and agricultural colleges to offer relevant training in agricultural mechanisation and related disciplines.
- 2) Strengthen the capacity of TEVETA colleges to offer relevant vocational training to the youth in agricultural mechanisation.
- 3) Strengthen the agricultural mechanisation departments of universities and colleges by improving training facilities and teaching aids.
- 4) Provide courses in entrepreneurship to enhance business management skills and innovation among students in agricultural mechanisation along the value chain.
- 5) Develop and undertake annual refresher training programmes on the use and management of agricultural machinery and equipment including emerging agricultural mechanisation technological innovations.
- 6) Partner TEVETA institutions with the private sector and other stakeholders to support vocational training institutions to offer formal and informal short courses to the youth and farmers in artisanal and agricultural mechanisation related subjects.

6.2.2 Thematic Area 2: Strengthening Agricultural Mechanisation Demand for Smallholder Farmers, Women and Youth.

The demand for technologically advanced agricultural mechanisation in Zambia is rather low. Access to agricultural machinery and equipment such as tractors and processing equipment is quite diversified depending on the different hire services business models available. Commonly four (4) types of agricultural mechanisation business models are in use and these are: Private entrepreneurship business model, Group or organisation business model, Private sector importer/manufacturer led hire service business model and Multi-purpose hub business model.

To boost agricultural mechanisation, government must create a favorable environment to encourage and attract investment in the acquisition of agricultural machinery and equipment and the provision of mechanisation services among the various actors in the agricultural value chain. Therefore, several actions including the provision of incentives will need to be considered. This thematic area includes three strategic objectives and each strategic objective is divided into strategic interventions.

Strategic Objective 2.1. Promote access to smallholder land development services.

Rationale

A good percentage of smallholder farmers' fields are generally not levelled and cleared of tree stumps, roots and stones, which makes it difficult to use tractors and equipment for land preparation and other farming operations. This situation also negatively impacts mechanisation service provision as it is a source of unnecessary machinery and equipment breakdown and damage and can be an expensive cost. Consequently, farming operations in fields which are not well cleared of tree stumps, roots and stone cannot be mechanised and thus farmers lose out in increasing/improving their production efficiency and productivity.

Access to affordable land clearing services will allow smallholder farmers to level their fields and properly clear/remove tree stumps, roots and stones. This will facilitate the effective and efficient use of agricultural mechanisation machinery and equipment for land preparation and other farming operations.

It is critical that a land development service/programme for smallholder farmers is promoted to not only increase their production and productivity through agricultural mechanisation, but also to increase the demand for agricultural mechanisation and make mechanisation services provision viable.

Strategic Interventions

- 1) Promote environmentally friendly land development services.

- 2) Develop and promote customised, affordable and innovative land development services financing products and packages for smallholder farmers, women and youth.
- 3) Identify and develop business models for smallholder land development services.

Strategic Objective 2.2: Promote financial products/mechanisms to enhance smallholder farmers' acquisition of agricultural machinery and equipment.

Rationale

The ability of small and medium-scale farmers and entrepreneurs to procure and maintain agricultural machinery and equipment is limited and obtaining loans from financial institutions is not easy. Most smallholder farmers depend on their savings to buy agricultural inputs, tools, machinery and equipment and pay for services. Few financial institutions in the country offer agricultural mechanisation financial products targeting smallholder farmers and entrepreneurs. However, these financial products are not easily accessible though and have very stringent conditions, as financial service providers consider it risky to lend to smallholder farmers due to among others their low financial capacity and limited collateral status. There is need for financial institutions to develop specific financial products and packages to spur investment in and use of agricultural mechanisation technologies along the agricultural value chains.

Strategic Interventions

1. Establish an agricultural mechanisation Fund to provide concessionary loans and matching grants to smallholder farmers, women and youth, and farmers organisations.
2. Develop and promote customised, affordable and innovative financing products and packages in agricultural mechanisation for smallholder farmers, women and youth and farmers organisations.
3. Promote appropriate business models to enhance access to agricultural mechanisation services for smallholder farmers, women and youth.
4. Promote the establishment of private sector-led agricultural mechanisation service centres.
5. Promote the development of public-private partnerships to foster the spread of business models that improve the provision of hire services.
6. promote agro-value chains with viable potential for market uptake and value addition.
7. Enhance access to and use of improved post-harvest and agro- processing technologies and services.

Strategic Objective 2.3: Promote the use of agricultural machinery and equipment among women and youth smallholder farmers.

Rationale

In agricultural development, men, women and youth are recognised as important players, but women and young farmers generally face more socio-cultural and economic constraints than men. The Zambian government recognises the importance of the inclusion of the youth and women in agricultural promotion and diversification efforts as they have a prominent role to play. Increased utilisation of agricultural machinery and equipment along the value chain among women and youth smallholder farmers will lead to improving their agricultural productivity and creation of jobs.

Zambia has about 8 million youths who account for about 50% of the total population. About 60% of the total labour force directly participates in the agricultural sector (World Bank 2014). Similarly, women play a very important role in the agricultural sector. At least 78 % of women are engaged in agriculture, compared with 69 % men. Consequently, if facilitated with appropriate agricultural support services, women have the potential to significantly contribute to food and nutrition security. (GRZ, 2013)

Strategic Interventions

- 1) Develop and promote customised, affordable and innovative financing products and packages in agricultural mechanisation for women and youth.
- 2) In collaboration with financial institutions develop friendly financial products for youth and women small holder farmers to enhance access to and use of agricultural machinery and equipment.
- 3) Support and facilitate the use of appropriate agricultural machinery and equipment by the women and youth.
- 4) Develop capacity of women and youth smallholder farmers in agricultural mechanisation.
- 5) Develop ICT packages for promotion of agricultural mechanisation among the women and youth smallholder farmers.

6.2.3 Thematic Area 3: Strengthening the Role of the Private Sector in the Agricultural Mechanisation Supply Chain.

The role of the private sector in the agricultural mechanisation supply chain is crucial and concerns all the players representing manufacturers, importers, distributors and repairers. It covers all the agricultural machinery and equipment in the entire agricultural value chain. It must be able to offer farmers the necessary machinery and equipment, provide appropriate services and operate in a competitive environment where the various activities can become profitable. The number of local manufacturers in Zambia is quite low and imported machinery and equipment are expensive. Local manufacturing of agricultural machinery and equipment is at an early stage of development and is hampered by international competition and imports.

In addition, there is a shortage of competent and qualified mechanisation service providers (viz., mechanics and workshops) and spare parts dealers in remote areas of the country. As a result, the repair and maintenance of agricultural machinery, equipment and tools is often poor or sub-standard, thus negatively impacting mechanised operations and the viability of smallholder farmers and entrepreneurs.

Thematic area 3, includes two strategic objectives and each strategic objective is divided into strategic interventions.

Strategic Objective 3.1: Strengthen the local manufacture and importation of agricultural machinery and equipment by the private sector.

Rationale

One of the main reasons for the low levels of agricultural mechanisation in Zambia is the high cost of acquisition of the machinery and equipment. This is in part because the number of local manufacturers is quite low and imported machinery and equipment are rather expensive. Local manufacturing of agricultural machinery and equipment is at an early stage and is also hampered by international competition and imports. Most private sector companies are usually franchises that import and sell select brands of agricultural machinery, equipment and tools.

Though some of the importers and suppliers of agricultural machinery and equipment provide after-sales services, this is insufficient compared to demand. It was further observed that the availability of spare parts has generally improved in the country, however, repair and maintenance facilities and services are generally poor and there is often a critical lack of technical expertise and spare parts, leading to long periods of downtime, under utilisation and premature write-off of machinery and equipment.

Strategic Interventions

- 1) Provide incentives to attract local and foreign investment in manufacturing agricultural machinery and equipment.
- 2) Provide incentives for investors and SMEs in the manufacture and distribution of agricultural machinery and equipment.

- 3) Develop and implement training programmes for continuous improvement of local manufacturers.
- 4) Facilitate the creation of a platform for information exchange for private sector manufacturers of agricultural machinery and equipment.
- 5) Provide incentives to catalyse importation, distribution and maintenance of appropriate agricultural machinery and equipment by the private sector.

Strategic Objective 3.2: Develop a regulatory framework for quality assurance of agricultural machinery, equipment and tools.

Rationale

The regulatory aspect of agricultural mechanisation in Zambia needs to be reviewed and enhanced. The regulatory framework, which should act as a facilitating mechanism for catalysing implementing of agricultural mechanisation initiatives and be an attractive tool for investors or suppliers of agricultural machinery and equipment, is not flexible because it is not harmonized and hence is ineffective. It is, therefore, necessary to have a regulatory framework regulating safety measures, sale, rental and driving and operation of machinery such as tractors, through appropriate orders and decrees. It may be useful to have regulations dealing exclusively with agricultural mechanisation as currently there is none.

As regards quality control of imported and manufactured agricultural machinery and equipment, there is no state structure responsible for this activity. Thus, the establishment of a regulatory framework and institution to set appropriate Zambian standards for all agricultural mechanisation products will be important.

Strategic Interventions

- 1) Develop national standards, testing and certification procedures and mechanisms for agricultural machinery, equipment and tools.
- 2) Establish a National Agricultural Mechanisation Testing Centre.
- 3) Promote adaptation and re-engineering of agricultural machinery and equipment prototypes that meet Zambian standards.
- 4) Disseminate the national standards, testing and certification procedures and mechanisms for agricultural machinery, equipment and tools.
- 5) Enforce the use of national standards in the design of agricultural machinery, equipment and tools.
- 6) Strengthen the capacity for testing and evaluation of agricultural machinery, equipment and tools.
- 7) Enforce standards for raw materials used in the local manufacture of agricultural machinery, equipment and tools.
- 8) Enforce standards for agricultural machinery, equipment and tools at points of entry.
- 9) Enforce the provision of after sales services and other related services for agricultural machinery and equipment by manufacturers and distributors.

6.3. Implementation, Monitoring and Supporting Measures

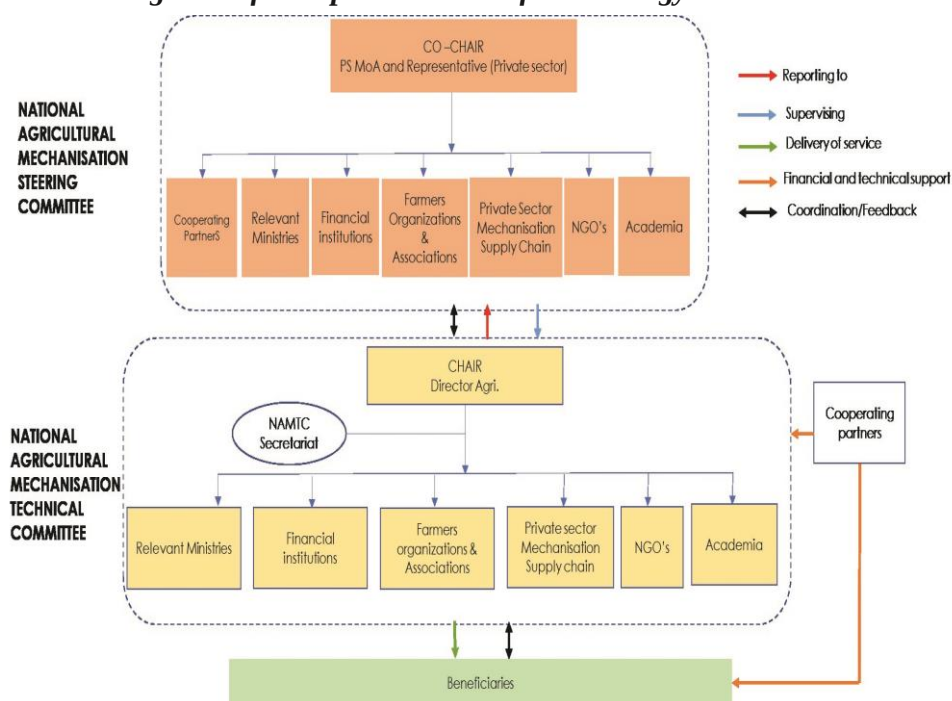
The formulation of this strategy is a very important step in the process of the sustainable development of agricultural mechanisation in Zambia. However, it will only be of value if the proposed strategy statements and interventions are translated into concrete actions on the ground. For this reason, special attention must be given to the implementation phase and in particular to the setting up of an institutional framework and effective monitoring and evaluation system.

6.3.1. Institutional Framework

The complexity of the issue of agricultural mechanisation and its multidisciplinary nature means that many institutions will need to be involved to ensure its successful implementation.

The institutional framework illustrated in Figure 6 below proposes the creation of a National Agricultural Mechanisation Steering Committee and a National Agricultural Mechanisation Technical Committee. The Government shall ensure that a comprehensive framework for the effective coordination and implementation of an integrated national agricultural mechanisation strategy is put in place. The relevant Ministries will be expected to review relevant policies and legislation to ensure that they support and facilitate the attainment of the objectives of the National Agricultural Mechanisation Strategy.

Figure 6. Institutional Arrangement for Implementation of the Strategy.



National Agricultural Mechanisation Steering Committee

The National Agricultural Mechanisation Steering Committee (NAMSC) shall be the supreme decision-making body for overseeing agricultural mechanisation interventions in the country. Its composition will include representatives from the following Ministries: Agriculture, Fisheries and Livestock, Finance and National Planning, Commerce Trade and Industry, Small and Medium Enterprises Development, Education, Technology and Science, Local Government and Rural Development, Youth, Sports and Arts and Gender Division. Key agricultural mechanisation stakeholders including from the private sector, Cooperating partners and NGOs will also be represented.

The NAMSC will be Co-Chaired by the Permanent Secretary in the Ministry of Agriculture and a representative of the Private sector. The Director responsible for Agriculture shall be the secretariat to the Steering Committee. The following will be the core responsibilities of the Steering Committee:

- Oversee the development and revision of appropriate policies and legislation to facilitate and catalyse the implementation of the National Agricultural Mechanisation Strategy.
- Provide policy guidance to facilitate the mainstreaming and integration of agricultural mechanisation activities in National Development Plans, Sector Policies, Strategies and Plans including among the private sector and non-state actors.
- Oversee the monitoring and evaluation of the implementation of the agricultural mechanisation implementation Plan and relevant reports.
- Provide policy guidance to facilitate resource mobilisation for agricultural mechanisation interventions.
- Provide policy guidance to ensure that agricultural mechanisation programmes are complementary and result in sustained positive impacts on the economy and people's livelihoods.

National Agricultural Mechanisation Technical Committee.

There shall be established a National Agricultural Mechanisation Technical Committee (NAMTC) comprising representatives from relevant Ministries and key stakeholders including from the private sector. The National Agricultural Mechanisation Technical Committee shall be the main advisory body to the National Agricultural Mechanisation Steering Committee on policy and NAMS implementation. The Technical Committee shall be chaired by the Director of Agriculture.

The Technical Committee will have the following core responsibilities:

- a. Formulate and/or review in consultation with stakeholders, appropriate policies and legislation to facilitate/catalyse the implementation of the National Agricultural Mechanisation Strategy and accordingly recommend these to the NAMSC.
- b. Formulate in collaboration with stakeholders, the annual national agricultural mechanisation implementation plan.
- c. Monitor and evaluate the implementation of the NAMS in line with its objectives.
- d. Coordinate the implementation of agricultural mechanisation initiatives, programmes and projects and
- e. Report to the Steering Committee on progress made in the implementation of the National Agricultural Mechanisation Strategy interventions.

The Assistant Director – Technical Services Branch shall be the secretariat to the National Agricultural Mechanisation Technical Committee. The Ministry responsible for Agriculture will be the lead institution in overseeing the coordination and implementation of the National Agricultural Mechanisation Strategy and will report to the National Agricultural Mechanisation Steering Committee (NAMSC).

6.3.2. Monitoring and Evaluation

The implementation of the National Agricultural Mechanisation Strategy (NAMS) will be monitored regularly by the National Agricultural Mechanisation Steering Committee (NAMSC) and the National Agricultural Mechanisation Technical Committee (NAMTC). They will utilise an annual reporting framework to capture and report progress. Evaluation will also be conducted to assess the impact of the NAMS and benefits accruing to the small holder farmers and mechanisation service providers. This will involve the establishment of baseline benchmarks and indicators by the responsible ministries in collaboration with key stakeholders.

The NAMS is underpinned on the principles of integration, collaboration and cooperation with stakeholders, especially the private sector. Hence monitoring, evaluation and assessments shall be undertaken through strong partnerships between government ministries, the private sector, development and cooperating partners, informal Sector, NGOs, CSOs, academic institutions and other stakeholders.

For effective monitoring and coordination of the NAMS, all key ministries and institutions will align their monitoring and evaluation frameworks with the government-wide Monitoring and Evaluation System. The institutional arrangements for monitoring and evaluation in the government-wide M&E system will mirror the roles and responsibilities set out in the Implementation Framework of the national implementation plan. This is to ensure that planning and M&E processes are standardised, interconnected, fully internalised and applied by the relevant institutions with the view to generate coordinated developmental results to inform decision-making processes.

Monitoring

Monitoring of interventions will be done by district level staff in the Ministry of Agriculture who will use reported data by agriculture extension workers, livestock officers and other officers who have networks at the sub-district level.

problems arising during implementation so that duty bearers can resolve them expeditiously.

Staff in the Ministry of Agriculture headquarters will conduct regular field visits to provide technical support to staff at provincial, district and camp level. Review meetings will also be held on a quarterly basis to assess progress towards the achievement of the agreed results. The Technical Services Branch will be required to produce quarterly performance reports in narrative and financial form for analysis and discussion by the ministry through various sector working committees. The quarterly reports will focus on progress made against planned inputs and outcomes, resource use efficiency, review of performance levels achieved and proposed measures to improve performance.

Evaluation

Building the link to monitoring, evaluations will be conducted mainly to assess the impact of the National Agricultural Mechanisation Strategy in the medium and long term. It will be important therefore, to undertake a baseline survey at the start of the implementation phase so that it becomes a basis for performance and impact assessment in years to come.

Evaluation will be aligned with other performance reporting frameworks so that duty bearers are prepared to conduct a mid-term review and an end-term evaluation at the end of the implementation period. Evaluations (both mid and end-term) will provide lessons from assessments of the impact both intended and unintended to inform similar interventions in future aimed at increasing the utilisation of appropriate agricultural mechanisation technologies and agricultural productivity.

6.4. Financing

There is no doubt that the investment cost required to implement the NAMS over the coming years is high. The financial resources required should be commensurate with the ambitions of this strategy and will be spread over the period of the implementation plan. The total cost for the five (5) years duration of the strategy is estimated at ZMW 3,681 billion (equivalent to US\$ 184 Million).

6.4.1. Financing Actors

The government will be responsible for mobilising the necessary resources and establishing the appropriate institutional framework. It will finance the implementation of the strategy by allocating the resources needed from the national budget. To this end, it will be expected to provide an annual budget to fund the line ministries, to enable them implement actions aimed at attaining the targets espoused in the NAMS. The Development and Cooperating partners will be expected to participate in and catalyse the implementation of the strategy through financing of the various interventions in the NAMS.

6.4.2. Financial Estimate

The implementation of the national agricultural mechanisation strategy will take place in the context of limited financial resources. Nevertheless, it should be noted that the agricultural sector is a national priority therefore, the mobilization of financial resources by the government and other partners is imperative. The estimated NAMS implementation cost was based on an indicative assessment of the financial resources necessary for the activities planned to attain the results defined to achieve specific targeted objectives. Consequently, the budget for the various actions planned within the framework of the strategy is given as an estimate only. The budget details are presented in table 8 below.

Table 8: Financial estimates and timeline of the NAMS implementation

Strategic Objectives	Cost Estimates (ZMW)	Timeline
Strategic Objective 1.1. To develop knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.	483,000,000.00	2024 - 2028
Strategic Objective 1.2 To disseminate knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.	1,264,000,000.00	2024 - 2028
Strategic Objective 1.3. To strengthen the national education and training system in agricultural mechanisation .	390,0 00,000.00	2024 - 2028
Strategic Objective 2.1. Promote access to small holder land development services.	130,000,0000.00	2024 - 2028
Strategic Objective 2.2: To promote financial products/mechanisms to enhance small holder farmers acquisition of agricultural machinery and equipment.	1,120,000,000 .00	2024 - 2028
Strategic Objective 2.3 To promote the use of Agricultural machinery and equipment among women and youth smallholder farmers	115,000,000.00	2024 - 2028
Strategic Objective 3.1. To strengthen the local manufacture and importation of agricultural machinery and equipment by the private sector.	24,000,000.00	2024 - 2028
Strategic Objective 3. 2. To develop a regulatory framework for quality assurance of agricultural machinery, equipment and tools	155,000,000.00	2024 - 2028
Grand Total	3,681,000,000.00	

6.5. Communication Plan

The National Agricultural Mechanisation Strategy (NAMS) will need to be disseminated to all relevant stakeholders through a robust communication plan. The National Agricultural Information Services (NAIS) in the Ministry of Agriculture will develop a communication plan for the NAMS. This plan will have strategies to facilitate communication through different media platforms to smallholder farmers and all relevant stakeholders in the sector. The plan guiding principles should include openness, quality, embracing a culture of knowledge sharing and learning and fostering partnership to sustain productive relationships, partnerships and networks.

The Communication Plan will adopt appropriate and different communication & social marketing techniques in order to ensure the agricultural mechanisation messages intended for the various target audience have the desired impact. Some of the communication tools and activities this plan will employ include face-to-face, print-based, electronic and audio-visual, social media and digital platforms.

The implementation of the Communication plan will be monitored on an ongoing basis and evaluated annually. Key performance indicators will include, but are not limited to:

- 1) Increased reach, awareness and recognition of agricultural mechanisation programmes.
- 2) Changes in target audience knowledge, perceptions or attitudes
- 3) Extended reach through integration into partner's Communication Plans
- 4) Achievement of activities included in communication plans.
- 5) Meeting communication plan objectives

ANNEXES

ANNEX 1: LOGICAL FRAMEWORK FOR IMPLEMENTATION OF THE NATIONAL AGRICULTURAL MECHANISATION STRATEGY

Strategic Interventions		Performance/Output Indicators	Targets	Means of Verifications	Timeline	Cost Estimates ZMW	Responsible institution
Strengthen agricultural mechanisation technologies adaptive research and development systems for climate smart technologies in plant production, post-harvest handling, animal husbandry.	• No of climate smart mechanisation technologies adapted	• At least one technology adapted per two years	• At least one technology Developed per two years	• Quarterly reports Annual Reports	2024-2028	50,000,000.00	MoA, Universities, Colleges, CPs, Private sector
	• No of climate technologies developed						
Create platforms for effective stakeholder linkages and data sharing in climate smart agricultural mechanisation research and development	• No. of stakeholder platforms created	• At least one stakeholder platform with a data management system repository	• Minutes of stakeholder meetings • One Data management system established	2024-2025	1,000,000.00	MoA	
Strengthen collaboration among public institutions and private sector involved in agricultural mechanisation research and extension.	• No. of stakeholder collaboration platforms • No. of collaborative research programmes and activities implemented.	• At least one National collaboration platform • At least 50% of agricultural mechanisation research and extension programmes and activities are collaborative	• Minutes of collaboration meetings • Quarterly and annual report	2024-2025	1,000,000.00	MoA	
Enhance budgetary funding to agricultural mechanisation research and development.	• Dedicated Budget line for agricultural mechanisation research and development created	• One budget line for agricultural mechanisation research development MoA/ZARI	•Yellow book •Annual Financial returns •Annual reports	2024-2028	100,000,000.00	MoA, MoFNP	
Enhance the technical capacity for agricultural mechanisation research and development.	• No. of Mechanisation research staff employed	• At least 100 mechanisation research staff employed	•Staff returns	2024-2026	120,000,000.00	MoA, MoFNP	
	• No. of mechanisation research staff trained	At least 100 staff	• Training reports	2024-2026	5,000,000.00	MoA	
	• No. of mechanisation research staff provided with mobility facilities	All staff	•Transport facilities procured	2024-2025	6,000,000.00	MoA, MoFNP	
Establish regional agricultural Mechanisation Centres of Excellence	• No. of regional agricultural mechanisation centres of excellence established	At least Four regional agricultural mechanisation centres of excellence established	•Operational reports Quarterly and annual report	2024-2026	200,000,000.00	MoA, MoFNP	

Thematic Area 1: Promoting Sustainable And Efficient Agricultural Mechanisation Practices Among Smallholder Farmers	
	Strategic Objectives
Strategic Objective 1.1 : Promote the development of knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.	

Strategic Objective 1.2: Disseminate knowledge in agricultural mechanisation among the actors involved in the agricultural value chain.	Conduct a baseline survey for agricultural mechanisation along the value chain - status and demand.	• No. of baseline surveys conducted	• One national baseline survey	• Baseline survey report • Annual and quarterly report	2024-2025	25,000,000.00	MoA, MoFNP, Zamstats, SZI
	Establish and maintain a National Agricultural Mechanisation Data bank.	• No of National agricultural mechanisation data banks	• One National agricultural mechanisation data bank established and maintained	• Reports (quarterly and annual)	2024-2027	15,000,000.00	MoA, Zamstats, SZI
	Formulate an agricultural mechanisation extension manual to guide the effective delivery of agricultural mechanisation extension messages and services	• No. of agricultural mechanisation extension manuals developed	• At least one agricultural mechanisation extension manual	• Agricultural mechanisation-on extension manual • Quarterly and annual reports	2024-2025	10,000,000.00 20	MoA, CPs, Private sector
	Promote climate smart and environmentally friendly agricultural mechanisation production and processing technologies along the value chain.	- No. of climate smart agricultural mechanisation production technologies promoted. - No. of climate smart agricultural mechanisation processing technologies promoted. - No. of climate smart agricultural mechanisation production technologies demonstrations conducted. - No of demonstrations conducted climate smart agricultural mechanisation processing technologies	- At least 3 climate smart agricultural mechanisation production technologies promoted. - At least 3 climate smart agriculture processing technologies promoted. - At least one demonstration per block per year - At least one demonstration per block per year	• Quarterly and annual reports	2024-2027	100,000,000.00	MoA, MoFL
	Enhance the technical capacity for agricultural mechanisation extension services.	- No. of Mechanisation staff employed - No. of mechanisation and extension staff trained - No. of mechanisation and extension staff provided with mobility facilities	- At least 300 mechanisation staff employed - At least 2000 mechanisation and extension staff trained - All staff	- Positions in the establishment - filled - Training reports - Transport facility procured	2024-2026	400,000,000.00	MoA, MoFNP, CPs, Private sector

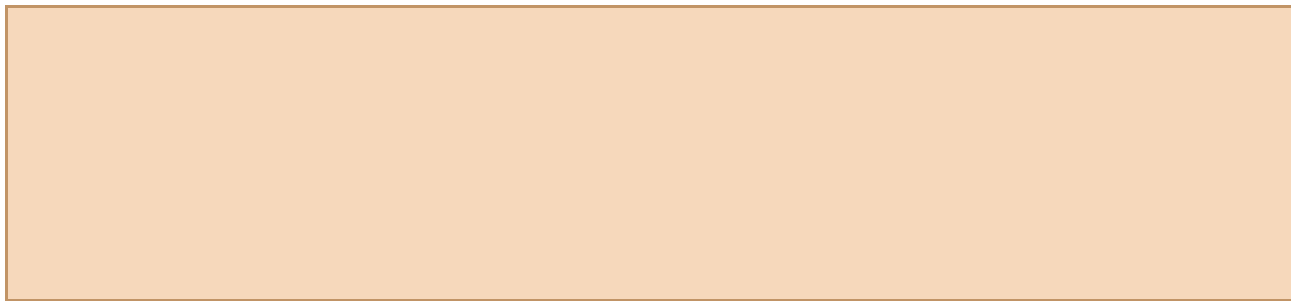
Develop the capacity of smallholder farmers to adopt good agricultural mechanisation practices such as stumping of trees to facilitate the efficient use of agricultural machinery and equipment.	- No. of extension messages/materials developed and disseminated. - No of trainings and demonstrations in good mechanisation practices conducted	- One manual/booklet of guidelines in Mechanisation Extension services - At least one manual of generic mechanisation extension technical messages - At least one Training/demonstration manual on good mechanisation practices. - Pamphlets, Fliers, Posters in good mechanisation practices	- Annual and quarterly reports - Training reports	2024-2027	10,000,000.00	MoA, CPs, Private Sector
Build capacity of rural artisans, mechanics and service providers in the design, maintenance and repair of agricultural machinery, equipment and tools.	- No of training manuals in the design of agricultural machinery, tools and equipment - No of training manuals in the maintenance of agricultural machinery, tools and equipment	- At least one manual in the design of agricultural machinery, tools and equipment - At least one manual in the maintenance of agricultural machinery, tools and equipment	- Annual and quarterly reports - Training reports	2024-2025	10,000,000.00	MoA, CPs, Private Sector
	- No. of rural artisans and mechanics trained. - No of service providers trained	- At least 20 rural artisans trained in the design of agricultural machinery, tools and equipment. - At least 116 rural artisans and mechanics trained in the maintenance of agricultural machinery, tools and equipment. - At least 116 mechanisation service providers trained in the maintenance of agricultural				
Conduct sensitization for stakeholders to nurture opportunities in small and medium-scale agro processing along the value chain.	- Concept note/ guidelines for facilitating the sensitisation workshops/ meetings. - No of sensitisation workshops/ meetings - No of participants reached	- At least one concept note/guidelines to guide the facilitation of sensitisation meetings. - At least one meeting per district. - At least 20 participants per meeting per district	- Annual and quarterly reports - Sensitisation reports	2024-2028	350,000,000.00	MoA, CPs, Private Sector



Build capacity of primary agro processing and service providers along the value chain.	• Concept note/guidelines for building capacity of primary agro processing and service providers • No of capacity building workshops/meetings • No of participants reached	• At least one concept note/guidelines to guide the capacity building sessions/workshops/ meetings. • At least one capacity building session/workshop/ meeting per district • At least 20 participants per meeting per district	• Annual and quarterly reports • Capacity building reports	2024-2028	350,000,000.00	MoA, MCTI, MSMED, CPs, Private sector
Facilitate the establishment of a National Agricultural Mechanisation Association to serve as a platform for information sharing among service providers.	• No National Agricultural Mechanisation Associations formed and registered. • No of draft constitution for the Association • No of national inaugural meetings convened to develop mechanisms/ platform for coordination, information management and sharing.	• One National agricultural Mechanisation Association formed and registered. • Constitution of the Association ratified. • Representative leadership of the association democratically selected • Information management and sharing mechanisms/ platform defined agricultural machinery, tools and equipment.	• Annual returns to registrar of societies • Annual General meeting minutes • Quarterly and annual report	2024-2025	1,000,000.00	MoA, Farmer Organisations, Private sector
Enhance budgetary funding for agricultural mechanisation extension services.	• Lobby for the recognition of the Agricultural Mechanisation Section in the official mandate of the Ministry of Agriculture • Lobby for the creation of a dedicated budget line for Agricultural mechanisation extension services	• One budget line (DoA/ Agric Mech Section)	• Yellow book • Annual Financial Returns • Annual report	2024-2026	1,000,000.00 1	MoA, MoFNP
Strengthen the capacity of universities and agricultural colleges to offer relevant training in agricultural mechanisation and related disciplines.	• No of Curricular revised periodically • No. of Appropriate mechanisation training staff recruited and regularly updated	• Five curricular revised periodically (UNZA, MU, NRDC, ZCA Monze, ZCA Mpika) • Staff recruited. All mechanisation training staff attend at least one refresher course per year	• Curricular revision reports • Revised curricular • Staff returns. • Staff refresher course reports • Quarterly and Annual reports	2024-2028	100,000,000.00	MoA, MoE

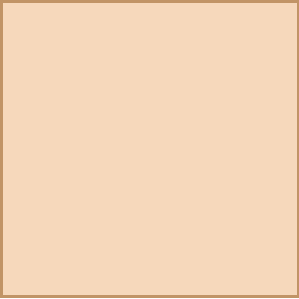
	Objective 1.3: To strengthen the national education and training system in agricultural mechanisation.
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Strengthen the capacity of TEVETA colleges to offer relevant vocational training to the youth in agriculture.	No of training curricular revised periodically	Five curricular revised periodically (UNZA, MU, NRDC, ZCA Monze, ZCA Mpika)	- Annual and quarterly reports - Capacity building reports	2024-2028	100,000,000.00	MoA, MoE
	No. of Appropriate mechanisation training staff recruited and regularly updated	- Staff recruited. - All mechanisation training staff attend at least one refresher course per year	- Staff returns. - Staff refresher course reports - Quarterly and Annual reports			
Strengthen the capacity of TEVETA colleges to offer relevant vocational training to the youth in agriculture.	No of training curricular revised periodically	At least one curricular revised per selected TEVET Institution	At least one curricular revised per selected TEVET Institution	2024-2028	5,000,000.00	MoA, MoTS
	No. of Appropriate mechanisation training staff recruited and regularly updated	Staff recruited	- Staff returns. - Staff refresher course reports - Quarterly and Annual reports			
Strengthen the agricultural mechanisation departments of universities and colleges by improving training facilities and teaching aids.	No of Up-to-date mechanisation training aids and facilities acquired	All mechanisation departments at universities and colleges acquire up to date mechanisation training aids and facilities	Quarterly and Annual reports	2024-2028	250,000,000.00	MoA, MoE
Provide courses in entrepreneurship to enhance business management skills and innovation among students in agricultural mechanisation along the value chain.value chain.	- No of entrepreneurship and business management training courses undertaken - No of mechanisation business incubation programmes facilitated.	- At least one full course in entrepreneurship and business management provided by each university and college. - At least one mechanisation business incubation programme facilitated per university and college	Quarterly and annual reports	2024-2028	10,000,000.00	MoA, MoE, MSMED, MCTI, Private Sector
Develop and undertake annual refresher training programmes on the use and management of machinery and equipment including emerging agricultural mechanisation technological innovations.	No. of Refresher training courses developed	At least three courses	- Training modules - Training reports - Quarterly and annual reports	2024-2028	15,000,000.00	MoA, Private Sector
	No. of Refresher training courses undertaken	Three courses delivered				
	No. of Staff receiving refresher training	staff trained				



Partner with TEVETA, private sector and other stakeholders to support vocational training institutions to offer formal and informal short courses to the youth farmers in artisanal and agricultural mechanisation related subjects.	- No. of training courses provided. - No. of training programmes sponsored. - No. of youths trained. - No. of farmers trained	- At least 3 short courses provided by each TEVET institution. - At least two training programmes sponsored per TEVET institution. - At least 60 youth farmers trained per TEVET institution. - At least 100 farmers trained per TEVET Institution	- Training modules - Training reports - Quarterly and annual reports	2024-2028	10,000,000.00	MoA, MoE, MCTI, MSME, MLGRD, Private Sector
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THEMATIC AREA 2: TO ENHANCE DEMAND FOR AGRICULTURAL MECHANISATION SERVICES OF SMALL HOLDER FARMERS, WOMEN AND YOUTH						
Strategic Interventions	Performance/Output Indicators	Targets	Means of Verifications	Timeline	Cost Estimates (ZMK)	Responsible Institutions
Promote environmentally friendly land development services.	- No. of service providers undertaking environmentally land development friendly services. - No. of environmentally friendly land development messages developed. - No. of awareness campaigns on environmentally friendly land development conducted. - No. of land development demonstrations conducted	- At least one service provider per district - At least 3 key messages - At least one awareness campaign per agricultural camp per year. - At least one land development practice demonstration per block	Quarterly and annual reports	2024-2028	100,000,000.00	MoA, Private sector
Develop and promote customised, affordable and innovative land development services financing products and packages for smallholder farmers, women and youth.	- No. of customised and innovative mechanisation land development products and packages developed. - No. of customised and innovative land development financing products and packages promoted. - No. of smallholder farmers, women and youth, access/acquire innovative financing products and packages.	- No. of customised and innovative mechanisation land development products and packages develop. - No. of customised and innovative land development financing products and packages promoted.- - No. of smallholder farmers, women and youth, access/acquire innovative financing products and packages.	- Quarterly and annual reports - Quarterly and annual reports	2024-2028 20	2,000,000.00	MoA, MoFNP, MCTI, MSMED, MLGRD, Private Sector



Strategic Objective	
Strategic Objective 2.1. Promote access to small holder land development services.	

Strategic Objective 2.2: Promote financial products/- mechanisms to enhance small holder farmers acquisition of agricultural machinery and equipment.	Establish an Agricultural Mechanisation Fund to provide concessionary loans and matching grants to smallholder farmers, women and youth, farmer organisa- tions.	No. of beneficiary smallholder farmers, women and youth using land development machinery and equipment acquired.	- At list five beneficiaries per agricultural camp (one for each beneficiary category viz small-scale farmer, woman and youth farmer cooperatives and associations) accessing/acquiring innovative financing products and packages. - All beneficiaries per agricultural camp using machinery and equipment acquired.	- Business model reports - Quarterly and annual reports	2024-2028	10,000,000.00	MoA, MoFNP, MCTI, MSMED, MLGRD, Private Sector
	Develop business models for small holder land development services.	- No. of appropriate business models developed to enhance access to land development services for small holder farmers, women and youth. - No. of appropriate business models promoted to enhance access to agricultural mechanisation services for small holder farmers, women and youth. - No. small holder farmers, women and youth providing land development services. - No of small holder farmers, women and youth accessing land development services.	- At least 3 business models developed (one per farmer category) - At least 3 business models promoted (one per farmer category) - At least 30% of small holder farmers, women and youth providing land development services. - At least 50% of small holder farmers, women and youth accessing land development services	- Fund management and disbursement reports - Quarterly and Annual reports	2024-2028	1,000,000,000	MoA, MoFNP, MCTI, MSMED

Develop and promote customised, affordable and innovative financing products and packages in agricultural mechanisation for smallholder farmers, women and youth, farmer organisations.	- No. of customised and innovative mechanisation financing products and packages developed. - No. of customised and innovative mechanisation financing products and packages promoted. - No. of smallholder farmers, women and youth, farmers Cooperatives and Associations accessing/acquiring innovative financing products and packages - No. of beneficiary smallholder farmers, women and youth using mechanisation machinery and equipment acquired.	- At least five mechanisation financing products and packages developed (one for each beneficiary category (viz small-scale farmer, woman and youth, farmer cooperatives and associations) - At least five mechanisation financing products and packages promoted (one for each beneficiary category viz small-scale farmer, woman and youth farmer cooperatives and associations) - At list five beneficiaries per agricultural camp (one for each beneficiary category viz small-scale farmer, woman and youth farmer cooperatives and associations) accessing/acquiring innovative financing products and packages. - Beneficiaries per agricultural camp using machinery and equipment acquired.	Quarterly and annual reports	2024-2028	20,000,000.00	MoA, MoFNP, MCTI, MSMED, MLGRD Private Sector
Develop and promote appropriate business models to enhance access to agricultural mechanisation services for small holder farmers, women and youth.	- No. of appropriate business models developed to enhance access to agricultural mechanisation services for small holder farmers, women and youth. - No. of appropriate business models promoted to enhance access to agricultural mechanisation services for small holder farmers, women and youth. - No. small holder farmers, women and youth providing mechanisation services. - No. of small holder farmers, women and youth accessing mechanisation	- At least 5 business models developed (one per farmer category) - At least 5 business models promoted (one per farmer category) - At least 30% of small holder farmers, women and youth providing mechanisation services. - At least 50% of small holder farmers, women and youth accessing mechanisation	- Business model reports - Quarterly and annual reports	2024-2028	25,000,000.00	MoA, MoFNP, MCTI, MSMED, MLGRD, Private Sector



Promote the establishment of private sector led Agricultural Mechanisation Service Centres.	- No. of mechanisation service centres established. - No. of mechanisation service centre business models promoted. - No of smallholder farmers, women and youth accessing the mechanisation services	- At least 116 mechanisation service centres established one per agricultural camp - At least two business models promoted. - At least 50% of women and youth farmers access mechanisation services	Quarterly and Annual reports	2024-2028	25,000,000.00	MoA, MoFNP, MCTI, MSMED, Private Sector
Promote the development of public-private partnerships to foster the spread of business models that improve the provision of hire services.	No of public-private partnerships developed	- At least one national partnership - At least one provincial partnership - At least one district partnership	Quarterly and Annual reports	2024-2028	10,000,000.00	MoA, MoFNP, MCTI, MSMED, Private Sector
Promote agro value chains with viable potential for market uptake and value addition.	No. of agro value chains promoted	At least two key value chains promoted per district	Quarterly and Annual reports	2024-2028	20,000,000.00	MoA, MoFNP, MCTI, MSMED, MLGRD, Private Sector
Enhance access to and use of improved post-harvest and agro processing technologies and services.	- No. of post-harvest and agro processing demonstrations conducted. - No. of mechanisation service providers providing post-harvest and processing services - No. of smallholder farmers, women and youth accessing post-harvest and processing services - No. of smallholder farmers, women and youth using improved post-harvest and processing services	- At least one improved post-harvest and agro-processing demonstration conducted per camp. - At least one mechanisation service provider providing improved post-harvest and processing services per camp. - At least 50% of smallholder farmers, women and youth accessing improved post-harvest and processing services. - At least 50% of smallholder farmers, women and youth using improved post-harvest and processing services	- Demonstration reports - Quarterly and annual reports	2024-2025	20,000,000.00	MoA, CPs, Private Sector

Strategic Objective 2.3: To promote the use of Agricultural machinery and equipment among women and youth smallholder farmers.	Develop and promote customised, affordable and innovative financing products and packages in agricultural mechanisation for women and youth.	• No. of customised and innovative financing products and packages developed. • No. of women and youth smallholder farmers accessing the innovative financing products and packages • No. of promotional campaigns undertaken	• At least 3 customised and innovative financing products and packages developed. • At least 50% of women and youth access customised and innovative financing products and packages • At least one promotional campaign per camp per year.	• Quarterly and Annual reports	2024-2028	20,000,000.00	MoA, CPs, Private sector
	In collaboration with financial institutions develop youth and women smallholder farmer friendly financial products to enhance access to and use of agricultural machinery and equipment	• No. of financial institutions offering women and youth friendly financial products • No. of women and youth friendly financial products developed. • No. of women and youth farmers acquiring mechanisation machinery and equipment • No. of women and youth farmers using mechanisation machinery and equipment	• At least 50% of key financial institutions develop and offer women and youth friendly financial products. • At least 50% of women and youth farmers acquire mechanisation machinery and equipment. • At least 75% of women and youth farmers use mechanisation acquired machinery and equipment	• Quarterly and Annual reports	2024-2028	10,000,000.00	MoA, MoFNP, MCTI, CPs, Private sector
	Support and facilitate the use of appropriate agricultural machinery and equipment by the women and youth.	• No. of appropriate agricultural machinery and equipment adopted and used by women and the youth	• At least 30% of women and youths adopt and use appropriate agricultural machinery and equipment	• Quarterly/ Annual reports.	2024-2028	25,000,000.00	MoA, MFL, OVP, MoYS, MSMED
		• Percentage of women and the youth farmers having access to appropriate mechanisation technologies.	• At least 50 % of women and youth farmers accessing appropriate mechanisation technologies				

	Develop capacity of women and youth smallholder farmers in agricultural mechanisation.	- No. of capacity trainings in agricultural mechanisation undertaken. - Percentage of women and the youth farmers having access to appropriate mechanisation technologies.	- At least one training per Agricultural Camp - At least 50 % of women and youth farmers accessing appropriate mechanisation technologies	Quarterly/ Annual reports.	2024-2028	25,000,000.00	MoA, CPs, Private sector
	In collaboration with financial institutions develop youth and women smallholder farmer friendly financial products to enhance access to and use of agricultural machinery and equipment	- No. of financial institutions offering women and youth friendly financial products - No. of women and youth friendly financial products developed. - No. of women and youth farmers acquiring mechanisation machinery and equipment - No. of women and youth farmers using mechanisation machinery and equipment	- At least 50% of key financial institutions develop and offer women and youth friendly financial products. - At least 50% of women and youth farmers acquire mechanisation machinery and equipment. - At least 75% of women and youth farmers use mechanisation acquired machinery and equipment	Quarterly and Annual reports	2024-2028	10,000,000.00	MoA, MoFNP, MCTI, CPs, Private sector
	Support and facilitate the use of appropriate agricultural machinery and equipment by the women and youth.	- No. of appropriate agricultural machinery and equipment adopted and used by women and the youth - Percentage of women and the youth farmers having access to appropriate mechanisation technologies.	- At least 30% of women and youths adopt and use appropriate agricultural machinery and equipment - At least 50 % of women and youth farmers accessing appropriate mechanisation technologies	Quarterly/ Annual reports.	2024-2028	25,000,000.00	MoA, MFL, OVP, MoYS, MSMED, MoTS
	Develop ICT packages for promotion of Agricultural Mechanisation among the women and youth smallholder farmers.	- No. of ICT packages Developed. - No. of smallholder farmers utilizing ICT in agricultural mechanisation	- At least one ICT package in agricultural mechanisation - At least 50% of smallholder farmers	Quarterly/ Annual Reports	2024-2028	10,000,000.00	MoA, MoTS, SZI

THEMATIC AREA 3. STRENGTHEN THE ROLE OF THE PRIVATE SECTOR IN THE AGRICULTURAL MECHANISATION SUPPLY CHAIN

Strategic Objective	Strategic Interventions	Performance/Output Indicators	Targets	Means of Verifications	Timeline	Cqst Estimates ZMW	Responsible Institutions
Strategic Objective 3.1: To strengthen the local manufacture and importation of agricultural machinery and equipment by the private sector.	Provide incentives to attract local and foreign investment in manufacturing agricultural machinery, equipment and spare parts.	- No. of incentives provided. - No of local and foreign investments attracted	- At least one set of incentives - At least 10 local and foreign investments attracted	- ZDA investment reports - Quarterly and annual reports	2024-2028	1,000,000.00	MoA, MoFNP, MCTI
	Provide incentives for investors and SMEs in the manufacture and distribution of agricultural machinery and equipment.	- No. of investors and SMEs accessing start up incentives to manufacture and distribute agricultural machinery and equipment. - No. of investors and SMEs starting to manufacture and distribute agricultural machinery and equipment	- At least 4 investor SMEs access startup incentives - At least 4 beneficiary investor SMEs manufacture and distribute mechanisation machinery and equipment	Reports (quarterly and annual)	2024-2028	1,000,000.00	MoA, MoFNP, MCTI
	Develop and implement training programmes for continuous improvement local manufacturers.	No. training programmes developed and implemented for continuous improvement targeting local manufacturers	- At least two programmes developed. - At least 4 local manufacturers trained.	Reports (quarterly and annual)	2024-2028	20,000,000.00	MoA, MCTI, MoFNP
	Facilitate the creation of a platform for information exchange for private sector manufacturers of agricultural machinery and equipment.	No. of platforms for information exchange for private sector manufacturers of agricultural machinery and equipment created	One national platform created and supported	Reports (quarterly and annual)	2024-2025	1,000,000.00	MoA, ZABS,
Strategic Objective 3.2: To develop a regulatory framework for quality assurance of agricultural machinery, equipment and tools	Provide incentives to catalyse importation, distribution and maintenance of appropriate agricultural machinery and equipment by the private sector.	- No. of incentives provided. - No. of beneficiary private sector engaged	- At least 3 incentives - At least 5 private sector investors engaged and operational	Reports (quarterly and annual)	2024-2028	1,000,000.00	MoA, MoFNP, MCTI, ZDA
	Develop national standards, testing procedures and certification mechanisms for agricultural machinery and equipment.	No. of National standards, testing procedures and certification mechanisms for agricultural machinery and equipment	- Set of Standards Developed. - Guidelines for certification of agricultural machinery and equipment developed	- Copies of national standards and guidelines documents. - Reports (quarterly and annual) machinery and equipment developed	2024-2028	5,000,000.00	MoA, ZABS,

	Establish a National Agricultural Mechanisation Testing Centre.	No. of National Agricultural Mechanisation Testing Centres	national agricultural Mechanisation testing centre established	Reports (quarterly and annual)	2024-2026	100,000,000.00	MoA, ZABS,
	Promote adaptation and re-engineering of agricultural machinery and equipment prototypes that meet Zambian standards.	No. of reengineered prototypes of Agricultural machinery and equipment	At least 5 prototypes reengineered.	Reports (quarterly and annual)	2024-2028	25,000,000.00	MoA, MoE
	Disseminate national standards, testing and certification procedures/mechanisms for agricultural machinery and equipment	No. of dissemination sessions conducted	At least one dissemination workshop for manufacturers conducted per quarter	Reports (quarterly and annual)	2024-2028	5,000,000.00	MoA, ZABS,
	Strengthen the capacity for testing and evaluation of agricultural machinery, equipment and tools.	No. of technical staff trained in testing and evaluation of agriculture machinery and equipment.	At least 20 Technical staff trained in testing and evaluation of agricultural machinery and equipment.	Reports (quarterly and annual)	2026-2028	5,000,000,000	5,000,000,000
	Enforce standards for raw materials used in the local manufacture of agricultural machinery, equipment and tools.	No. of mechanisation standards enforced.	Conduct quarterly routine compliance spot checks.	Reports (quarterly and annual)	2024-2028	5,000,000.00	MoA, ZABS,
	Enforce agricultural machinery, equipment and tools standards at points of entry.	No. of standards for agricultural machinery and equipment at points of entry enforced	At least one ICT package in agricultural mechanisation	Reports (quarterly and annual)	2024-2028	5,000,000,00	MoA, ZABS, ZRA
	Enforce the provision of after sales services and other related services for agricultural machinery and equipment by manufactures and distributors	% of clients accessing after sale services from manufacturers and distributors - No. of after sales services enforcement visits. - No. of routine compliance after sales services monitoring visit	- At least 80% of the serviced client's access after sale services from manufacturers and distributors - Quarterly after sales services enforcements visits undertaken to manufacturers and distributors. - Monthly routine compliance monitoring visits for after sales services undertaken to manufacturers and distributors	- Monthly routine monitoring reports - Reports (quarterly and annual)	2024-2028	5,000,000,00	MoA, ZABS, MCTI



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NATIONAL AGRICULTURAL MECHANISATION STRATEGY 2024 - 2028

