



AFRICAN UNION COMMISSION

POST-HARVEST LOSS MANAGEMENT STRATEGY

AUGUST 2018

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ABBREVIATIONS AND ACRONYMS

AGRA	Alliance for a Green Revolution in Africa
APHLIS	African Post-Harvest Losses Information System
AU	African Union
AUC	African Union Commission
BR	Biennial Report
CAADP	Comprehensive Africa Agriculture Development Programme
DREA	Department of Rural Economy and Agriculture
FAO	Food Agriculture Organisation
GHI	Global Hunger Index
IFPRI	International Food Policy Research Institute
NDC	Nationally Determined Contributions
NPCA	NEPAD Planning and Coordinating Agency
NPHLMS	National Post-harvest loss management Strategy
PH	Post-Harvest
PHL	Post-Harvest Loss
PHLMS	Post-harvest Loss Management Strategy
REC	Regional Economic Community
SDG	Sustainable Development Goal
TZS	Tanzanian Shilling
UN	United Nations
URT	United Republic of Tanzania
URT	United Republic of Tanzania
US	United States (of America)
US\$	United States Dollar
RBM	Results-Based Management
M&E	Monitoring and Evaluation

ACKNOWLEDGEMENTS

The African Union Commission wishes to acknowledge the support by and thank the FAO in the development of this strategy which will provide guidance and support at the national level in the attainment of the Malabo Declaration Commitment with specific regards to the third commitment to ending hunger by 2025 through, among other interventions, halving (decreasing by 50%) the current levels of post-harvest losses by the year 2025.

EXECUTIVE SUMMARY

Overview

At its 23rd Ordinary Session of the African Union Assembly held in Malabo, Equatorial Guinea, in June 2014, Heads of State and Government adopted eight commitments that now make up the 'Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods'. Among the many targets that the African Union Commission was mandated to report on in the Agricultural Review Process is the target to halve the current levels of Post-Harvest Losses by the year 2025 under Malabo Declaration commitment to ending hunger in Africa by 2025.

In line with this target and with the support from the Food, Agriculture Organisation (FAO) of the United Nations, the Department of Rural Economy and Agriculture (DREA) of the AUC undertook to support efforts on the continent by developing this, the African Union Post-Harvest Loss Management Strategy (PHLMS). In addition to achieving the targets of the Malabo Declaration, the implementation of this strategy will also support the attainment, at the global level, of the United Nations Sustainable Development Goal (SDG) Goal 12.3 which aims, by 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

The concept of *post-harvest loss management* that this strategy presents describes an integrated approach to dealing with post-harvest losses by bringing together all possible forms of approaches across the entire agricultural value chain that together contribute to reduced levels of losses occurring during and post harvesting of grains, fruits, vegetables, oilseeds and all food crops, livestock and fisheries products.

Overview of Post-Harvest Losses in Africa

Food loss and waste is a global phenomenon and is not restricted to the African continent. Roughly one-third of the food produced in the world for human consumption gets wasted. Food losses and waste amount to roughly USD 680 billion in industrialized countries and USD 310 billion in developing countries (FAO). Total quantitative food loss in sub-Saharan Africa has been estimated at a 100 million metric tonnes per year. For grains alone, the value of post-harvest losses are estimated to equate to approximately USD 4 billion/year (at 2007 prices), which could meet the annual food requirements of about 48 million people and exceeds the annual value of grain imports into Africa and the value of total food aid received in sub-Saharan Africa over the past decade.

Post-harvest losses occur both in quantitative terms, affecting food availability and nutrition security, and in qualitative terms, affecting the food use and utilisation as well as food availability. Apart from reducing the total amount and quality of food available, PHL also exacerbate the already fragile poverty ridden rural economies by eroding income generation along the food value chain and therefore affect the accessibility as well as sustainability of

food and nutrition security. Overall, PHL singly has a tremendous impact on the totality of food and nutrition security. Therefore halving post-harvest losses from current levels will have a tremendous positive impact in reducing food insecurity on the African continent.

Based on the 2017 regional scorecard for implementing Malabo Declaration as calculated in the Inaugural Biennial Review Report of the African Union Commission (AUC 2018), it would appear that the key challenges facing the continent include lack of:

- a. awareness and communication on the impact or consequences of post-harvest losses (PHL);
- b. awareness of standardised post-harvest loss measurement methodologies;
- c. targeted policies and / or strategies at the national levels on PHL;
- d. appreciation of the economic value of PHL and its impact on food security;
- e. research and development including lack of evidence-based PHL assessments;
- f. institutional and organisational arrangements including lack of support for generation and dissemination of PHL best practices and knowledge; and
- g. targeted financing and investment in PHL activities.

It is such challenges therefore that this strategy will address from a continental perspective in support of actions to be taken in the same areas at the regional economic community level and ultimately at the Member States level.

Purpose of the Strategy

Drawing from the challenges and constraints identified, this strategy has been designed in a generic manner that allows for commodity specific post-harvest loss management interventions to be effectively guided. It is intended therefore that the African Union Post-Harvest Loss Management Strategy contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock and fisheries products.

Strategic Focus Areas

To the above effect, this Strategy will focus on four strategic issues which form the four pillars of the Strategy, namely: (a) Policy, Awareness and Institutional Capacity; (b) Knowledge Management, Data, Skills and Human Development; (c) Technology, Markets and Infrastructure; and (d) Finance and Investment. This strategy will be operationalised in five-year cycles allowing for progressivity based on experiences gained during the implementation of the one five-year period into the next. The implementation of identified interventions under each pillar will be prioritised in a manner that allows for quick impact and results.

The implementation of this Strategy will be supported by a PHL Management Monitoring and Evaluation (M&E) system designed to monitor the outcomes of PHL reduction plans, interventions, strategies and policies.

PART 1: BACKGROUND

1.1. Overview

To mark the 10th anniversary of the Comprehensive African Agriculture Development Programme (CAADP), the African Union launched 2014 as the “**Year of Agriculture and Food Security**” during its 22nd Assembly held in Addis Ababa, Ethiopia. The climax of the 2014 AU Year of Agriculture and Food Security was marked during the 23rd Ordinary Session of the African Union Assembly held in Malabo, Equatorial Guinea, in June 2014 under the theme, “Transforming Africa’s Agriculture for Shared Prosperity and Improved Livelihoods through Harnessing Opportunities for Inclusive Growth and Sustainable Development” when Heads of State and Government of the African Union Member States adopted the ‘Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods’. Through this declaration, Heads of State and Government:

- I. Recommitted to the principles and values of the Comprehensive Africa Agricultural Development Programme (CAADP) process;
- II. Committed to enhancing investment finance in agriculture;
- III. Committed to ending hunger in Africa by 2025;
- IV. Committed to halving poverty by the year 2025 through inclusive agricultural growth and transformation;
- V. Committed to boosting intra-African trade in agricultural commodities and services;
- VI. Committed to enhancing resilience of livelihoods and production systems to climate variability and other related risks;
- VII. Committed to mutual accountability to actions and results; and
- VIII. Undertook to strengthen the African Union Commission to support delivery on these commitments (AUC 2014).

To expedite the translation of these commitments into results, the Malabo Declaration called for, among other actions:

- a. the African Union Commission (AUC) and NEPAD Planning and Coordinating Agency (NPCA) to develop an implementation strategy and roadmap that facilitates translation of the 2025 vision and goals of Africa Accelerated Agricultural Growth and Transformation into concrete results and impacts, and report to the January 2015 Ordinary Session of the Executive Council for its consideration;
- b. the AU Commission and Regional Economic Communities (RECs) to facilitate the acceleration of economic integration to boost intra-Africa trade in food and agriculture;
- c. the AU Commission and NPCA, in collaboration with partners;

- i. to develop mechanisms that enhance Africa's capacity for knowledge and data generation and management to strengthen evidence-based planning and implementation;
 - ii. to institutionalize a system for peer review that encourages good performance on achievement of progress made in implementing the provisions of this Declaration and recognize biennially exemplary performance through awards;
 - iii. to conduct on a biennial basis, beginning from year 2017, Agricultural Review Process, and report on progress to the Assembly at its January 2018 Ordinary Session;
- d. the African stakeholders, including farmers, pastoralists, fishers, private sector operators in agriculture, agribusiness and agro-industries, civil society organisations, and financial institutions, to rally behind the realization of the provisions of this Declaration and take advantage of the huge opportunities that it presents;
- e. the African Agricultural Research and Knowledge Institutions to vigorously support the realization of this agenda through an integrated and coherent manner, building on national systems and capacities; and
- f. the Development Partners to rally and align their technical and financial support in a harmonized and coordinated manner to support the implementation of the provisions of this Declaration.

Among the many targets that the AUC was mandated to report on in the Agricultural Review Process is the target to halve the current levels of Post-Harvest Losses by the year 2025 under Malabo Declaration commitment to ending hunger in Africa by 2025. To achieve this target requires the coordinated support and action of all the parties named above in the Malabo Declaration:

- (i) The AUC and NEPAD taking on the leading and coordinating role;
- (ii) RECs working with and supporting Member States in the implementation of strategies that reduce hunger and in particular, post-harvest losses;
- (iii) African stakeholders whose role is to actually implement the strategies designed, with their input, that lead to reduced hunger;
- (iv) African Agricultural Research and Knowledge Institutions whose role involved knowledge generation, analysis and dissemination on issues including post-harvest loss; and
- (v) Development Partners in the financial and technical support of various initiatives aimed at reducing hunger including through post-harvest loss management.

In line with the target to halve the current levels of post-harvest losses, and with the support from the Food, Agriculture Organisation (FAO) of the United Nations, the Department of Rural Economy and Agriculture (DREA) of the AUC undertook to support efforts on the continent by developing this, the African Union Post-Harvest Loss Management Strategy (PHLMS). In addition to achieving the targets of the Malabo Declaration, the implementation of this strategy will also support the attainment, at the global level, of the United Nations Sustainable Development Goal (SDG) Goal 12.3 which aims, by 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (ECOSOC, 2016)

Furthermore, the implementation of the African Union Post-Harvest Loss Management Strategy will also support the attainment of the commitments by AU Member States under the Paris Agreement and the Nationally Determined Contributions (NDC) to curb national emissions resulting from, among other causes, increased food production patterns, a considerable amount of which is lost through post-harvest food practices.

1.2. Process Of Developing The Post-Harvest Loss Management Strategy

The process of developing this strategy drew from three main processes. First was the literature review process through which elements of post-harvest loss management are derived and adapted for this strategy. In the second instance, using a selected set of countries, a review of their post-harvest loss management strategies was undertaken to advance common issues of continental relevance against which a continental strategy could be developed. The selected countries of study were limited to Ethiopia, Kenya, Tanzania, Zambia and Zimbabwe. This was to take advantage of recent work performed by the FAO in these countries towards the development of their national post-harvest loss management strategies.

Through a regional workshop held in Nairobi, Kenya in July 2018, experiences and knowledge were shared in the sphere of post-harvest loss activities by the four countries, Kenya, Tanzania, Zambia and Zimbabwe. It is intended that the experiences of the five countries studies be scaled up to other countries and that as more countries are studied, that additional knowledge and information will further bolster this strategy. In the third instance, consultations with key stakeholders were also conducted to ensure inclusivity and therefore congruence of ideas on the need, design and structure of a continental level PHLM strategy.

1.3. Concept of Post-Harvest Loss Management

It is essential that common ground be established as issues of post-harvest losses, food waste, food security and other similar terms have oftentimes been confused with each other or are given different meanings within the concept of post-harvest loss management. The

following are definitions of a selected few common terms used in post-harvest loss management.

Food losses are defined as “the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption” (FAO 2011, p. 3). Food losses take place at the production, harvesting, primary handling, aggregation, storage, transport, processing, distribution, and consumption segments (FAO 2014). Food losses occurring on the demand side of the food chain (retail and final consumption) are generally referred to as “food waste”, which relates to retailers’ and consumers’ behavior. (Parfitt *et al.*, 2010 as quoted by FAO 2011, p. 3). In the FAO 2014 Definitional Framework of Food Loss working paper, ‘food loss’ is simply defined as the decrease in quantity or quality of food.

Post-harvest food loss refers to a decrease in *quantity* and/ or *quality* of food mass on the supply side of the food chain. It is defined as ‘measurable qualitative and quantitative food loss along the supply chain’ (De Lucia and Assennato, 1994; Hodges, Buzby and Bennett, 2011, as quoted by Aulakh *et al*, 2013); Consequently, post-harvest is not only multidimensional but multidisciplinary involving the agriculture sector; agro-processing industry; health and nutrition sector; distribution and manufacturing sectors, among others.

Quantitative food loss refers to the decrease in edible food mass available for human consumption (FAO, 1980). In the FAO 2014 Definitional Framework of Food Loss working paper, ‘quantitative food loss’ is simply defined as the decrease in mass of food. In physical terms, this is grain removed from the post-harvest supply chain and not consumed due to, among other causes, spillage, consumption by pests and also due to physical changes in temperature, moisture content and chemical changes. The quantity lost would have either deteriorated rendering it inedible or discarded for failure to meet regulated standards to eat as a food or to use as an animal feed.

Qualitative food loss is when food loses its quality attributes resulting in the deterioration in quality leading to a loss of economic, social and nutritional value. The qualitative loss can occur due to incidence of insect pests, mites, rodents and birds, or from handling, physical changes or chemical changes in fat, carbohydrates and protein, and by contamination of mycotoxins, pesticide residues, insect fragments, or excreta of rodents and birds and their dead bodies. When this qualitative deterioration makes food unfit for human consumption and is rejected, this contributes to food loss (Aulakh *et al*, 2013). In most cases, the quality deterioration goes along with a significant loss of nutritional value, which might affect the health and nutrition status of the whole community (FAO 2014). In the FAO 2014 Definitional Framework of Food Loss working paper, ‘qualitative food loss’ is simply defined as the decrease of quality attributes of food.

The concept of *post-harvest loss management* therefore describes an integrated approach to dealing with post-harvest losses. As defined in some of the terms above, post-harvest loss management is about bringing together all possible forms of approaches across the entire value chain that together contribute to reduced levels of losses occurring during and

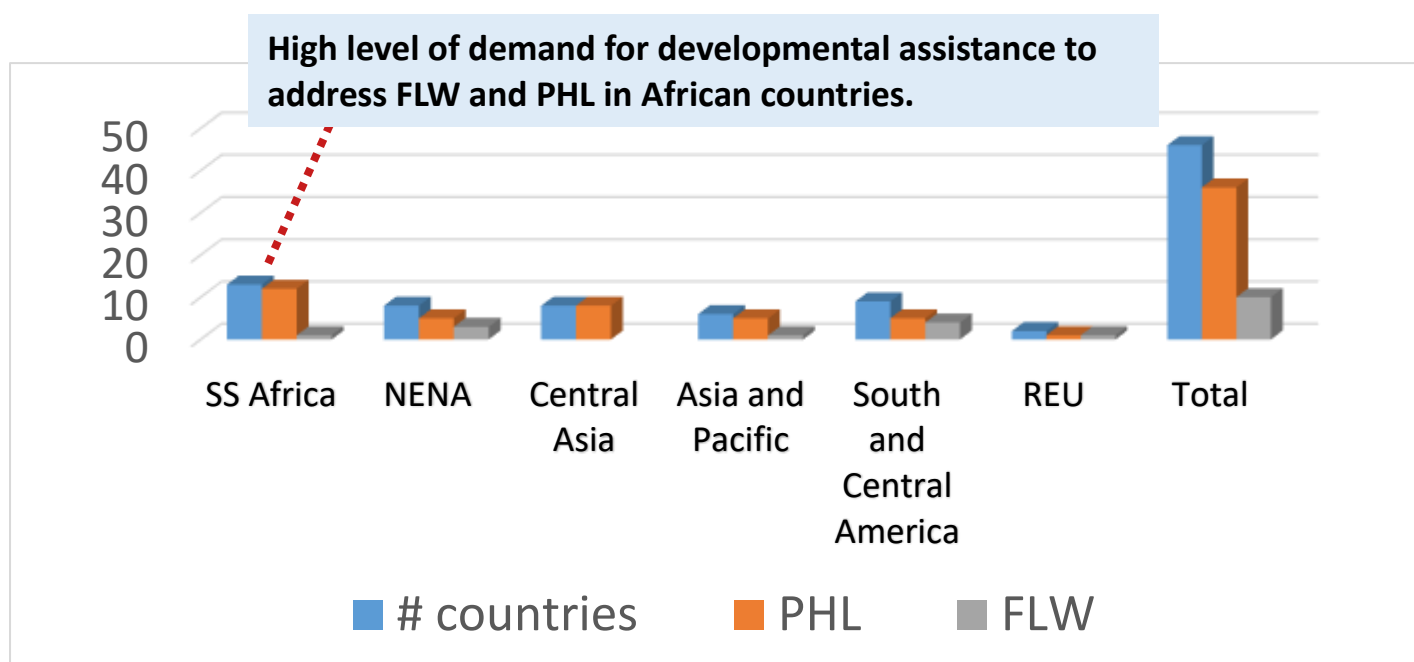
post harvesting of grains, fruits, vegetables, oilseeds and all food crops, livestock and fisheries products. Additional related terms are defined in Annex 2 (Glossary of Terms).

1.4. Demand for Development Assistance in Post-Harvest Loss Management

According to the FAO who have undertaken a series of analysis through their country programming frameworks in FAO Member Countries in five developing regions for the period 2013 – 2020, they have identified a high need for development assistance support in dealing with post-harvest losses in the Sub-Saharan Africa region. From this results of this assessment, as depicted in Figure 1, the FAO concluded that there is a high level of demand for developmental assistance to address food loss and waste and post-harvest loss in African countries.

Figure 1: Less of Development Support Requirements by Region

Reduction of Post-Harvest Losses (PHL) and Food Loss and Waste (FLW) - A Priority for Developing Regions including in Africa



Source: Presentation by Mireille Totobesola PH.d.), Project Manager, Nutritional and Food Systems Division (ESN) of the FAO, during the AU-FAO Post harvest Regional Workshop, Nairobi, 24-25 July 2018: Compiled from FAO Country Programming Frameworks

1.5. Structure of the Document

The document is structured into six parts. Part 1 has provided the background to the development of this strategy, and the concept of post-harvest loss management. Part 2 discusses the rationale for developing a continental level post-harvest strategy and its importance to the continent. Part 3 summarises the key strategic issues in post-harvest loss management at the national level in the five countries studied, namely, Ethiopia, Kenya, Tanzania, Zambia and Zimbabwe. Each of these country reports are presented in Annex 5 for detailed reading. These five country examples are used to highlight key challenges and constraints that give rise to the need for a continental level coordinated approach to the strategy.

Part 4 is the suggested post-harvest loss management strategic framework outlining the vision, goal and objectives of post-harvest loss management. Part 5 outlines indicative strategic interventions that the strategy proposes to implement.. Part 6 outlines the strategy implementation framework. Through the regional workshop held on Nairobi, Kenya in July 2018, some attempt at prioritising and phase implementation of activities for immediate to short term, medium term and long-term implementation is also presented. Lastly, Part 7 outlines the monitoring and evaluation framework for the post-harvest loss management strategy.

PART 2: RATIONALE FOR AFRICAN UNION POST - HARVEST MANAGEMENT STRATEGY

2.1. Overview Of Post-Harvest Losses In Africa

Food loss and waste is a global phenomenon and is not restricted to the African continent. Roughly one-third of the food produced in the world for human consumption gets wasted. Food losses and waste amount to roughly USD 680 billion in industrialized countries and USD 310 billion in developing countries (FAO).

Total quantitative food loss in sub-Saharan Africa has been estimated at a 100 million metric tonnes per year. For grains alone, the value of post-harvest losses are estimated to equate to approximately USD 4 billion/year (at 2007 prices), which could meet the annual food requirements of about 48 million people and exceeds the annual value of grain imports into Africa and the value of total food aid received in sub-Saharan Africa over the past decade. It is in this regard that amongst the seven commitments made by the Heads of State and Governments in Malabo, the third commitment on ending hunger in Africa by 2025 is directly relevant to the efforts to reduce PHL. The target is to halve (decrease by 50%) the current levels of post-harvest losses by the year 2025.

Christiaensen *et al*, (2018, p. 155) concluded that from a policy perspective, targeting PHL interventions to improve **post-harvest handling techniques** (especially those on the farm) is key to reducing post-harvest losses. Furthermore, they also concluded that scaling up these interventions must be **based on a better understanding of the true extent of PHL**. They contend that the use of **nationally representative household survey data** as a PHL measuring methodology is an important step in the right direction. Furthermore, their findings suggest that interventions encouraging the **use of improved storage and crop protection technologies would be effective in reducing food loss**. Christiaensen *et al*, (2018, p. 155) also warned, however, that this must be weighed against the cost of PHL interventions. Outside improved storage and crop protection technologies, (Christiaensen *et al*, 2018, p. 155) also concluded that the need for **better market access** and for **higher post-primary education** were crucial for PHL management. Not only do these factors identified by Christiaensen *et al* confirm the multidimensional nature of post-harvest losses but also the multi-disciplinary nature of management support that is required to deal with post-harvest losses.

In other works by Sheahan *et al* (2017), they also reached the conclusion that reducing post-harvest losses (PHL) is a key pathway to food and nutrition security in sub-Saharan Africa. Some of the major challenges found in relation to PHL management include: **knowledge of PHL magnitudes** which currently is limited; inadequacies of **loss assessment methodologies** that result in inaccurate PHL estimates; the issue that losses are often economic rather than physical product losses yet that **economic value of PHL** is rarely known or calculated; and **failure to address dynamics of supply chains by most technologies for loss mitigation**. Sheahan *et al* (2017) concluded that **rigorous PHL**

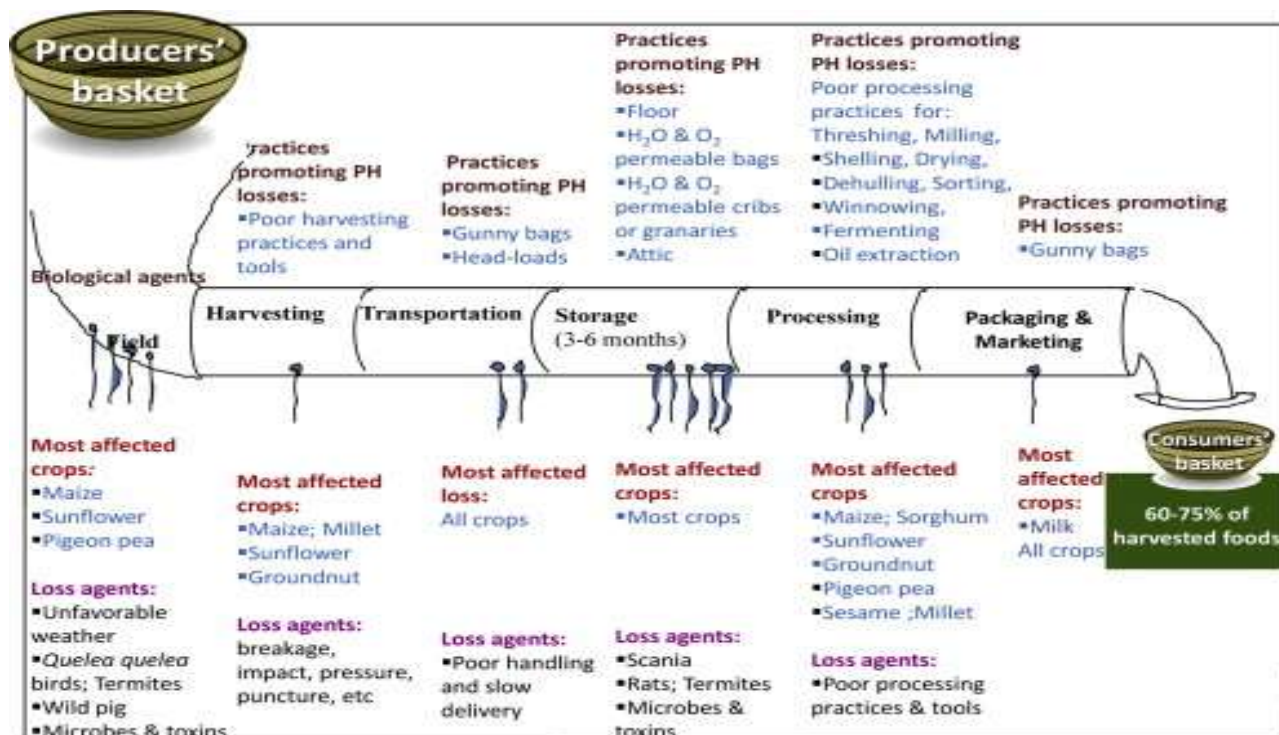
assessment using systematic methodologies, as well as holistic approaches for losses mitigation are needed on the African continent.

There are many volumes and studies that have over time been conducted and written on the subject matter of PHL on the African continent and all seem to come to similar conclusions as outlined above, namely: (a) issues of policy targeting at interventions towards post-harvest loss reduction; (b) methodologies and practices of measuring PHL; (c) technologies and practices of storing and protecting food crops; (d) market access; and (e) educational levels, behavioural and cultural practices of various communities particularly smallholder farmers as they influence their understanding of PHL.

2.2. Critical Post-Harvest Loss Points

It has been established from research and assessment works over the years such that it is now common cause that post-harvest losses occur throughout the agricultural value chain. The quantum differs by stage and by level of sophistication and efforts designed to reduce post-harvest losses. Diagram 1 typically represents the stages through which food losses can and do occur from production to consumption.

Diagram 1: Post-harvest Losses throughout the Agricultural Value Chain



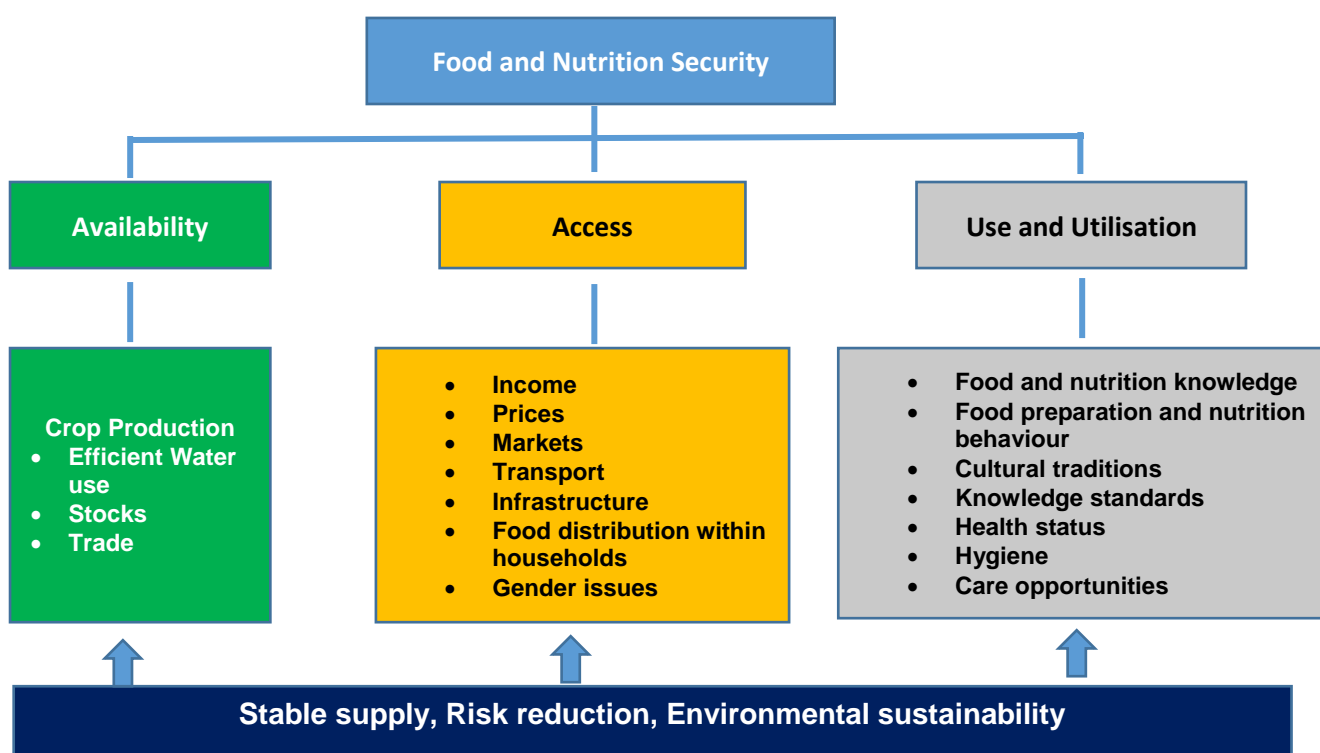
Source: Presentation by FANRPAN during the AU-FAO Post harvest Regional Workshop, Nairobi, 24-25 July 2018

As observed earlier, post-harvest loss management calls for multidimensional and multi-disciplinary support throughout the agricultural value chain.

2.3. Relevance of Post-Harvest Losses to Food and Nutrition Security

Earlier, **food security** was defined to exist when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food and nutrition security is anchored on four pillars of **food availability**, **access to food**, **utilization of food** and **stability of supply of food** must exist. Diagrammatically, this can be represented as in Diagram 2.

Diagram 2: The Four Pillars of Food and Nutrition Security



Source: Adapted after FAO

Also as defined earlier, post-harvest losses occur both in quantitative terms, affecting the food availability pillar of food and nutrition security, and in qualitative terms, affecting the food use and utilisation pillar as well as the food availability pillars of the food and nutrition security. Apart from reducing the total amount and quality of food available, PHL also exacerbate the already fragile poverty ridden rural economies by eroding income generation along the food value chain and therefore affect the accessibility as well as sustainability pillars of food and nutrition security. Overall, PHL singly has a tremendous impact on the totality of food and nutrition security. Therefore halving post-harvest losses from current levels will have a tremendous positive impact in reducing food insecurity on the African continent.

While the impact of post-harvest losses on food security is undoubted, very little is done about it. The significance of not prioritizing post-harvest losses can be demonstrated in the reported case of Ethiopia in 2010. According to the US Department of State (2013), the

United Nations Food and Agriculture Organisation and the World Food Program Crop and Food Security Assessment Mission estimated total post-harvest losses of 2.04 million tons of grain in Ethiopia in 2010. At the same time, Ethiopia's import requirements stood at 1.16 million tons. (US Dept. of State, 2013). Theoretically, had Ethiopia been successful at cutting their post-harvest losses by 50% in 2010, they would not have needed to import grains. Apart from the mere physical tonnage in losses reflected in these numbers, there is considerably more lost in the value of inputs that produced the 2.04 million, the labour, the time and all that went into its production.

Added to the loss in value of the estimated 2.04 million tones PHL experienced in Ethiopia in 2010 is the cost of importing 1.16 million tons of grains. In practical terms therefore, the economic value of PHL experienced in Ethiopia in 2010 was the sum total of the value of PHL and imports, a total value worth 3.2 million tons of grain. The issue that should therefore concern African governments, and therefore the importance being placed on this strategy by the African Union, is how much would an investment of such magnitude as lost in PHL in the experience of Ethiopia in 2010 would have improved the quality of life of the people of Ethiopia had that been put to reducing PHL?

Another example derives from the National Post-Harvest Management Strategy (2017-2027) of the United Republic of Tanzania. The PH Management Strategy of Tanzania reported that, despite the increase of cereal crops production at national level to an estimated 9.455 million tons on average per year, technologies used for harvesting and processing cereals are poor and this has led to PHLs in the region of 3.782 million tons on average per year in Tanzania, a staggering 40% loss in annual national production of cereals to PHLs.

The monetary loss in cereal grains in Tanzania due to post-harvest losses is fairly significant. According to the National Post-Harvest Management Strategy (2017 – 2027), of the estimated Tanzanian Shillings (TZS) 3.92 billion (approximately US\$1.7 billion) value in maize produced annually, approximately TZS600 million (US\$265,000) is lost along the value chain. This is a monetary loss of approximately 15.3%. Of the sorghum annual production valued at approximately TZS767 million, the estimated monetary loss is TZS95 million or 12.4% loss. In Rice, of the estimated TZS 2.58 billion worth of rice produced, an estimated loss of TZS276 millions or 10.7% is experienced annually. The real economic value lost due to these PHL is the value of both the quantitative and qualitative loss of food in Tanzania and the cost of any imports made to cover the shortfalls in national food supplies. Valued against the efforts required to ensure PHL reduction, the economic value of these losses is staggering.

Just these two examples clearly demonstrate that there is value in increasing investment into reducing post-harvest losses than continually investing in increased production which gets increasingly lost through post-harvest losses. Hence the desire, through the Malabo Declaration Biennial Report, to monitor and report on the PHL indicator. It can be inferred therefore that at the continental level, the African Union is justified in taking steps to address this issue lest the gains from the CAADP programme and those from many other

frameworks, yield little towards ensuring a more sustainable and enhanced food security situation across the continent.

2.4. Ending Hunger in Africa by 2025

According to the 2016 Global Hunger Index (GHI) Africa Edition produced by the International Food Policy Research Institute (IFPRI), while the level of hunger in all countries across the continent of Africa, for which GHI scores could be calculated, has declined since 2000, the level of hunger in many countries remains unacceptably high with only three countries out of 42 African countries with scores that fall into the “low” hunger category, while 28 fall into the “serious” category and five countries have 2016 scores in the “alarming” category. A reduction in post-harvest losses, among other strategies to enhance the food and nutrition security on the African continent, will go a long way to alleviating the huge hunger problem facing the continent.

By its nature and as revealed in many study works over the years, the target to half the current levels of post-harvest losses by 2025 calls for greater understanding and efforts towards the establishment of current levels of post-harvest losses in food crops. There is no real agreement at the national level as to the exact level of losses that are being experienced. To that effect, the Malabo Declaration target requires that **extensive research and analytical work on PHL estimations** be undertaken simply to establish the current levels of post-harvest losses against which the target of halving this level of losses can be applied. Other key issues that also emerge with analysing country level losses include **methods of post-harvest assessment and analysis** which depend on the authority cited; **financial support and investment into post-harvest loss reduction**; as well as the **political willingness and policy level awareness** on post-harvest losses.

The performance target on post-harvest losses as outlined in the Technical Guidelines for reporting on Malabo Declaration (as issued by the African Union¹) is to *Halve (decrease by 50%) the current levels of Post-Harvest Losses (PHL), by the year 2025 from the year 2015*. To measure this, the performance indicator was calculated on the *Reduction rate of Post-Harvest Losses for (at least) the 5 national priority commodities, and possibly for the 11 AU agriculture priority commodities*. This rate was defined as a *percentage of total production that is lost (quantitative and qualitative) during all the phases of the post-harvest system (harvesting, storage, transport, processing, packaging and sales) for priority products*.

The results of the Biennial Report (BR) on Malabo Declaration commitments on the post-harvest losses target are presented in Table 1, a summary of the outcome of reports received from Member States on this indicator. Only five countries on the continent reported

¹ As lead in the process of implementing the Malabo Declaration, the African Union Commission (AUC) established the Biennial Review and Reporting Mechanism to allow for regular country progress reports to the AU Assembly on the implementation of the Malabo Declaration. The first such report was prepared and submitted at the African Union Assembly held in January 2018 and formally launched in Libreville, Gabon at the 14th CAADP Partnership Platform Meeting held in April 2018.

as having collected data on post-harvest losses in their countries. In all five cases, the countries are on track towards achieving the post-harvest loss target by 2025. This is only 9% of the continent that demonstrated explicit efforts and reporting on post-harvest losses in their countries. 76% of the continent (42 Member States) did not report on the indicator.

Table 1: Summary of the African Continent Responses to the Malabo Declaration Ending Hunger by 2025 target on post-harvest losses.

No.	Countries <u>On Track</u> in PHL Indicator	Countries <u>Not on Track</u> in PHL Indicator		Countries that <u>did not report</u> on PHL Indicator
1	Malawi	Angola	Benin	Algeria (no data)
2	Mauritania	Botswana	Burundi	Comoros (no data)
3	Rwanda	Burkina Faso	Cameroon	Eretria
4	Togo	Cabo Verde	Central African Republic	Guinea-Bissau (no data)
5	Uganda	Chad	Congo	Libya (no data)
6		Cote d'Ivoire	DR Congo	Rep A Saharawi (no data)
7		Djibouti	Egypt	Somalia (no data)
8		Equatorial Guinea	Ethiopia	South Sudan (no data)
9		Gabon	Gambia	
10		Ghana	Guinea	
11		Kenya	Lesotho	
12		Liberia	Madagascar	
13		Mali	Mauritius	
14		Morocco	Mozambique	
15		Namibia	Niger	
16		Nigeria	Sao tome & Principe	
17		Senegal	Seychelles	
18		Sierra Leone	South Africa	
19		Sudan	Swaziland	
20		Tanzania	Tunisia	
21		Zambia	Zimbabwe	
Grand Total	5 (9%)	42 (76%)		8 (15%)

Source: Biennial Report to the AU Assembly on implementing the June 2014 Malabo Declaration: 2017 Report to the January 2018 Assembly – by Department of Rural Economy and Agriculture (DREA) of the African Union,

As this Biennial Report was the first such reporting mechanism on Malabo Declaration commitments, there was need to develop and establish benchmarks for various targets and indicators reported on. Using data collected during the exercise and literature reviewed, the 2017 benchmark score for achieving the Malabo Declaration target by 2025 was set at one (1). This score or benchmark is the minimum score that a country should have to attain to be on track in that particular year to achieving the Malabo Declaration target on post-harvest loss reduction. Any country scoring 1 or above 1, would be considered to be *on track* towards achieving the Malabo Declaration target on post-harvest loss reduction. Any country scoring below 1 is considered to *not be on track* to achieving this target.

Based on the 2017 regional scorecard for implementing Malabo Declaration as calculated in the Inaugural Biennial Review Report of the African Union Commission (AUC 2018), the following are regional performances against the target to halve the current levels of post-harvest losses by 2025:

- a. The Central Africa Region² with an aggregate calculated score of 0.0 is as a whole not on track towards meeting the Malabo Declaration target on post-harvest loss;
- b. The Eastern African Region³ with an aggregate calculated score of 0.42 has the highest computed score towards meeting the target but it still remains below the 1.0 benchmark;
- c. The Northern African Region⁴ at 0.40 was not on track towards achieving the Malabo Declaration target;
- d. The Southern African Region⁵ at 0.34 was also not on track to achieving the Malabo Declaration target;
- e. The West Africa Region⁶ at 0.13 was also not on track to achieving the Malabo Declaration target; and

All regions were, in aggregate, not on track towards achieving the Malabo Declaration target on post-harvest loss reduction. The aggregate calculated score for Africa as a whole at 0.26 raises very serious concerns at the continent's focus on post-harvest losses yet PHL is singly one of the most important factors affecting food and nutrition security.

The lack of data reporting on the indicator seems to indicate a major challenge with post-harvest loss management including monitoring and reporting in the majority of the African Member States. Crucially what these results seem to indicate, among many elements, is the lack of:

- h. awareness and communication on the impact or consequences of post-harvest losses (PHL);
- i. awareness of standardised post-harvest loss measurement methodologies;

² Central African Region comprised 9 countries, namely, Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, and Sao Tome and Principe.

³ East African Region comprised 12 countries, namely, Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, South Sudan, Tanzania and Uganda;

⁴ North African Region comprised 7 countries, namely, Algeria, Egypt, Libya, Mauritania, Morocco, Saharawi and Tunisia.

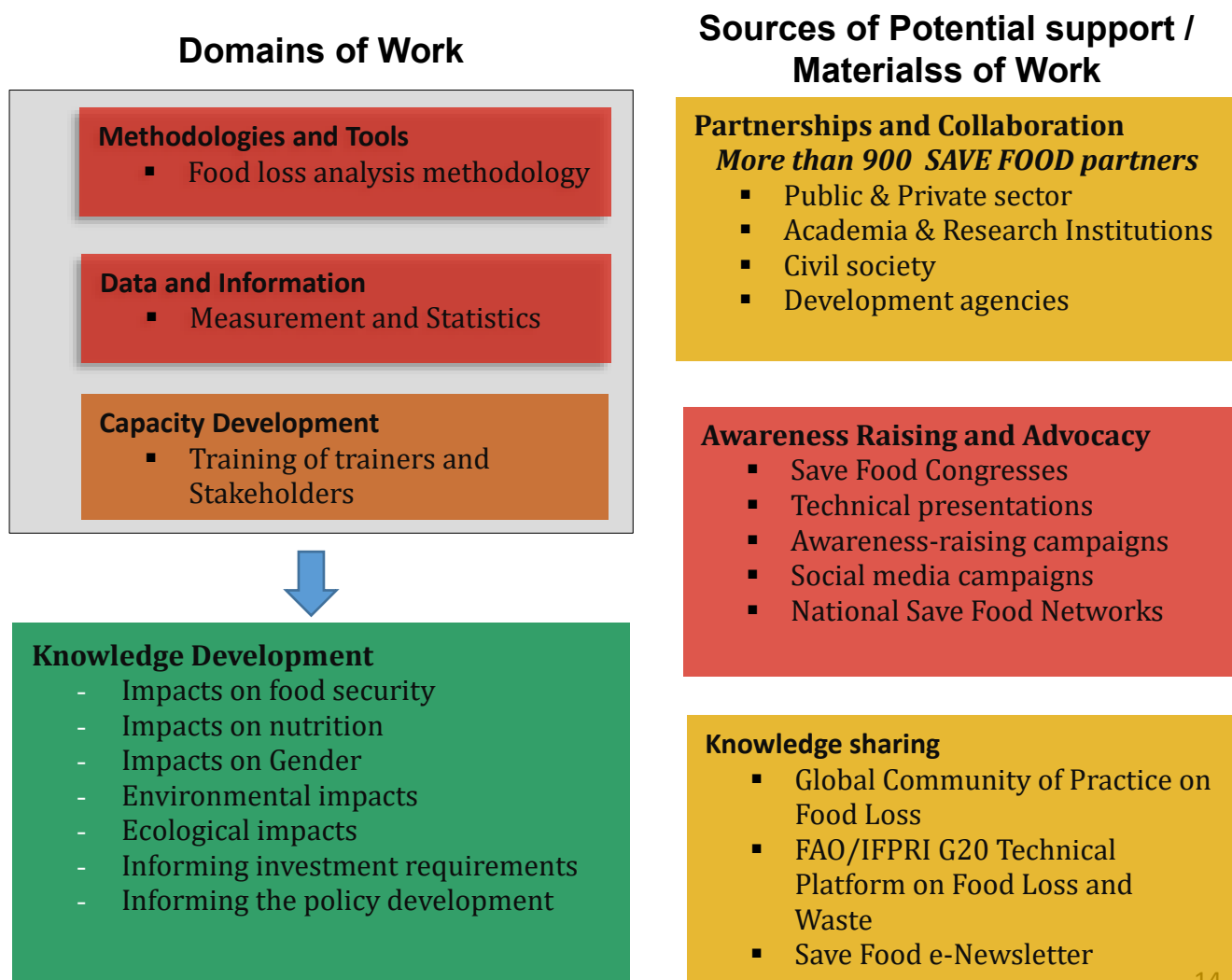
⁵ Southern African Region comprised 12 countries, namely, Botswana, Lesotho, Eswatini, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Seychelles, Zambia and Zimbabwe.

⁶ West African Region comprised 15 countries, namely, Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

- j. targeted policies and / or strategies at the national levels on PHL;
- k. appreciation of the economic value of PHL and its impact on food security;
- l. research and development including lack of evidence-based PHL assessments;
- m. institutional and organisational arrangements including lack of support for generation and dissemination of PHL best practices and knowledge; and
- n. targeted financing and investment in PHL activities.

It is such elements therefore that this strategy will attempt to address from a continental perspective in support of actions to be taken in the same areas at the regional economic community level and ultimately at the Member States level. This is supported by work done by the FAO. In Diagram 3, the FAO outline the various domains of work required to address food losses and post-harvest loss. These are methods and tools, data and information, capacity development and knowledge development. In the same Diagram, the FAO give examples (on the right hand side) of potential sources or materials that can be used in achieving these domains of work.

Diagram 3: Domains of Work to Address Food Losses and Post-Harvest Reduction



2.5. Observations from Consultative Missions

2.5.1. Consultative Missions

During the course of developing this strategy, limited consultations were held during country missions undertaken. Due to limited resources, not all countries could be visited and therefore virtual consultations were also part of the strategy to obtain views and comments in the formulation of this strategy. Key visits made were to Ethiopia, Addis Ababa to meet and consult with the officials from the AUC Department of Rural Economy and Agriculture (DREA), the FAO Sub-Regional Office for Eastern Africa, and the Ministry of Agriculture and Rural Development of the Government of Ethiopia. The visit to Ethiopia was followed by a visit to Kenya where consultations were held with the Ministry of Agriculture, Livestock and Fisheries, Alliance for a Green Revolution in Africa (AGRA), Rockefeller Foundation African Region Office, and the consultants responsible for developing the post-harvest loss management strategy for Kenya.

2.5.2. Key Observations from Consultative Missions

Several key issues arose from these mission consultations that have informed the formulation of this strategy. Key issues of a strategic nature (as opposed to administrative issues) are summarised below.

1) ***Role of Private Sector in PHL***

It was noted that indeed the role of the private sector in PHL is very essential therefore the need for the establishment of engagement mechanisms with the private sector in PHL management to allow for leveraging on private sector expertise, finances and business interests in food and nutrition security.

2) ***Guiding Principles in the Formulation of the Strategy***

In reflection on the proposed guiding principles for the formulation of the strategy (as per Annex 3), the message that came out from consultations was clear to the point that the strategy should support in the areas of *coordination, facilitation and sharing* of best practices and that actions be taken at the appropriate levels. The involvement of RECs in the processes was also considered to be extremely vital.

3) ***Reporting at Continental Level***

The idea of reporting at the continental level was considered to be key and therefore indeed the need for support in reporting processes and systems from national level up through regional economic communities to continental level. Furthermore, the importance of harmonising PHL assessment methodologies and reporting processes to allow for better comparability of data eventually reported on was stressed.

4) ***Standardised Assessment Methodologies***

It was noted that there were conflicting assessment methodologies that were being used at the national level in assessing PHL. There appeared to be no agreement on what methodologies are the most appropriate therefore the need in the strategy to consider the establishment of harmonised and standardized PHL assessment methodologies as one of the key strategy initiatives.

5) ***Technical PHL Skills***

It was noted that apart from the fact that there were very few higher-level education institutions that offer PHL training, the graduates are generally lacking in hands-on skills in PHL therefore the need, in the strategy, to consider the introduction of practical PHL training that produces practical PHL technicians.

6) ***Standards and Markets***

It was also proposed that the strategy should ensure discussion of issues around standards of commodities as they affect PHL. Furthermore, the strategy, DREA urged, should also consider market conditions and infrastructure as it affects PHL. This would include warehousing and storage systems, commodity exchange and price discovery systems, quality control systems and other such market related factors.

7) ***Infrastructure***

With respect to infrastructural issues, the expectation was that the strategy will also cover the needs for storage and marketing facilities as well as general infrastructural needs such as transport and logistics that would ensure the success in post-harvest loss reduction.

8) ***Technologies***

With respect to PHL technologies, the concern was about the efficiency of operation of the many technologies produced to combat PHL as the proliferation of these technologies also came with little standardization and certification of the post-harvest technology / machinery performance standards.

9) ***Financing and Investment***

The need for financing and investment into post-harvest loss coordination and implementation support initiatives was stressed requiring therefore that the strategy be sufficiently robust in this area to allow engagement with the International Cooperating and Development Partners to supporting this effort. The involvement of cooperating partners and financing institutions in PHL was considered critical in the whole process. One of the key questions was how the strategy could foster stronger engagement with private sector to support PHL initiatives. Furthermore, how could the strategy be used to leverage and mobilise resources for its implementation.

- 10) ***Financing Instruments for PHL management***
It was also suggested that the study should investigate and consider seriously ways of potentially creating a fund to support implementation.
- 11) ***Accreditation to Global Funds***
As funding is oftentimes a major constraint in the implementation of policies and strategies, it was noted that the FAO is accredited to the Global Funds. The African Union could leverage on the FAO accreditation to secure financing required in the implementation of this strategy.
- 12) ***Environmental Impact of PHL***
It was noted that certainly PHL has an impact on the environment including from the use (oftentimes misuse of) storage chemicals and inappropriate technologies. Environmental concerns should therefore feature in the strategy.
- 13) ***Climate Change and Post-harvest linkages***
The linkages of climate change and post-harvest losses were stressed and therefore also the need to link into climate smart agriculture and generally climate change initiatives to support PHL reduction.
- 14) ***Private sector investments***
The private sector has generally been excluded in policy formulation, yet it is acknowledged that actual implementation takes place at the firm and individual level. Driven by profits, the value of reduced post-harvest losses should be of interest to the private sector business entities and therefore the need to involve the private sector by developing appropriate dialogue mechanisms.
- 15) ***Strategic Food Reserves***
The issue of strategic food reserves was raised as one of those potential initiatives that could support and help in reducing PHL.
- 16) ***Institutional Capacity Structures***
It was stressed that there is need to include in the strategy suggestions about the institutional capacities required to implement it.
- 17) ***Operationalisation of the Strategy***
Concern was raised regarding Strategies that are developed and hardly operationalized for implementation to contribute to alleviating the food and nutrition security concerns on the continent and therefore the need for this strategy to focus on more practically implementable interventions in the short, medium and long-term.

2.6. Observations from Country Studies

Deriving from the experiences and challenges identified by the five countries studied, the following is a combined listing of critical issues that need to be taken into account in the formulation of the African Union post-harvest loss management Strategy as it is these factors that influence whether or not African Union Member States will be able to achieve the targets on post-harvest loss reduction. For the purpose of this strategy, these challenges can be grouped into the following categories:

Policy Factors

- a. **Targeted and standardised PHLM policies and strategies** at the regional and national levels are critical.

Institutional Factors

- a. **Institutional and organisational arrangements** for coordinating and supporting PHLM initiatives at various levels are considered pivotal.

Knowledge Management and Skills Factors

- a. **Research and development** including lack of evidence-based PHL assessments and lack of support for generation and dissemination of PHL best practices and knowledge were serious challenges requiring combined efforts at tackling them;
- b. **Skills and human development** including extension services training as well as training of farmers in PHL were identified as challenges of significant concern for any successful implementation of a PHLM strategy; and
- c. **Awareness and communication** on the impact or consequences of post-harvest losses (PHL) and therefore appreciation of the economic value of PHL and its impact on food security were of significant value to PHLM.

Technological, Marketing and Agro-Processing

- a. **Technology and mechanisation** including labour saving technologies were considered critical;
- b. **Markets and market infrastructure** including standards were considered critical; and
- c. **Agri-business and agro-processing** for processing and preservation were considered critical.

Financing and investment Factors

- a. **Financing and investment** in PHL initiatives needed to be improved; and

- b. **Macro-economic conditions** including incentives for technology and financing for improved PH management also needed to be improved upon.

Cross-cutting factors

- a. **Gender** particularly as it concerns women who in the most do the majority of the farming activities as well as perform household chores that influence food and nutrition security;
- b. **Entrepreneurial skills development** targeting particularly the youth; and
- c. **Cultural and societal behavioural practices and attitudes** including education as it impacts on understanding PHL.

These and more potential intervention areas will be discussed in more detail in Part 5, Strategic Interventions.

PART 3: STRATEGIC POST-HARVEST ISSUES FROM SELECTED NATIONAL LEVEL STRATEGIES

3.1. Background

As demonstrated in the Biennial Report on the Malabo Declaration commitments in the area of post-harvest losses, some countries on the continent have made attempts at developing and implementing post-harvest loss strategies but some have not done so yet. For purposes of developing this continental post-harvest loss management strategy, five countries were identified in consultation with partners. The countries are Kenya, Tanzania, Zambia and Zimbabwe and Ethiopia.

It is believed that the experiences in these five countries can be scaled up and in future phases of this process, added knowledge and information from other countries is expected to enhance the results derived herein. The following sections will discuss and synthesize the strategies as developed in each of the five study countries with the view to identifying areas of common relevance for action at the continental level.

3.2. Summary Status of Post-Harvest Losses

3.2.1. Overview of Current Status of PHL in Study Countries

Based on available information, Table 2 presents a summary of the current status of post-harvest loss strategies in each of the five countries reviewed.

The oldest established post-harvest loss management strategy of the five studied countries is that of Ethiopia that was developed in 2016 and finally approved for implementation in 2018. All the other strategies are newer and still in draft form for formal adoption by the countries concerned. Overall, therefore, the five study countries have not as at the time of writing this strategy, implemented a post-harvest strategy and therefore what is available is the theory of post-harvest loss management and not practical implementation experience. Be that as it may, this strategy can draw inferences from these reports in the areas that they commonly identify as requiring support or intervention. Annex 4 and Annex 5 contain summarised versions of the post-harvest strategies developed by the five study countries and outlines the visions, goals and objectives of each of the post-harvest strategies. The next sections will draw out the key strategic directions of each strategy.

Table 2: Status of Post-harvest loss management Strategies in the Selected Countries of Study

Country	Title of the Document	Rationale for Post-harvest loss management Strategy
Ethiopia	Post-harvest loss management Strategy in Grains in Ethiopia – October 2016	The Strategy was developed on the recognition that focus on primary production had tended to overlook and effectively neglect the importance of post-harvest losses with available data suggesting annual losses in the vicinity of 15-20 per cent of potential grain production due to poor pre-harvest practices and natural disasters and losses of up to 30 per cent post-harvest due to inappropriate collection, transport, storage, pest control systems in Ethiopia (Ethiopia, 2016, p. ii)
Kenya	Kenya Strategy for Post-Harvest Loss Reduction: 2018 - 2025	The strategy document for PHL reduction in Kenya does not state the rationale behind the development of the strategy. The strategy notes in general that agriculture was identified in Kenya's Vision 2030 as a key sector for achieving the envisaged annual economic growth rate. Neither does the Agriculture Sector Development Strategy nor the Food and Nutrition Security Policy nor the National Food Safety Policy (2013) of Kenya specifically, according to the PHL strategy, identify post-harvest loss management as a key constraint to food and security in that country.
Tanzania	National Post-harvest loss management Strategy (2017 – 2027) – December 2017 Second Draft produced in December 2017 with the support of FAO.	'Although the current policy environment is more receptive to the importance of PHL, the agriculture strategies have not paid adequate attention to PHL issues in effort to increase food and income security' (Tanzania, 2017, p. 3)
Zambia	Post-Harvest Management Strategy for Zambia (2018 – 2025) – March 2018 Draft Strategy prepared with the support of FAO and submitted in March 2018 for consideration by FAO	'In its second national agricultural policy released in 2016, Zambia recognised post-harvest losses as one of the main challenges that needs urgent attention (Nkonde <i>et al</i> 2018, p. 9)
Zimbabwe	Postharvest Management Strategy for Zimbabwe (2017 – 2025) – March 2018 Draft Strategy prepared with the support of FAO and submitted in March 2018	'Zimbabwe currently does not have a standalone policy on Post-harvest loss management. Current policy frameworks includes a few policy statements on Post-Harvest losses, particularly of the staple maize commodity' (Zimbabwe, 2018, p. viii)

3.2.2. Ethiopia

In the formulation of the Ethiopia PHLM strategy, several strategic issues were identified as requiring attention if Ethiopia were to improve on its post-harvest loss management. The following ten are highlighted.

- 1) **Awareness and Communication:** Observed in the case of Ethiopia was that post-harvest losses (PHL) were an awareness issue affecting the way of doing business. Furthermore, PHL was usually misunderstood;
- 2) **Policy:** In Ethiopia, PHL has been neglected for decades with little or no emphasis on PHL until around 2010. Part of the key reasons for this was lack of appreciation of the economic value of PHL and its impact on food security. As a consequence of lack of policy direction on PHL, there was no coordination on

PHL issues among the various disciplines such as health, education and agriculture in efforts to tackle PHL and there was also lack of or weak enforcement of regulatory frameworks affecting PHL;

- 3) **Skills and Human Development including Training:** It was clear in the case of Ethiopia that due to lack of attention on PHL, even the training curricula gave little attention to PHL. As such, the country lacks opportunities for the few trained PHL experts as PHL is not as generally recognised. There was also very little training of extension service agents and farmers on PHL due to limited capacity in PHL in institutions dealing with PHL. Generally, technologies and promotions in agriculture mainly focus on production as priority and hardly PHL;
- 4) **Research and Development:** In Ethiopia, it was observed that research on PHL was generally fragmented and not well coordinated such that evidencebased study data on actual loss assessments of PHL was generally not available;
- 5) **Markets and Market Infrastructure:** In this very crucial part of the commodity value chain processes, it was observed in Ethiopia that there was lack of formal, coordinated marketing structures for domestically consumed commodities thereby placing commodities produced by farmers at risk in terms of disposal systems. Associated with this lack of formal marketing systems are the challenges with grades and standards, pricing structures (no quality payment incentives for domestically consumed commodities); packaging; warehouse management; etc. This marketing environment leads generally to excessive PHL for lack of incentives for producing or maintain quality in harvested crops and in preserving harvested crop in such a state that will take advantage of price fluctuations during the seasons. Exacerbating the situation is the limited / poor infrastructure in terms of harvesting / marketing storage facilities including commodity handling (poor fumigation and general commodity storage systems); road and transport infrastructure, services (e.g. power) infrastructure, testing laboratories etc. Associated with these conditions, this also meant that there were no trade / marketing regulations for domestically consumed commodities to provide some form of control over the handling of grains through the marketing system.
- 6) **Technology and Mechanisation:** In Ethiopia, there is a general lack of appropriate and access to PHL reducing technologies (post production). The high cost of PHL technologies, the lack and high cost of service repairs, and the lack of regulatory / standardisation of machinery (operational performance) reduces the uptake of technology to reduce PHL losses. The of women-friendly and time saving production / processing technologies was also sighted as a major challenge to PHL as the majority of the commodity harvesting, processing and handling is done by women;
- 7) **Macro-economic conditions:** At the macro level, what has hindered the update of improved PHL methods has been the high levels of taxation on imported

agricultural equipment and supplies and generally the lack of regulation on labour wages in Ethiopia;

- 8) **Institutional and Organisational Structures:** It was observed in Ethiopia that the lack of coordination among country (including inter-disciplinary) actors involved in PHL, the lack of support for PHL best practices and knowledge platforms, universities, research institutions, training centres, etc; and the lack of PHL skills, capacity and personnel for instance in the Ministry of Agriculture and Rural Development were major setbacks to promoting good post-harvest loss management practices;
- 9) **Financing and Investment:** Very critical to the whole issue of PHL is financial support throughout the agricultural supply chain. This is lacking in Ethiopia and furthermore, there has been limited budgetary resource allocation for PHL activities. The private sector has found little incentives to get involved in PHL issues; and
- 10) **Agri-Business / Agro-Processing:** The lack of involvement of the private sector in inputs production and distribution; the lack of support for industry in areas such as bag, sheller, thrasher manufacturing; and the lack of support for micro rural agro-processing of crops have all contributed negatively to improved PHL reduction in Ethiopia. The poorly developed agro-processing industry results in a situation where most grains have to be consumed immediately with little preservation for longer shelf life taking place.

3.2.3. Kenya

The Kenya Strategy for Post-Harvest Loss Reduction is anchored on four pillars identified as drivers for post-harvest loss reduction in Kenya, namely, policies, institutions, PHL reduction practices and PHL reduction services. More specifically:

- 1) **Lack of policy focus on post-harvest loss reduction:** Post-harvest food losses in Kenya are estimated at 20-30%. Where there is mention of PHL in some policies, these policies are said to have been ineffective as they do not address post-harvest losses at critical source points. Subsector policies have tended to focus more on boosting production and promoting markets rather than on addressing losses along the food supply chains. Inadequate budgetary allocation for implementation of current policies also exacerbates the ineffectiveness of current policies at PHL management.
- 2) **Lack of institutional capacity development on post-harvest loss management:** Management of post-harvest food losses in Kenya is hampered by inadequate and an outmoded **legal frameworks**. The various laws and statutes that support production and supply of food do not focus on PHL reduction. Sector regulations tend to focus on promotion of production and markets on the one hand and licensing and control of actors on the other.

Furthermore, PHL management is not elaborated in national laws, giving no specific mandates to institutions to address PHL in the respective subsectors.

- 3) **Lack of Good Practices and Technologies to Reduce Post Harvest Losses:** this is the case at all levels of primary producers, agro-processors, traders and consumers in Kenya.
- 4) **Poor access to financing for post-harvest loss reduction initiatives:**

Access to bank credit to finance post-harvest loss reduction initiatives is still a major challenge despite the fact that Kenya has a relatively well-developed banking system. Risks associated with agribusiness coupled with complicated land laws and tenure systems that limit the use of land as collateral make financing agriculture unattractive to the formal banking industry. The cost of bank credit and the limited number of banks in rural areas are some of the factors that make it difficult for farmers to access bank credit.
- 5) **Extension Services is poor and lacks post-harvest loss reduction training:**

Over the years, Kenya relied on public agricultural extension services coordinated centrally. With devolution of agriculture, extension services are carried out by County Governments. Since then, the effectiveness of extension services has reduced calling for a reorganisation of the public sector extension services. The number of public sector extension personnel is low and facilitation to carry out extension services is limited. For commercial crops driven by productivity and competitiveness in market access, the need to implement market standards or codes of practice has given birth to private extension services. However, post-harvest losses are currently much higher in less commercial production systems. The link between national extension services and sources of research or new information, particularly on post-harvest loss reduction is weak.
- 6) **Poor agricultural market information systems:** Data collection, analysis and information dissemination are a major challenge for agricultural market information systems in Kenya as they are poorly funded. Most agricultural market information systems in Kenya have tended to over-rely on external support and therefore remain unsustainable. Besides, the messages currently disseminated do not necessarily focus on post-harvest losses at different stages of the food supply chain.
- 7) **Lack of research and development in PHL:** Despite the large number of skilled scientific staff engaged in agricultural research in both public and private universities, no mechanism exists to harness these strengths at the national level or even a designated process to link the universities with the large public or private research initiatives and industry. Very little research is being done on PHL.

3.2.4. Tanzania

According to the National Post-Harvest Management Strategy (NPHMS) (2017-2027) of the United Republic of Tanzania (URT), it identified eight strategic issues to be addressed in an effort to reduce post-harvest losses in Tanzania. These are:

- 1) Inadequate awareness on post-harvest losses including causes, impacts and solutions by actors along the value chain;
- 2) Limited access to appropriate and cost effective PHLM technologies;
- 3) Insufficient and poor marketing systems, including infrastructure;
- 4) Inadequate research and innovation efforts on PHLM;
- 5) Inadequate and poor enforcement of existing post-harvest loss management regulations and guidelines;
- 6) Limited institutional capacity, inadequate coordination, and little involvement of other stakeholders in post-harvest loss management;
- 7) Limited capacity to adapt and mitigate the effect of climate changes on PHLM; and
- 8) Inadequate financing of Post-Harvest Loss Management.

3.2.5. Zambia

According to the proposed draft post-harvest loss strategy for Zambia, the post-harvest loss management Strategy for Zambia (2018-2025), which is still under formulation, the following are some of the key findings that impede effective post-harvest loss reduction efforts in Zambia:

- 1) Awareness creation of available PHL-reducing technologies;
- 2) Improving access to PHL reducing technologies;
- 3) Policy recommendations;
- 4) Education on best practices in harvest and post-harvest handling technologies;
- 5) Research on improved varieties for pre- and post-harvest loss reduction;
- 6) Exploitation of existing information exchange platforms or developing new ones;
- 7) Market and marketing facilities including transport, storage, processing and packaging infrastructure and facilities; and
- 8) Strengthen research and farmer capacity building.

3.2.6. Zimbabwe

The Post-Harvest Management Strategy of Zimbabwe outlines in general the strategic issues it consider essential in post-harvest loss management. The strategy also outlines commodity specific challenges and therefore strategic issues that require attention by commodity. Outlined below are the general strategic issues on post-harvest issues in Zimbabwe cutting across cereals and grains, horticulture, fruit and vegetable and milk sub-sectors:

- 1) **Create conducive policy environment:** According to the strategy document, there is currently no policy in Zimbabwe focusing specifically on PHL. There is need to put in place a PH policy and strategy (which has now (2018) just been developed) that can inform and provide guidelines to both the public and private sector on prioritizing investments in PHL reduction towards achieving the Malabo Declaration commitments and targets;
- 2) **Institute a mechanism to coordinate post-harvest loss management:** According to the Zimbabwe PHL strategy, the review of past and present policies indicated that there is lack of coordination of the various programmes and projects that have been implemented in Zimbabwe by non-government organizations and the public sector;
- 3) **Raise awareness on post-harvest losses:** Some of the causes of PHL can be mitigated if the actors are fully informed of the impact of PHL. Raising awareness is therefore important as it triggers understanding of the magnitude of the problem and enables value chain actors to put in place PHL reduction measures that ensure they derive maximum benefits from their activities;
- 4) **Implement agricultural systems and practices that support loss reduction:** One of the issues that is responsible for PHL in cereals for example is harvesting of the crops with high moisture content. This is mainly because farmers lack the necessary knowhow and importance of harvesting under the optimal conditions. Furthermore, the lack of equipment and appropriate technologies to determine optimal moisture content at harvest or after drying the commodity also add to the problem although there are practices that can be used for these purposes;
- 5) **Facilitate research and development on post-harvest loss management:** There are laboratories in both the public and private sectors that provide testing services. These laboratories can be strengthened to provide quality and research services relevant to PH management.
- 6) **Facilitate investments in technology, mechanization and general practices:** There are a number of technologies that have been produced but are not yet widely available in Zimbabwe. There is also generally very low uptake rates of these technologies in the country.
- 7) **Improve post-harvest extension and training:** Post-harvest loss management is a relatively new science that is not widely integrated and taught in universities and colleges. Most of the graduates therefore lack post-harvest loss management technical capacity and an understanding of the principles behind the discipline. Field extension workers have mainly accessed post-harvest technical training through capacity development programmes that have been implemented. There is therefore need to upgrade the skills of extension staff and

integrate the teaching of post-harvest loss management at all levels of the education systems;

- 8) **Improve marketing infrastructure:** The rural road infrastructure is mainly composed of seasonal roads that are linked to the national network of all-weather roads. The roads in the rural areas become impassable particularly during the rainy season. There is a lack of marketing and aggregation structures in rural areas that allow for linkages with enhanced urban markets. There is need therefore to prioritize the maintenance of the rural roads given the importance in terms of movement of produce from the farms to the market and the installation of aggregation, storage and marketing facilities;
- 9) **Mainstream gender and the youth in post-harvest activities:** Men tend to dominate income generating activities in the smallholder areas. This is mainly because men have better access to resources compared to women and youth. In order to encourage and promote gender equity, there is need to promote investments that take into account the interests of women and youth. Appropriate PH management technologies developed and promoted should take into account labour saving technologies for activities that are mainly performed by women and youth in order to encourage their participation; and
- 10) **Promote post-harvest loss management processes that take into account the impact on the environment and climate change:** Environmental sustainability is important in order for the regeneration of the natural resource base. Use of PH management methods that deplete the environment without the requisite replenishment are not environmentally friendly. Examples can be found in the use of firewood, in boiling milk for pasteurization when alternative options such as the use of electricity, biogas and solar could be considered within the context of the impact on the environment.

3.3. Summary of PHLM Strategic Issues Emanating from Country Studies

Deriving from the experiences and challenges identified by the study countries that have been reviewed, as well as strategic issues that the study countries highlighted, the following is a combined listing of critical issues that need to be taken into account in the formulation of the African Union Post-Harvest Loss Management Strategy as it is these factors that influence whether or not African Union Member States will be able to achieve the Malabo Declaration target on post-harvest loss reduction. For this purpose, these challenges can be grouped into several categories as tabulated below (Table 3).

Table 3: Summary of Strategic Factors of Regional and Continental Relevance_Emanating from Study Country Studies

Strategic Factors	Key Challenges
1. Policy	1.1. Lack of policy direction and focus on post-harvest loss management 1.2. Lack of standardised structure in national PHL Management Strategies
2. Awareness	2.1. Lack of awareness at all levels and lack of high level focus on PHL
3. Institutional	3.1. Lack of coordination among country actors and institutions dealing with PHL 3.2. Poor involvement of private sector and other disciplines in coordinated action on PHL 3.3. Lack of institutional capacity development on post-harvest loss management 3.4. Poor enforcement on existing PHL regulations and guidelines (e.g. in marketing systems and storage structures)
4. Knowledge Management and Data	4.1. Fragmented and uncoordinated efforts at research and development on PHL 4.2. Lack of PHL best practices and knowledge platforms, universities, research institutions, training centres 4.3. Lack of PHL data, lack of harmonised data and poor reporting 4.4. Poor agricultural market information systems
5. Skills and human development	5.1. Lack of PHL training at all levels of the education systems 5.2. Poor extension services which also lacks PHL management training
6. Technology, Agri-business and Agro-Processing	6.1. Lack of appropriate (e.g. labour saving) and access to PHL reducing technologies 6.2. High cost of PHL reducing technologies 6.3. Lack of regulations on standards and efficiency ratings for PHL reducing technologies 6.4. Poorly developed agri-business and agro-processing due to lack of incentives for private sector involving in PHL management particularly in agri-businesses and agro-processing
7. Markets and market Infrastructure	7.1. Lack of formal coordinated marketing structures 7.2. Lack of trade / marketing regulations 7.3. Lack of grades and standards (price for quality) both for commodities and for storage structures 7.4. Lack of or poor or limited market infrastructure such as roads, transport, storage
1. Financing and Investment	1.1. High cost of and poor access to financing for PHL technologies 1.2. Lack of funding for PHL activities 1.3. Poor involvement of the private sector in PHL initiatives including policy formulation
2. Cross-cutting	2.1. Poor capacity to adapt and mitigate the effects of climate change on PHL 2.2. Poor engagement and training of women and youth in PHL management 2.3. Poor regulations on use and disposal of pesticides and other storage chemicals

PART 4: STRATEGIC FRAMEWORK

4.1 Purpose of the Strategy

Drawing from the challenges and constraints identified based on the five study countries and from literature reviewed, the following are the suggested vision, goal, objectives and indicative intervention areas that this strategy aims to achieve. The strategy overall aims to support Member States achieve the targets of the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods as well as the targets of the United Nations Sustainable Development Goals (SDGs) particularly SDG 12, target 12.3.

The strategy is proposed as a high level framework which has been designed in a generic manner that allows for commodity specific post-harvest loss management interventions to be effectively guided. The purpose, therefore, of this the African Union Post-Harvest Loss Management Strategy (PHLMS) is *to define commonly agreed objectives and measures to guide, promote and support actions at all levels in the agricultural and food value chains to significantly reduce post-harvest losses in line with the Malabo Declaration commitments on post-harvest loss reduction.*

4.2 Vision of the PHLM Strategy

The proposed vision of the African Union Post-Harvest Loss Management Strategy is *to contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock and fisheries products.*

4.3 Goal of the PHLM Strategy

The goal of the African Union Post-Harvest Loss Management Strategy is *to halve (decrease by 50%) the current levels of Post-Harvest Losses (PHL), by the year 2025 from the year 2015*

4.4 Objectives of the PHL Strategy

4.4.1 Overall Objective

The overall objective of the African Union Post-Harvest Loss Management Strategy is *to effectively guide and coordinate post-harvest loss initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets.*

4.4.2 Specific Objectives

More specifically, the strategy aims to:

- a. Facilitate the development and effective implementation of **structurally standardised and robust post-harvest loss policies and strategies**;
- b. Facilitate and **create awareness** of the impact, economic value and consequence on food security of post-harvest losses
- c. Facilitate the **effective coordination and support of post-harvest loss initiatives** by supporting the **establishment of effective institutional and organisational mechanisms** on PHLM;
- d. Support the **creation, generation and dissemination of knowledge, knowledge products and best-practices** in post-harvest loss and its management;
- e. Facilitate the **development of skills and capacities** in post-harvest loss management and training;
- f. Promote **technological advancements, value addition and preservation** through improved agri-business and agro-processing environment to support PHL management best practices;
- g. Support the **development of improved markets and market infrastructure** including grades and standards in post-harvest loss management throughout the agricultural value chains;
- h. Support the **development of private sector involvement and investment in agriculture** through engagement mechanisms with the private sector in PHL management to allow for leveraging on private sector expertise, finances and business interests in food and nutrition security
- i. Support **sound practices in macro-economic governance** that induce conditions conducive for financing and investment in PHLM; and
- j. Promote the use of **smart, environmentally friendly, labour saving and gender sensitive technologies** in PHLM.

4.4.3 Strategic Focus Areas

For purpose of this strategy, these nine specific objectives can be clustered into four strategic focus areas which will form the pillars of the African Union Post-Harvest Loss Management Strategy. These are outlined in Table 4 below.

Table 4: Strategic Objectives of the African Union Post-Harvest Loss Management Strategy

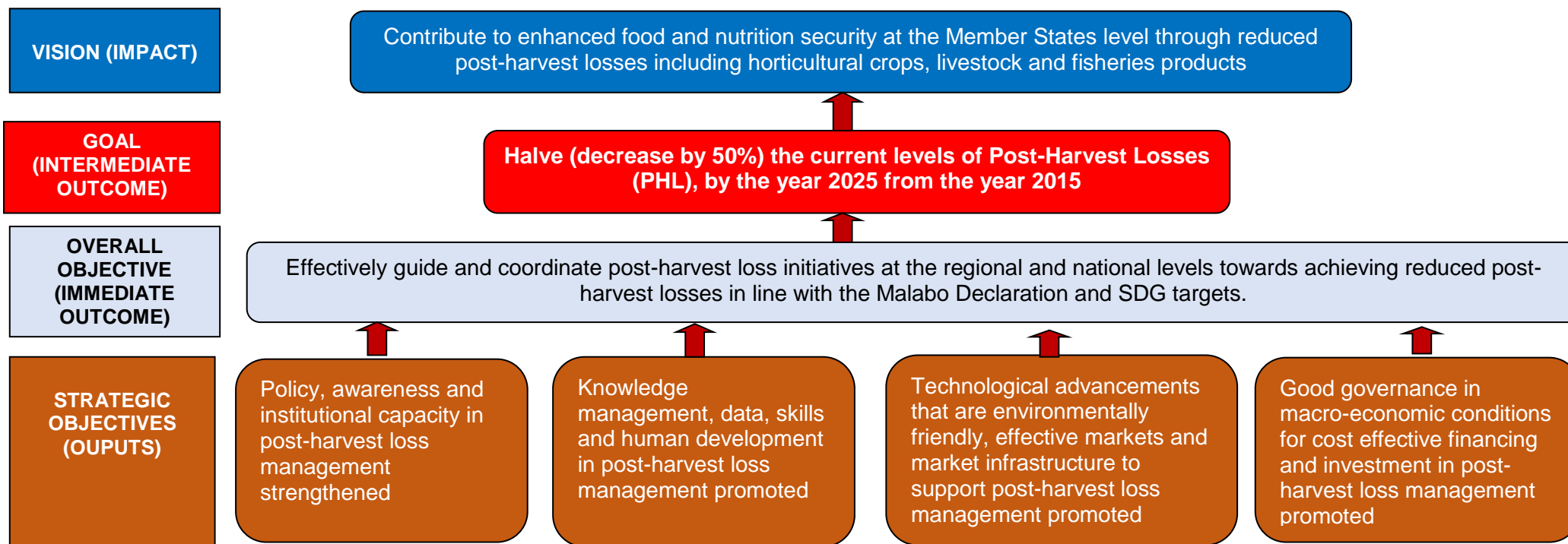
Pillar	Strategic Focus Areas	Specific Objectives Cluster
I	Policy, Awareness and Institutional Capacity	<ol style="list-style-type: none"> 1. Policy: Facilitate the development and effective implementation of structurally standardised and robust post-harvest loss policies and strategies; 2. Awareness: Facilitate and create awareness of the impact, economic value and consequence on food security of post-harvest losses 3. Institutional: Facilitate the establishment of institutional and organisational mechanisms that allow for effective coordination and support of post-harvest loss initiatives
II	Knowledge Management , Data, Skills and Human Development	<ol style="list-style-type: none"> 1. Knowledge Management: Support the creation, generation, dissemination and reporting of data, knowledge, knowledge products and best-practices in post-harvest loss and its management; 2. Skills and Human Development: Facilitate the development of skills and capacities in post-harvest loss management and training
III	Technology, Markets and Infrastructure	<ol style="list-style-type: none"> 1. Technology, Agri-business and Agro-processing: The promotion of technological advancements, value addition and preservation through improved agri-business and agro-processing environment to support PHL management best practices; 2. Markets and Market Infrastructure: Support the development of improved markets and market infrastructure including grades and standards in post-harvest loss management throughout the agricultural value chains 3. Cross-Cutting: Promote the use of environmentally friendly, labour saving and gender sensitive technologies in PHLM
IV	Finance and Investment	<ol style="list-style-type: none"> 1. Financing and Investment: Support governance that induces macro-economic conditions conducive for financing and investment in PHL management 2. Private sector involvement and investment in agriculture: Support establishment of engagement mechanisms with the private sector in PHL management to allow for leveraging on private sector expertise, finances and business interests in food and nutrition security

4.1 Overall Results Chain Framework

Deriving from the above, the results chain for the proposed African Union Post-Harvest Loss Management Strategy is as shown in Figure 2

Figure 2: Overall AU PHL Results Chain Framework

Conceptual Framework of African Union Post-Harvest Loss Management Strategy in Food and Horticultural Crops, Livestock and Fisheries Products



PART 5: CONTINENTAL LEVEL STRATEGIC INTERVENTIONS

5.1 Introduction

Based on the strategic focus areas identified in the previous part, this part outlines indicative interventions foreseen in the implementation of this strategy. These interventions will change with time as they get implemented and their impact and effects begin to be felt on the African Continent. As such, it is here in these interventions that this strategy will remain a living document cycle after cycle.

It is a fact that resources are limited and therefore interventions designed under this strategy should be impact delivery oriented. What therefore is proposed below are indicative intervention areas that, depending on resources available, can be broadened provided value addition, sound partnerships and long-term sustainability can be achieved.

5.2 Policy, Awareness and Institutional Capacity

5.2.1 Overview

From the study of the five selected countries, Ethiopia, Kenya, Tanzania, Zambia and Zimbabwe, it was clear that none have yet implemented post-harvest loss strategies. In fact, only Ethiopia has developed and since approved for implementation its post-harvest loss management strategy. The rest of the countries studied are in the formulation stages of their post-harvest strategies. From the results of the 2018 Biennial Report on Malabo Declaration Commitments under which countries were obliged to report on post-harvest losses, only five countries out of 55 reported as having monitored post-harvest losses. These are Malawi, Mauritania, Rwanda and Uganda. It was also established that FAO has over the years been assisting at least eight African countries to develop and implement their PHL strategies. It will therefore, not be accurate to conclude that no African country had developed and implemented a post-harvest strategy at the time of drafting this strategy however, what the five countries studied and the lack of reporting on Post-Harvest losses by 50 countries on the continent have highlighted, is the general lack of policy focus on Post-Harvest losses in parts of the African continent.

It can be inferred from this analysis that the issues of post-harvest loss management are a challenge on the African continent requiring strengthening. The importance of a policy and strategy derives from their definitions. A 'policy' can be defined as a coherent set of decisions (goals) or statement of actions to guide the attainment of rational outcomes. Policies are generally implemented by way of one or more strategies where a 'strategy' defines how the end (goals) set out in a policy, will be achieved and by what means (resources). It follows therefore that without a sound policy and strategy on post-harvest loss management, the roadmap to achieving the Malabo Declaration commitment target of halving the current post-harvest losses by 2025 becomes nearly impossible to achieve.

Even where policies and strategies exist, these have to be implemented, hence the importance of resource allocation for their implementation. These resources take the form of financial and human resources through appropriately structured and mandated institutional and regulatory arrangements. Sensitization and awareness of the importance of Post-Harvest losses therefore becomes essential to allow for the implementers to be fully disposed to implement the strategy. Part of the key to a successful implementation of a sound PHLM strategy therefore lies in the awareness and readiness by the population to implement such a strategy. This calls for institutional support in the many processes of awareness generation, training, regulating, coordinating and overall implementing the strategy.

5.2.2 Objective

As such, it is the main aim for interventions identified under this strategic focus area *to facilitate the development and effective implementation of structurally standardised post-harvest loss management strategies across the African continent.*

5.2.3 Proposed Indicative Intervention Areas

To achieve the above objective, the following are proposed as critical intervention activities under each sub-focus area:

1) Policies and Strategies

- a. Undertake a complete mapping of the existence and status of implementation of post-harvest loss management policies and strategies on the African Continent;
- b. Facilitate the development of well-structured policies and strategies on post-harvest loss management on the African continent; and
- c. Support the implementation of the post-harvest strategies on the African continent.
- d. Continental guidelines for PHL policies and strategies to guide MS in mainstreaming PHL in the CAADP/NAIPs

2) Awareness Campaigns

- a. Develop a continent-wide awareness campaign on post-harvest losses and its management; and
- b. Support the implementation of the post-harvest loss awareness campaign.

3) Institutional Capacity

- a. Facilitate the establishment of a PHL Platform / Forum for sharing expert advice, information and general activities in the PHL space; and
- b. Develop coordination mechanism of PHL activities across the continent.

5.3 Knowledge Management, Data, Skills and Human Development in PHLM

5.3.1 Overview

Knowledge management has been defined as the explicit and systematic management of processes enabling vital individual and collective knowledge resources to be identified, created, stored, shared and used for collective benefit (adapted from Girard & Girard, 2015 according to the Technical Centre for Agricultural and Rural Cooperation (CTA) Working Paper 17/06: Effective Tools for Knowledge Management and Learning in Agriculture and Rural Development, by Krishan Bheenick and Israel Bionyi). What is key in knowledge management are the (a) processes to generate, analyse and disseminate usable information; (b) hence the skills to generate, analyse and use the information; and (c) the institutional capacities to coordinate and facilitate the generation, analysis and dissemination of information in a regulated manner that is sound and generally acceptable to most key stakeholders.

5.3.2 Objective

As such, it is the main aim for interventions identified under this strategic focus area *to create a knowledge management system including skills and human development in post-harvest loss management*

5.3.3 Proposed Indicative Intervention Areas

To the above effect, the following are proposed as critical intervention activities under each sub-focus area:

- 1) **Knowledge Management**
 - a. Facilitate the standardisation of methodologies in the assessment of post-harvest losses across the continent;
 - b. Data and information generation, analysis and dissemination
 - c. Support Research and Development in PHL including application and dissemination of the results;
 - d. Create a continent-wide database on PHL; and
 - e. Facilitate refinement of PHL monitoring and reporting tools for Biennial Reporting.
- 2) **Skills and Human Development**
 - a. Facilitate the development of PHLM curricula guidelines on PHL management to support training institutes deliver PHL education; and
 - b. Support mentorships and exchanges in PHLM

5.4 Environmentally Friendly PHL Technologies and Market Infrastructure

5.4.1 Overview

As defined earlier, Post-Harvest technology development requires an inter-disciplinary and multi-dimensional approach, which must include, scientific creativity, technological innovations, commercial entrepreneurship and institutions capable of inter-disciplinary research and development all of which must respond in an integrated manner to the developmental needs. The use of this technology is also varied catering for protection, conservation, processing, packaging, distribution, marketing, and utilization of food crops, livestock and fisheries products.

Technologies therefore exist that can assist reduce post-harvest losses to acceptable levels. The issues therefore that are facing Africa in the post-harvest loss management space with regards to the use of PHL reducing technologies include the appropriateness of the technology to local conditions, cost effectiveness of the technology, availability of the technology including its ease of serviceability, cultural norms and practices as they influence the adoption of technology and many other such socio-economic factors. The answer therefore to PHL management is not simply the use of technology but more on how to adapt appropriate technology to localized conditions and practices. Acceptance and affordability of technology play a huge part in its adoption.

It is a fact market conditions including market infrastructure for the majority of the African countries is inadequate making marketing transaction more difficult and expensive generally to the detriment of the farmer. The longer a commodity is stored inappropriately, the larger the post-harvest losses. With adequate marketing facilities and infrastructure, it is possible to extend the life of most commodities in a quality that is acceptable for human consumption and for the generation. Market facilities and services also allow producers to make more rationale decisions towards disposal and purchase of needed commodities and therefore have a huge impact on income generation. It is essential therefore that the continent improve on its markets, market infrastructure and market services.

5.4.2 Objectives

As such, it is the main aim for interventions identified under this strategic focus area *to create a knowledge management system including skills and human development in post-harvest*

5.4.3 Proposed Indicative Intervention Areas

To the above effect, it is proposed that interventions to support the adoption of environmentally friendly PHL management technologies and the improvement of market conditions to reduce post-harvest losses, should be in the following areas from the perspective of continental level support:

- 1) **Technology, Agri-Business and Agro-Processing**
 - a. Develop and share a compendium of PHL reduction technologies and best practices suited for the African continent;
 - b. Facilitate the certification (standards of operation) of PHL technologies; and
 - c. Promote the development of labour saving and gender sensitive PHL reducing technologies throughout the agricultural value chain.

- 2) **Markets and Market Infrastructure**
 - a. Promote the development of commodity exchanges and price discovery systems;
 - b. Promote standardised grades and standards across markets; and
 - c. Promote high standards in storage infrastructure and systems.

- 3) **Climate change and PHL**
 - a. Ensure environmentally friendly and sensitive processes and procedures in the above activities.

5.5 Financing and Investment

5.5.1 Overview

It is generally accepted that the role of governments (public sector) lies in the formulation and development of policies and strategies targeted at delivering on identified target issues. It is also generally accepted that the private sector (defined here to mean an institution or organisation that is not public sector), are the implementers of various policies and strategies outlined by governments as these affect their business enterprises. At the core of any business enterprise are issues of financing and investment support provided for such activities. Yet, it is common knowledge that continental, regional and national policies and strategies suffer from limited or weak or lack of engagement with key stakeholders (private sector, civil society, academia, among many) in the development of such policies and strategies and consequently their implementation. The lack of direct involvement by the private sector is a barrier to economic development in general and more specifically, a barrier to reducing post-harvest losses. ;

It is an undisputed fact that the adoption of technology by the private sector (implementers of policies and strategies) is associated with its cost affordability despite sometimes its cost effectiveness over time. Similarly, the adoption of good farming and storage practices are influenced by the cost of inputs, storage facilities, storage and pest control chemicals / pesticides and many such elements as well as market prices for stored commodities. These and many other factors are influenced by the country's macro-economic and financial governance structures and practices on the one hand, and market forces on the other.

Often cited as a prohibitive factor is the cost of importing PH technologies or components for local manufacture. Also often cited are the lack of incentives for local manufactures of

PHL technologically advanced equipment and instruments. There is also a general lack of support and investment into local research and development into appropriate PHL technologies that are adapted to local conditions. Generally, in Africa, investment and support to research and development as a whole is on the decline. This general lack of financing for agriculture activities, as can be observed from the number of countries that have not reached the CAADP 10% allocation of national budgets to agriculture target, and the difficulties of accessing financing are some of the critical hindrances to improved PHLM and therefore reduced PHL.

Fundamentally, there has been little focus on PHL in terms of cost affordability of PH technologies, practices and systems requiring therefore concerted action on both investment into and the cost of same. To what extent at the continental level the African Union can influence sovereign decisions on macro-economic factors is a challenge that affects PHLM in as much as it affects other financial and economic decisions at the member states level. In the SADC region, and potentially other regions, a country peer review mechanism has been in operation for a while where a team of financial and economic experts from one country are assigned to peer review the entire macro-economic situation of another country and present their reports at formal SADC annual meetings. This process has provided an oversight on gaps and challenges that countries should focus on in their financial and fiscal policies and strategies. Perhaps this is an activity that could be encouraged and raised to the continental level with a focus on support for PHLM financing needs and the engage of the private sector in processes of material relevance to their businesses.

5.5.2 Objectives

As such, it is the main aim for interventions identified under this strategic focus area *to strengthen a macro-economic peer review mechanism aimed at ensuring adequate budgetary allocations and financial support to agriculture in general, as envisaged in the CAADP, but with more specificity on PHLM support.*

5.5.3 Proposed Indicative Intervention Areas

To the above effect, it is proposed that interventions to support increased and affordable financing and investment in agriculture as a whole but particularly PHLM, should be in the following areas from the perspective of continental level support:

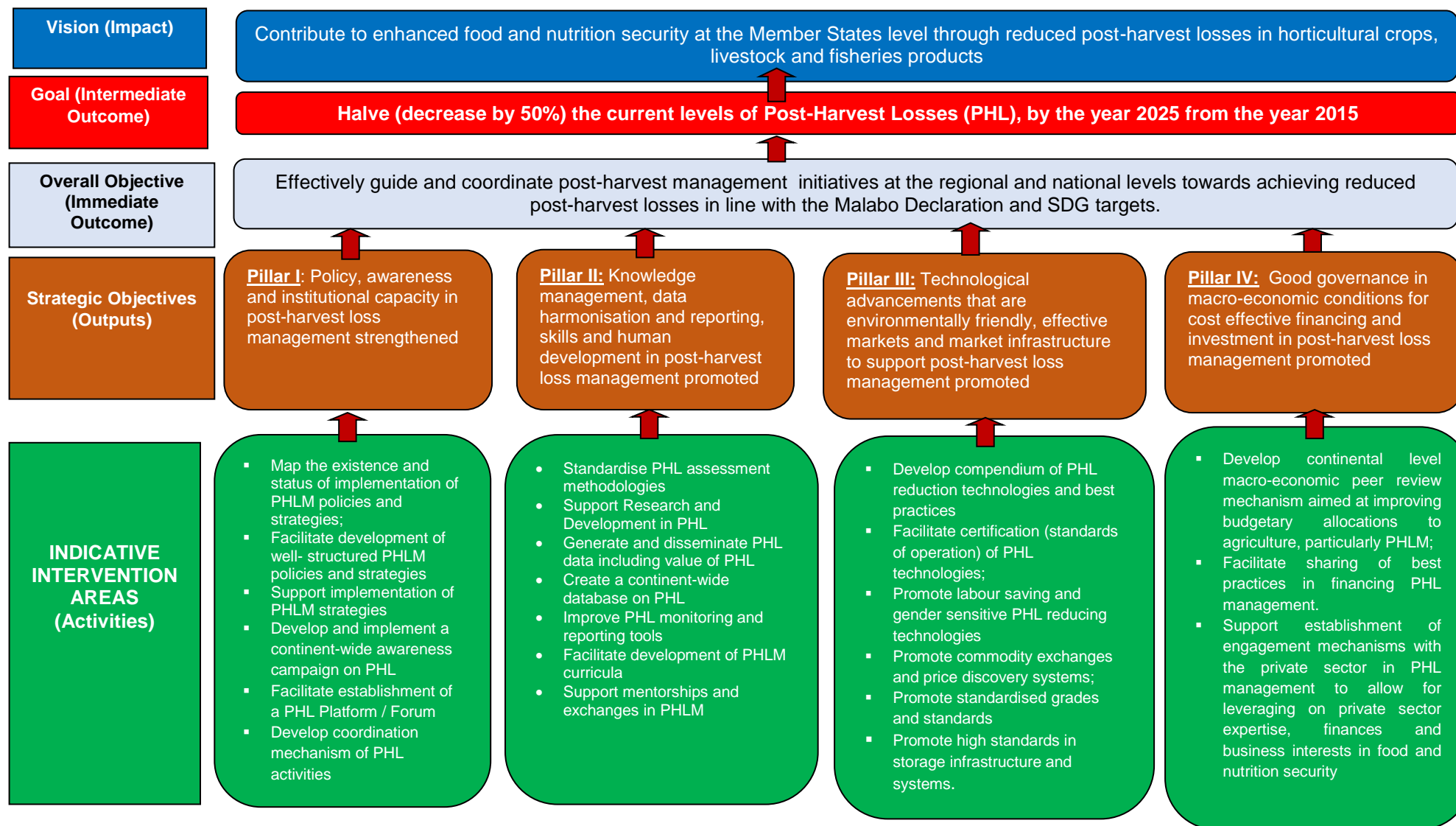
- 1) **Financing and Investment**
 - b. Develop a continental level macro-economic peer review mechanism aimed at improving budgetary allocations to agriculture as a whole and PHLM in particular; and
 - c. Facilitate sharing of best practices in financing PHL management.
- 2) **Private sector involvement and investment in agriculture**

- a. Support establishment of engagement mechanisms with the private sector in PHL management to allow for leveraging on private sector expertise, finances and business interests in food and nutrition security.

5.6 Results Framework

The Results Framework or the Results Chain for the African Union Post-Harvest Loss Management Strategy is derived from the above analysis. The Results framework, a tool for planning, monitoring and evaluation is based on how proposed inputs and actions lead to outputs, outcomes (immediate and intermediate) and impact that will be produced by the AU PHLM Strategy in a logical way. More details on the Results Framework use are given in the M&E Framework, Logic Model section 7.3.3 of this strategy. In summary of the above sections, the Results Framework for the African Union Post-Harvest Loss Management Strategy is presented in Figure 2 overleaf.

Figure 2: Results Chain of African Union Post-Harvest Loss Management Strategy in Food and Horticultural Crops, Livestock and Fisheries Products with Indicative Interventions



PART 6: IMPLEMENTATION FRAMEWORK

6.1 Prerequisites for Successful Implementation

The success of this strategy will hinge on a number of key issues.

- a. First, the African Union recognizes eight regional economic communities on the African Continent. In alignment with the guiding principle of 'subsidiarity', it would ordinarily be expected that this strategy would target support and/or guidance in PHL at the regional level and in a cascading manner, Regional Economic Communities would support and provide guidance at the national level. The success of this strategy will be influenced by the extent to which RECs are involved in the processes.
- b. The issue of continental relevance, adding value to activities at the REC level and further down to the Member States level, is crucial. The strategic intervention areas at the continental level should not duplicate what is being done at the REC or Member State level but add value to actions taken at the REC level and similarly actions at the REC level should add value to those at the national level where the actual implementation takes place.
- c. The focus of this strategy should be on few critical, high level and strategic actions for whose interventions should be carefully targeted for high impact on post-harvest loss reduction.
- d. While there is overwhelming political willingness and support for agriculture as a whole, there is need for focused attention at the highest levels, on post-harvest loss management.
- e. The creation of effective partnership platforms and coordinated actions by various PHLM expert institutions with the full engagement of all key stakeholders in the implementation of the Strategy is also paramount.
- f. The establishment of the requisite infrastructure to support agricultural development including transport and road networks, ICT, electricity and such market related infrastructure is also paramount and will considerably influence the success of this strategy.
- g. The building of understanding and confidence by the financial sector of the agriculture sector and therefore the provision of affordable and accessible financing and investment is vital for the success of this strategy; and
- h. The mainstreaming of gender, youths, HIV/AIDS, environmental including climate change and variability factors and other cross cutting issues into the Strategy interventions at all levels is most important.

6.2 Phased Planning and Implementation

6.2.1 Overview

This strategy, it is proposed, will be operationalised in five-year cycles allowing for progressivity based on experiences gained during the implementation of the one five-year period into the next. The implementation of identified interventions will be prioritised in a manner that allows for quick impact and results in the short to medium term. This however does not imply that those actions that need to commence now but for longer term impact will be ignored, these will also be programmed to start at appropriate times.

For each implementation cycle, **an investment and implementation plan** articulating costed prioritised programmes and sub-programmes, will be developed for implementation. The organisational and institutional and governance structures to operationalise each cycle will be determined to meet the needs of those programmes identified for the cycle. Furthermore, the investment plan will articulate the implementation mechanisms to be employed in implementing the Strategy.

The funding for the strategy implementation is critical. Effectively, the funding needs will depend on a number of issues but also on how deep the AUC plans to be involved in the implementation of suggested PHLM interventions. It is important therefore that the investment plan for each five-year period consider a resource mobilisation strategy based on costed programmes and projects to be implemented.

6.2.2 Proposed Indicative Intervention Areas for Implementation in the First Five-Year Implementation Plan of the PHLMS

During the AU / FAO Post-Harvest Loss Regional Workshop held in Nairobi, Kenya in July 2018, participants engaged in the proposed AU PHLMS Results Framework and drew out indicative intervention areas that were considered of immediate importance to implement, and those that were of medium to long-term. Table 5 overleaf, using the relevant overall indicators from the AU PHLMS Results Chain (Figure 2 in Part 5), outlines the proposed activities for the immediate implementation of the PHLMS once approved.

As discussed above, this listing of proposed activities will require to be fully disaggregated in terms of the actions to be undertaken, each action then also needs to be costed and a budget drawn up for their implementation including the institutional and operational manner in which these activities will be implemented.

Table 5: Proposed Activities for Immediate Implementation of the AU PHLMS⁷

Pillar	Strategic Focus Areas	Indicative Intervention Areas (Proposed Activities for Implementation) (Part 5, Figure 2, Results Chain)	
		Immediate Term Activities	Short to Medium Term Activities
I	1. Policy, Awareness and Institutional Capacity		<p>1.1. Policy: Facilitate the development and effective implementation of structurally standardised and robust post-harvest loss policies and strategies</p> <p>1.2. Awareness: Facilitate and create awareness of the impact, economic value and consequence on food security of post-harvest losses</p> <p>1.3. Institutional: Facilitate the establishment of institutional and organisational mechanisms that allow for effective coordination and support of post-harvest loss initiatives</p>
II	2. Knowledge Management, Data Harmonisation and Reporting, Skills and Human Development	<p>2.1. Methodologies: Adopt and incorporate the FAO Global food loss index in the AU reporting system;</p> <p>2.2. Methodologies: Standardise / harmonise methodology for collection of data and train and collect data;</p> <p>2.3. Knowledge Management: Support the creation, generation and dissemination of data, knowledge, knowledge products;</p> <p>2.4. Knowledge Management: Best-practices in post-harvest loss and its management and build on FAO community of practitioners;</p> <p>2.5. Assessments: Support 2 Countries/RECs abilities to measure and report on losses for 2019 BR;</p> <p>2.6. Skills and Human Development: Facilitate the development of skills and capacities in post-harvest loss management and training</p>	2.7. Methodologies: Incorporation and adoption of the FAO Global food waste index into the AU reporting system
III	3. Technology, Markets and Infrastructure	3.1. Technologies and Best Practices: Map and disseminate practical examples of PHL technologies involving in the processes the private sectors	3.3. Technology, Agri-business and Agro-processing: Promote technological advancements, value addition and preservation through improved agri-business and agro-

⁷ This is a listing of proposed activities as drawn out during the AU / FAO Post-Harvest Loss Regional Workshop held in Nairobi, Kenya in July 2018

Pillar	Strategic Focus Areas	Indicative Intervention Areas (Proposed Activities for Implementation) (Part 5, Figure 2, Results Chain)	
		Immediate Term Activities	Short to Medium Term Activities
		3.2. Markets and Market Infrastructure: Support the development of improved markets and market infrastructure including grades and standards in post-harvest loss management throughout the agricultural value chains	processing environment to support PHL management best practices; and 3.4. Cross-Cutting: Promote the use of environmentally friendly, labour saving and gender sensitive technologies in PHL management;
IV	4. Finance and Investment	4.1. Financing and Investment: Support sound macro-economic governance that induces conditions conducive for financing and investment in PHL management	4.2. Private sector involvement and investment in agriculture: Support establishment of engagement mechanisms with the private sector in PHL management to allow for leveraging on private sector expertise, finances and business interests in food and nutrition security

PART 7: MONITORING AND EVALUATION (M&E) FRAMEWORK

7.1 Background

7.1.1 Overview

In a separate process, under the FAO Support to the African Union (AU) in the Development of Policies and Strategies for Country Specific Plan to Reduce Post-Harvest Losses Programme, a Generic Post-Harvest Losses (PHL) Management Monitoring and Evaluation Framework for the African Union Member States (MS) (2018 – 2025) has been formulated. The M&E Framework presented in this section relates to the monitoring and evaluation of the implementation of AU PHLM Strategy. It therefore relates with but is different from the Generic PHL Management M&E Framework for the AU MS.

The Generic PHL Management M&E framework for AU MS was developed to support and guide AU MS implement various planned PHL reducing interventions and therefore create evidence for informed and timely decision making on PHL at the national level. Once adopted and domesticated, the Generic PHL Management M&E Framework for AU MS will provide guidance to AU MS on how to monitor the outcomes of PHL reduction plans, interventions, strategies and policies following the Malabo declaration as well as in alignment with SDGs.

Although the Generic PHL Management M&E Framework for AU MS has upward accountability to the AUC, it is by and large a national M&E framework for measuring implementation of country plans and interventions. The potential synergy between the Generic PHL Management M&E Framework for AU MS and the AU PHLMS M&E Framework herein outlined is that the earlier system feeds into the AU PHLMS M&E Framework. The AU PHLMS M&E system shall play a key role in strengthening national and REC level M&E systems. The AU MS shall be the primary beneficiaries of AU PHLMS M&E system with the 8 Regional Economic Communities (RECs) being secondary beneficiaries. Invariably, there are clear linkages between the two frameworks.

7.1.2 Result-Based Management Approach

In line with the African Union's thrust to place greater emphasis on outcomes and impacts in planning, monitoring, evaluation and reporting, the AU PHLMS M&E framework shall be based on Results-Based Management (RBM) principles. Using this approach, the accountability of all key stakeholders to results will be enhanced and capacity of AUC, RECs and AU MS to work towards and achieve the Malabo PHL reduction targets strengthened. From an institutional point of view, the basic purposes of a RBM M&E systems are to generate and use performance information for:

- a. accountability reporting to all relevant stakeholders;

- b. learning and improving performance, and
- c. decision-making.

Following the principles and methods of the RBM facilitates the attainment of the best results. Results Based Management (RBM) principles applied for this M&E framework include, focusing on the achievement of results that contribute effectively towards the attainment of PHLMS goals or outcomes; improving institutional and stakeholders' knowledge on the strategy and its impacts; improving decision making; and promoting an accountability culture towards results.

Stakeholder participation in the strategy monitoring and evaluation systems will be critical. This engagement will promote transparency in the implementation of the strategy, create a platform for adding value and broadening ownership of the strategy. As there are three main levels of AU PHLM Strategy implementation, MS, REC and AU, the emphasis on the expected results of this multi-sectoral strategy and the need for coordinated actions following the principles and methods of the RBM facilitates the attainment of the best results.

7.1.3 Scope and Objectives of the AU PHLMS M&E Framework

A key element of the AU PHLMS M&E Systems shall be to track implementation of investment plans at the AU, REC and MS levels. This will involve measuring the degree to which the implementation of planned *activities* complies with work-plans and budgets to ensure timely delivery of *outputs*. In addition to implementation compliance, the AU PHLMS M&E systems shall monitor progress towards the attainment of *outcomes* and *impacts*. Finally, the AU PHLMS M&E System shall also facilitate lessons learning for adaptive management and improvement through M&E initiatives.

To ensure the attainment of planned outcomes and impacts of the PHLMS, the AU PHLMS M&E Framework shall be constructed to track the Strategy's implementation and investment plans at appropriate levels using participatory processes which ensure that the AU, RECs and MS identify what is important to them to track. The AU PHLMS M&E Framework should therefore provide for an interactive, consistent and reliable mechanism with which to guide and support decision making at various levels.

The overall AU PHLMS M&E system shall be a sum of monitoring and evaluation sub-systems that will be present at RECs and AU MS levels. The M&E Framework of AU PHLMS will therefore be harmonised within already existing or established M&E Systems of the PHLMS in RECs and MS to provide detailed information and data to measure progress. Relying on the monitoring and reporting systems set up by RECs and MS and supporting AU as well as RECs and MS to collect progress data and report at national and regional levels is essential for sustaining a reliable AU PHLMS M&E system that provides stakeholders with credible information for decision making.

The main aim therefore of the AU PHLMS M&E framework is to allow for an understanding and monitoring of the progress made by stakeholders in the implementation of specific actions of the AU PHLM Strategy with the view to ensuring the attainment of the Malabo Declaration goals and targets on post-harvest loss reduction.

7.2 Measuring Implementation of PHLMS

Implementation of the AU PHLMS shall be done mainly using output and outcome indicators. In the next sub-sections, a criteria for the selection of indicators and a list of pre-selected indicators shall be proposed. More specific indicators will need to be identified at formulation of AU PHLMS implementation and investment plans at AU, REC and MS levels. Annex 1 is a summary of the overall indicators identified for this AU PHLMS M&E Framework.

7.2.1 Selecting PHLMS Indicators

All indicators selected for M&E of the AU PHLMS shall be:

- a. sensitive enough to inform stakeholders of progress so that implementation issues can be addressed timely;
- b. useful and compelling in communicating impact;
- c. should measure the result it intends to measure as closely as possible and proxy indicators should only be considered when more direct indicators cannot be used;
- d. should be Specific, Measurable, Accurate, Realistic and Time bound (SMART); and
- e. should be simple and easily understood by all stakeholders.

7.2.2 Impact Indicators

Based on the Results Framework developed in Part 5 at Figure 2, the AU PHLMS is designed at the impact level to **contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in horticultural crops, livestock and fisheries products**. Impact indicators should therefore be selected to measure the levels of food and nutrition security at the MS levels. The majority of AU MS and RECs already measure and monitor food and nutrition security. These already existing systems shall provide information for monitoring impact indicators for the AU PHLMS M&E Framework. The general indicators used for measuring food security at MS level, which are also proposed for the AU PHLMS M&E Framework, include:

- a. Food Consumption Score (FCS);
- b. Household Dietary Diversity Score (HDDS);
- c. Household Hunger Score (HHS);
- d. Global Hunger Index (GHI); and
- e. Food Insecurity Experience Scale (FIES).

7.2.3 Outcome Indicators

Based on the Results Framework developed in Part 5 at Figure 2, the AU PHLMS is designed:

- a. at the intermediate outcome level to ***halve (decrease by 50%) the current levels of post-harvest losses by the year 2025 from the year 2015;*** and
- b. at the immediate outcome level to ***effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets.***

In this respect, therefore, separate indicators should be selected to measure both the intermediate and immediate outcomes.

Intermediate outcome:

The intermediate outcome is to halve (decrease by 50%) the current levels of Post-Harvest Losses (PHL), by the year 2025 from the year 2015. It is essential therefore to track, as an intermediate indicator, the ***'Reduction rate of Post-Harvest Losses for (at least) the 5 national priority commodities, and possibly for the 11 AU agriculture priority commodities'*** at the MS levels. This was the core indicator tracked in the first Biennial Report on the Implementation of the Malabo Declaration commitments as presented to the African Union Assembly in 2018.

This indicator details the achievements on PHL at harvesting, storage, transport, processing, packaging and sales for the 5 national priority commodities, and possibly 11 AU agriculture priority commodities each country is reporting on. The AU PHLMS M&E System at AU, RECs and MS level shall support and strengthen already existing initiatives and systems to measure and report PHL rate changes.

Immediate outcome:

The immediate outcome is to ***effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets.*** It is essential therefore to track, as immediate indicators,

- i. Implementation Plans of the AU, Regional and National PHLM Strategies;
- ii. Investment in post-harvest loss management; and
- iii. Private sector participation in PHLMS implementation.

Appropriate proxies for the above overall indicators will need to be disaggregated based on agreed factors whose data is either readily available or that which can the AU can support in the collection of. For purpose of this Strategy, the indicators are therefore shown at this high level.

7.2.4 Output (Strategic Objectives) Indicators

The indicators at the output level are related to the products and services produced as a result of implementing AU PHLMS interventions or activities. Although some of these activities are at the continental and regional levels, most are typically at national level with coordination and support from AU and REC levels. In addition, output indicators are dependent on priorities and implementation plans of RECs and MS. Invariably, AU PHLMS M&E shall measure the change related directly to the activities undertaken at the AU, REC and national levels under the four strategic objectives (pillars) as called for by AU, REC and MS PHLMS implementation plans. The following categories of indicators are, however, suggested for consideration for each strategic objective:

Pillar I: Policy, awareness and institutional capacity in post-harvest loss management strengthened

- a. **Impact on knowledge, skills and attitudes** – these indicators refer to change of awareness and PHL Management activities;
- b. **Sustainability of change** – as indicated by new policies and regulatory frameworks, partnerships and institutional arrangements;
- c. **Accessibility of PHL awareness messages** – suitable for specific target groups like smallholder farmers and agro-dealers; and
- d. **Participation** – evaluation may monitor interest and active participation of key stakeholders including private sector players.

Pillar II: Knowledge management, data harmonisation and reporting, skills and human development in post-harvest loss management promoted

- a. **Knowledge products** developed and shared; and
- b. **Functional regional and national information and knowledge management systems.**

Pillar III: Technological advancements that are environmentally friendly, effective markets and market infrastructure to support post-harvest loss management promoted

- a. **Access to market** measures; and
- b. **Adaptive research and development** measure.

Pillar IV: Good governance in macro-economic conditions for cost effective financing and investment in post-harvest loss management promoted

- a. **Agricultural financing Interest rates** made available to agriculture activities;
- b. **Percentage of national budgets allocated to agriculture** and in particular, PHLM; and

c. Adoption rates of PHM technologies.

7.3 Management Cycle and Governance of the PHLMS M&E Framework

7.3.1 Planning and Operations Framework

The steps to be taken to develop, monitor and evaluate effective AU PHLMS implementation plans are illustrated in Diagram 4 below. AU Member States and RECs shall follow these steps in developing implementation plans as well as monitoring, evaluation and learning. The virtuous circle will start with evidence-based **planning** process at AU, REC and MS levels following the formulation of this AU PHLM Strategy. The **implementation** phase shall be based on the agreed plans and shall be monitored progressively according to set milestones and targets. **Monitoring** and **Reporting** shall be done according to the M&E work plan that specifies the content, frequency, format and audience among other parameters. The cycle is completed by **Evaluation** and **Learning** before seamlessly starting again with planning.

Diagram 4: Planning, monitoring and evaluation cycle



7.3.2 Establishing Baselines and Setting Targets

Baselines to allow for the measurement of change shall be established for all the identified indicators. This clearly defined starting point (point of departure) at the start of implementation allows for improvement to be judged or comparisons to be made. The difference between actual and the baseline which is the extent achievement of the desired outcome is attained, helps to measure or judge whether or not interventions have had any effect on the subject of a development undertaking.

Based on the baseline derived, targets and milestones shall also be set in line with stated policies and strategies. The targets for PHL reduction are already set in the Malabo roadmap and baselines as reported in the first Biennial Report on the implementation of the Malabo Declaration. These may be adjusted or changed based on lessons learnt during the compilation of the first Biennial Report. A target specifies a particular value for an indicator that the M&E system wishes to track. The targets should be realistic.

ANNEXES

ANNEX 1: AU PHLMS M&E INDICATOR FRAMEWORK

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK				
ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products				
IMPACT INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Food Consumption Score (FCS)				
Household Dietary Diversity Score (HDDS)				
Household Hunger Score (HHS)				
Global Hunger Index (GHI)				
Food Insecurity Experience Scale (FIES)				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK				
ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products				
GOAL / INTERMEDIATE OUTCOME: <i>to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the year 2025 from the year 2015</i>				
OUTCOME INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Reduction rate of Post-Harvest Losses for (at least) the 5 national priority commodities, and possibly for the 11 AU agriculture priority commodities				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK

ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products

GOAL / INTERMEDIATE OUTCOME: *to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the year 2025 from the year 2015*

OVERALL OBJECTIVE: effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets

INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Implementation Plans of the AU, Regional and National PHLM Strategies				
Investment in post-harvest loss management				
Private sector participation in PHLMS implementation				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK

ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products

GOAL / INTERMEDIATE OUTCOME: *to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the year 2025 from the year 2015*

OVERALL OBJECTIVE: effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets

STRATEGIC OBJECTIVE NO. 1: Policy, awareness and institutional capacity in post-harvest loss management strengthened

INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Impact on knowledge, skills and attitudes – these indicators refer to change of awareness and PHL Management activities	•			
Sustainability of change – as indicated by new policies and regulatory frameworks, partnerships and institutional arrangements				
Accessibility of PHL awareness messages – suitable for specific target groups like smallholder farmers and agro-dealers				
Participation – evaluation may monitor interest and active participation of key stakeholders including private sector players				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK				
ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products				
GOAL / INTERMEDIATE OUTCOME: <i>to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the ear 2025 from the year 2015</i>				
OVERALL OBJECTIVE: effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets				
STRATEGIC OBJECTIVE NO. 2: Knowledge management, skills and human development in post-harvest loss management promoted				
INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Knowledge products developed and shared	•			
Functional regional and national information and knowledge management systems.				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK				
ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products				
GOAL / INTERMEDIATE OUTCOME: <i>to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the ear 2025 from the year 2015</i>				
OVERALL OBJECTIVE: effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets				
STRATEGIC OBJECTIVE NO. 3: Technological advancements that are environmentally friendly, effective markets and market infrastructure to support post-harvest loss management promoted				
INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Access to market measures				
Adaptive research and development measure				

AFRICAN UNION POST-HARVEST LOSS MANAGEMENT STRATEGY RESULTS FRAMEWORK

ULTIMATE OUTCOME/IMPACT: Contribute to enhanced food and nutrition security at the Member States level through reduced post-harvest losses in food including horticultural crops, livestock, and fisheries products

GOAL / INTERMEDIATE OUTCOME: *to halve (decrease by 50%) the current levels of post-harvest losses (PHL), by the year 2025 from the year 2015*

OVERALL OBJECTIVE: effectively guide and coordinate post-harvest management initiatives at the regional and national levels towards achieving reduced post-harvest losses in line with the Malabo Declaration and SDG targets

STRATEGIC OBJECTIVE NO. 4: Good governance in macro-economic conditions for cost effective financing and investment in post-harvest loss management promoted

INDICATORS	BASELINES	TARGETS	VERIFICATION SOURCES	RISKS AND ASSUMPTIONS
Agricultural financing Interest rates made available to agriculture activities				
Percentage of national budgets allocated to agriculture and in particular, PHLM				
Adoption rates of PHM technologies				

Annex 2: Glossary of Terms

Food Security, as defined by the United Nations' Committee on World Food Security, is the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Food, according to the FAO 2014 Definitional Framework of Food Loss working paper, is defined, in the Codex Alimentarius Commission, Procedural Manual, 2013, as any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances used only as drugs.

Supply chain is characterised as a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer.

Food supply chain, according to the FAO 2014 Definitional Framework of Food Loss working paper, is defined as the connected series of activities to produce, process, distribute and consume food.

Value chain is characterised as a set of activities that a firm or organisation operating in a specific industry or supply chain performs in order to transform and deliver a valuable product to the market.

Value added is a process involving the transformation (addition of time, place and/or form utility) of a raw material by changing its form to produce a high quality end product in order to meet the needs, tastes or preferences of consumers.

Food losses are defined as "the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption" (FAO 2011, p. 3). Food losses take place at the production, harvesting, primary handling, aggregation, storage, transport, processing, distribution, and consumption segments (FAO 2014). Food losses occurring on the demand side of the food chain (retail and final consumption) are generally referred to as "food waste", which relates to retailers' and consumers' behavior. (Parfitt *et al.*, 2010 as quoted by FAO 2011, p. 3). In the FAO 2014 Definitional Framework of Food Loss working paper, 'food loss' is simply defined as the decrease in quantity or quality of food.

Post-Harvest food loss refers to a decrease in *quantity* and/ or *quality* of food mass on the supply side of the food chain. It is defined as 'measurable qualitative and quantitative food loss along the supply chain' (De Lucia and Assennato, 1994; Hodges, Buzby and Bennett, 2011, as quoted by Aulakh *et al*, 2013); Consequently, Post-Harvest is not only

multidimensional but multidisciplinary involving the agriculture sector; agro-processing industry; health and nutrition sector; distribution and manufacturing sector, among others.

Quantitative food loss refers to the decrease in edible food mass available for human consumption (FAO, 1980). In the FAO 2014 Definitional Framework of Food Loss working paper, 'quantitative food loss' is simply defined as the decrease in mass of food. In physical terms, this is grain removed from the post-harvest supply chain and not consumed due to, among other causes, spillage, consumption by pests and also due to physical changes in temperature, moisture content and chemical changes. The quantity lost would have either deteriorated rendering it inedible or discarded for failure to meet regulated standards to eat as a food or to use as an animal feed.

Qualitative food loss is when food loses its quality attributes resulting in the deterioration in quality leading to a loss of economic, social and nutritional value. The qualitative loss can occur due to incidence of insect pests, mites, rodents and birds, or from handling, physical changes or chemical changes in fat, carbohydrates and protein, and by contamination of mycotoxins, pesticide residues, insect fragments, or excreta of rodents and birds and their dead bodies. When this qualitative deterioration makes food unfit for human consumption and is rejected, this contributes to food loss (Aulakh *et al*, 2013). In most cases, the quality deterioration goes along with a significant loss of nutritional value, which might affect the health and nutrition status of the whole community (FAO 2014). In the FAO 2014 Definitional Framework of Food Loss working paper, 'qualitative food loss' is simply defined as the decrease of quality attributes of food.

Post-Harvest technology⁸ is inter-disciplinary "Science and Techniques" applied to agricultural produce after harvest for its protection, conservation, processing, packaging, distribution, marketing, and utilization to meet the food and nutritional requirements of the people in relation to their needs. It has to develop in consonance with the needs of each society to stimulate agricultural production; prevent post-harvest losses, improve nutrition and add value to the products. In this process, it must be able to generate employment, reduce poverty and stimulate growth of other related economic sectors. The process of developing post-harvest technology and its purposeful use needs an inter-disciplinary and multi-dimensional approach, which must include, scientific creativity, technological innovations, commercial entrepreneurship and institutions capable of inter-disciplinary research and development all of which must respond in an integrated manner to the developmental needs.

Post-Harvest System, according to the FAO, can be considered to encompass 'the delivery of a crop from the time and place of harvest to the time and place of consumption with minimum loss, maximum efficiency and maximum return for all involved' (Hidden Harvest, 1976 as quoted by Grolleaud, 2002). The key elements of a post-harvest system are as follows, according to Grolleaud, (2002):

⁸ http://amickau.nic.in/index.php?option=com_content&task=view&id=53&Itemid=87

- a. *Harvesting.* The time of harvesting is determined by the degree of maturity which affects successive operations, particularly storage and preservation.
- b. *Pre-harvest drying,* mainly for cereals and pulses. Extended pre-harvest field drying ensures good preservation but also heightens the risk of loss due to attack (birds, rodents, and insects) and moulds encouraged by weather conditions, not to mention theft. On the other hand, harvesting before maturity entails the risk of loss through moulds and the decay of some of the food crops.
- c. *Transport.* Much care is needed in transporting a mature harvest. Collection and initial transport of the harvest thus depend on the place and conditions where it is to be stored.
- d. *Post-harvest drying and / or cold storage.* The length of time needed for full drying of grains or cold chain storage of horticultural crops including fruit and vegetables, depends on many factors including weather and atmospheric conditions. In structures for lengthy drying of grains such as cribs, or even unroofed threshing floors or terraces, the harvest is exposed to wandering livestock and the depredations of birds, rodents or small ruminants. Apart from the actual wastage, the droppings left by these marauders often result in higher losses than what they actually eat. On the other hand, if grain is not dry enough, it is vulnerable to mould and can rot during storage. If grain is too dry it becomes brittle and can crack after threshing, during hulling or milling and winnowing. In cold chain storage for fruits and vegetables and horticultural products, issues of humidity and fluctuating temperatures can have serious consequences on the quality of the product hence the need for enhanced technologies including steady and guaranteed supply of energy in the form of electricity or fuels to drive ovens or coolers as is necessary.
- e. *Threshing.* If a harvest is threshed before it is dry enough, this operation will most probably be incomplete. Furthermore, if grain is threshed when it is too damp and then immediately heaped up or stored (in a granary or bags), it will be much more susceptible to attack from micro-organisms, thus limiting its preservation. The threshing process which include machine settings and manual force must be such that it does not cause grain breakage.
- f. *Storage.* Facilities, hygiene and monitoring must all be adequate for effective, long-term storage. In closed structures (granaries, warehouses, hermetic bins, cold stores), control of cleanliness, temperature and humidity is particularly important. Damage to facilities caused by pests (insects, rodents) and moulds can lead to deterioration of facilities (e.g. mites in wooden posts) and result in losses in quality and food value as well as quantity.
- g. *Processing.* Excessive hulling or threshing can also result in grain losses, particularly in the case of rice (hulling) which can suffer cracks and lesions. The grain is then not only worth less, but also becomes vulnerable to insects such as

the rice moth (*Corcyra cephalonica*). Processing of horticultural products is an industry on its own requiring very stringent measures to be followed for the production of safe foods for human consumption.

- h. *Marketing*. Marketing is the final and decisive element in the post-harvest system, although it can occur at various points in the agro-food chain, particularly at some stage in processing. Moreover, it cannot be separated from transport, which is an essential link in the system.

ANNEX 3: GUIDING PRINCIPLES IN THE FORMULATION OF THE PHLM STRATEGY

In developing the African Union Post-Harvest Loss Management Strategy (PHLMS), it was also essential to reflect on and circumscribe through a set of guiding principles, the keys to successful strategy implementation. The following suggested key principles guided the formulation of the Post-Harvest Loss Management Strategy:

Value Addition Guiding Principles

One of the key principles of the Comprehensive Africa Agriculture Development Programme (CAADP) that has been embraced across the continent is the cognizant leverage of regional complementarities and cooperation to boost growth. Another key principle of CAADP talks to assigning responsibility for programme implementation to individual countries, coordination with designated Regional Economic Communities (RECs), and facilitation with relevant organs such as the NPCA Secretariat. Value addition at each level from national to continental therefore is a key success factor to any strategy and to this end, the following guiding principles were used in the formulation of this Post-Harvest Loss Management Strategy:

- 1) **Subsidiarity** - whereby all programmes and activities are designed and undertaken at levels where coordination adds value to regional economic community and or Member States' individual interventions and actions;
- 2) **Additionality** – only continental programmes that add value to continental and regional integration, or enhance the capacity to achieve policy objectives at both the regional and national levels be implemented as priorities;
- 3) **Complementarity** – continental programmes should be complementary to regional and national programmes developed and implemented at the regional and national levels; and
- 4) **Proportionality** - action at the continental level should not exceed that which is necessary to achieve the objectives of the strategy avoiding imposing on regional economic communities and or Member States rules that are too stringent or efforts that are too great relative to those that would be reasonable or effective.

Partnerships Guiding Principles

Partnerships, consultations and alliances are also key features of the CAADP process. Consequently, the following guiding principles were employed in the formulation of this Continental Post-Harvest Loss Management Strategy:

- 1) **Partnership and Consultation** – to ensure the permanent involvement of stakeholders in the agricultural and related sectors in the identification of solutions to constraints, implementation, monitoring and evaluation of the strategy; and
- 2) **Responsiveness to change** – acknowledgement that the strategy must be an organic or evolving strategy, rather than a static instrument, that focuses on a set of basic fundamentals and grows iteratively in response to experience and changing circumstances.

Sustainability Guiding Principles

Sustainability in all respects is essential. This called therefore for the following guiding principles in the formulation of this Post-Harvest Loss Management Strategy:

- 1) **Environmental sustainability** – continental, regional and national programmes should aim at sustainably using the continent's environmental and natural resources and, along with both social sustainability and economic sustainability, contribute to sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs;
- 2) **Progressivity** – allowing for moving forward in such a manner that takes into account different regional and national circumstances and particular interests; and
- 3) **Leveraging** – noting that not one organisation can provide for all the needs of its constituent members and therefore the desire to use available resources to leverage on potential other resources both in the public and private sector domains.

ANNEX 4: SUMMARY OF VISION, GOAL AND OBJECTIVES OF POST-HARVEST LOSS MANAGEMENT STRATEGIES OF ETHIOPIA, KENYA, TANZANIA, ZAMBIA AND ZIMBABWE

Country	Vision of the Strategy	Goal	Strategic Objectives	Specific Objectives
Ethiopia	<u>Vision</u> 'Contribute to improved food security and ultimately to poverty reduction through the attainment of food self-sufficiency in basic food commodities and improved incomes of the Ethiopian people' (Ethiopia 2016)	<u>Goal</u> To improve food availability, food access, food safety and nutrition, and farmer incomes through reduced post-harvest losses along the agricultural value chains of grains in Ethiopia	<u>Overall Objective</u> To reduce food losses through the adaptation/adoption and implementation of appropriate post-harvest loss management systems along the agricultural value chains in Ethiopia.	<u>Specific Objectives</u> i. Reducing, both quantitatively and qualitatively, food losses along the agricultural value chains of grains; ii. Improving agricultural input and output market efficiencies for grains with the view to enhancing post-harvest loss management practices; iii. Improving access to financing and investment for improved post-harvest loss management practices; and iv. Supporting sustainable value addition enterprises throughout the agriculture value chain. (Ethiopia 2016)
Kenya	<u>Vision</u> 'To contribute to increasing the quantity and quality of food available and accessible in order to ensure that all Kenyans have an adequate, diverse and healthy diet.	<u>Goal</u> 'To halve (decrease by 50%) the current levels of Post-Harvest Losses (PHL), by the year 2025 from 2018 as the baseline year.	<u>Overall Objective</u> To effectively guide and coordinate post-harvest loss reduction initiatives at the County and National Levels for key food supply chains in Kenya.	<u>Specific Objectives:</u> i. Effectively implement post-harvest loss reduction policies and strategies in Kenya ii. Strengthen institutional capacity to implement PHL reduction interventions at national and county levels iii. Implement good practices and technologies to reduce quantitative and qualitative post-harvest losses in Kenya's Food supply Chains iv. Strengthen linkages between food supply chains and post-harvest reduction services in Kenya v. Mainstream cross-cutting issues of significance to post-harvest loss reduction including gender, youth, environmental factors and agricultural information management in Post-Harvest reduction initiatives
Tanzania	<u>Vision</u> 'Reduced post-harvest losses along the commodity value chains, which adequately reward the actors and sufficiently contributes to national	<u>Mission</u> To improve PHLM by ensuring availability of appropriate post-harvest and value-addition practices and technologies, providing incentives for investment in marketing systems, as well as improving capacities and coordination of strategic interventions		<u>Strategic Objectives</u> a. Facilitate Awareness on Post-harvest loss management to Improve Efficiency and Reduce Crop Losses along the Value Chain b. Promote availability, accessibility, affordability and adoption of tested technologies to reduce post-harvest losses c. Facilitate agricultural marketing systems to improve market access and minimize post-harvest losses

Country	Vision of the Strategy	Goal	Strategic Objectives	Specific Objectives
	food and nutrition security and the economy' (Tanzania 2017, p. 20)			<ul style="list-style-type: none"> d. Promote research and innovations of new and appropriate technologies and methods to reduce crop losses e. Review and put in place new legislations to enhance standards and practices to minimize PHL. f. Strengthen institutional capacity, coordination, partnerships and stakeholders' participation of PHLM actors to enhance implementation of strategic interventions g. Strengthen post-harvest loss management systems to adapt and mitigate the effects of climate change. <p>Addressing inadequacy in PHLM financing</p>
Zambia	<p><u>Vision</u> 'An efficient agricultural sector landscape that assures reduced post-harvest losses, food and nutrition security and provides a pathway to ending hunger by 2025' (Nkonde <i>et al</i> (2018, p. 10)</p>			<p><u>Guiding principles of the strategy</u></p> <ul style="list-style-type: none"> a. The right to adequate and nutritious food; b. Value chain governance; c. Public sector facilitation of private sector led agriculture; d. Private sector-led agricultural development; e. Evidenced-based innovations; f. Affordability of technology; g. Gender responsiveness; h. Environmental awareness; and i. Zambia's commitment to the Malabo Declaration and Sustainable Development Goals. <p>(Nkonde <i>et al</i> (2018), p. 11)</p>
Zimbabwe	<p><u>Vision</u> 'A prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to national development' (Zimbabwe 2018, p. 48)</p>	<p><u>Policy Objectives</u></p> <ol style="list-style-type: none"> 1. Assure national and household food and nutrition security; 2. Ensure that the existing agricultural resource base is maintained and improved; 3. Generate income and employment to feasible optimum levels; 4. Increase agriculture's contribution to the Gross Domestic Product (GDP); 5. Contribute to sustainable industrial development through the provision of home-grown agricultural raw materials; and 	<p><u>Strategic Objectives for the Five National Priority Commodities</u></p> <ol style="list-style-type: none"> a. Create conducive policy environment b. Institute a mechanism to coordinate post-harvest loss management c. Raise awareness on post-harvest losses d. Implement agricultural systems that support loss reduction e. Facilitate research and development on post-harvest loss management 	

Country	Vision of the Strategy	Goal	Strategic Objectives	Specific Objectives
		6. Expand significantly the sector's contribution to the national balance of payments.	<ul style="list-style-type: none"> f. Facilitate investments in technology, mechanization and practices g. Improve post-harvest extension and training h. Improve marketing infrastructure i. Mainstream gender and the youth in post-harvest activities j. Promote post-harvest loss management processes that take into account the impact on the environment and climate change (Zimbabwe 2018, p. 48 – 49) 	

ANNEX 5: STUDY COUNTRY POST-HARVEST STRATEGY BRIEFS

I. ETHIOPIA

I.1. Overview

Ethiopia is the second most populous country in Africa after Nigeria with a population of over 100 million in 2016 according to the United Nations Department of Economic and Social Affairs – Population Division. More than 85% of the population reside in rural areas and are engaged in and depend on agricultural production for their livelihoods. The major source of food for Ethiopia is from cereals (mainly teff, maize, wheat, and sorghum), pulses and oil crops.

According to the Global Growing Casebook of 2012, agriculture in Ethiopia contributed 50% of total GDP, 85% of employment, 70% of raw material requirements for large and medium industries in the agro-processing sector and 90% of exports (Global Growing Casebook, 2012). There is no doubt that agriculture is the mainstay of Ethiopia's economy contributing immensely to exports, employment and subsistence. Typically, Ethiopian agriculture comprises mainly subsistence small-scale farming systems that were estimated to account for 95% of total area under agricultural use and are responsible for approximately 90% of the total agricultural output, 94% of food crops production and 98% of coffee production (Global Growing Casebook, 2012).

Characteristic of small-scale agriculture in Ethiopia is low productivity due mainly to limited access to agricultural inputs, financial services, improved production technologies, irrigation and agricultural markets (MoARD, 2010). When there are surpluses, smallholder farmers are constrained, in the main, by lack of access to markets (MoARD, 2010). This is as a result of under-developed transportation infrastructure (U.S. Department of State, 2013), inadequate storage facilities, and lack of agro-processing industries to preserve surpluses. Consequently losses are significantly high and occur at various levels of the food value chain. According to the African Post-Harvest Losses Information System (APHLIS), post-harvest losses in Ethiopia in 2012 for teff were estimated at 12.3%, for sorghum at 11.6%, for wheat at 9.9% and for maize at 16.8%.

The impact of such food losses is demonstrated in a classic case reported in 2010 in Ethiopia when the United Nations Food and Agriculture Organisation and the World Food Program Crop and Food Security Assessment Mission estimated the national grain balance. The estimated total post-harvest losses stood at 2.04 million tons of grain at a time when Ethiopia's import requirement stood at 1.16 million tons (US Dept. of State, 2013). A reduction in post-harvest losses could have mitigated against the import requirements by improving food availability. According to the Ministry of Agriculture and Rural Development, Ethiopia's agricultural production has not been able to meet total national food requirements with almost half the population subsisting in absolute poverty (MoARD, 2010).

It was in 2010 that the need in Ethiopia for a strategy to reduce the level of losses was prioritised (MoARD 2010). This followed the recognition in Ethiopia's Rural Development Policy and Strategies of 2003 that focus on primary production had tended to overlook and effectively neglected the importance of post-harvest losses (MoARD 2010). This impetus to prioritise post-harvest loss management was further heightened by the call by the African Union Heads of State and Government through the Malabo Declaration of 2014 to end hunger by 2025 through, among other initiatives, halving 'the current levels of Post-Harvest Losses, by the year 2025' (AUC 2014).

Furthermore, Sustainable Development Goal 12 (ensure sustainable consumption and production patterns) calls for halving 'per capita food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses' by 2030 (UN Economic & Social Council: Statistical Commission, March 2016). In response to these calls, the Ethiopian Government, with the support of the FAO, developed in 2016 its draft Post-Harvest Management Strategy In Grains.

I.2. Strategic Issues in Post-harvest loss management in Ethiopia

In the formulation of the Ethiopia PHLM strategy, several strategic issues were identified as requiring attention if Ethiopia were to improve on its post-harvest loss management. The following ten are highlighted.

- 1) **Awareness and Communication:** Observed in the case of Ethiopia was that post-harvest losses (PHL) were an awareness issue affecting the way of doing business. Furthermore, PHL was usually misunderstood;
- 2) **Policy:** In Ethiopia, PHL has been neglected for decades with little or no emphasis on PHL until around 2010. Part of the key reasons for this was lack of appreciation of the economic value of PHL and its impact on food security. As a consequence of lack of policy direction on PHL, there was no coordination on PHL issues among the various disciplines such as health, education and agriculture in efforts to tackle PHL and there was also lack of or weak enforcement of regulatory frameworks affecting PHL;
- 3) **Skills and Human Development including Training:** It was clear in the case of Ethiopia that due to lack of attention on PHL, even the training curricula gave little attention to PHL. As such, the country lacks opportunities for the few trained PHL experts as PHL is not as generally recognised. There was also very little training of extension service agents and farmers on PHL due to limited capacity in PHL in institutions dealing with PHL. Generally, technologies and promotions in agriculture mainly focus on production as priority and hardly PHL;
- 4) **Research and Development:** In Ethiopia, it was observed that research on PHL was generally fragmented and not well coordinated such that evidence based study data on actual loss assessments of PHL was generally not available;

- 5) **Markets and Market Infrastructure:** In this very crucial part of the commodity value chain processes, it was observed in Ethiopia that there was lack of formal, coordinated marketing structures for domestically consumed commodities thereby placing commodities produced by farmers at risk in terms of disposal systems. Associated with this lack of formal marketing systems are the challenges with grades and standards, pricing structures (no quality payment incentives for domestically consumed commodities); packaging; warehouse management; etc. This marketing environment leads generally to excessive PHL for lack of incentives for producing or maintain quality in harvested crops and in preserving harvested crop in such a state that will take advantage of price fluctuations during the seasons. Exacerbating the situation is the limited / poor infrastructure in terms of harvesting / marketing storage facilities including commodity handling (poor fumigation and general commodity storage systems); road and transport infrastructure, services (e.g. power) infrastructure, testing laboratories etc. Associated with these conditions, this also meant that there were no trade / marketing regulations for domestically consumed commodities to provide some form of control over the handling of grains through the marketing system.
- 6) **Technology and Mechanisation:** In Ethiopia, there is a general lack of appropriate and access to PHL reducing technologies (post production). The high cost of PHL technologies, the lack and high cost of service repairs, and the lack of regulatory / standardisation of machinery (operational performance) reduces the uptake of technology to reduce PHL losses. The of women-friendly and time saving production / processing technologies was also sighted as a major challenge to PHL as the majority of the commodity harvesting, processing and handling is done by women;
- 7) **Macro-economic conditions:** At the macro level, what has hindered the update of improved PHL methods has been the high levels of taxation on imported agricultural equipment and supplies and generally the lack of regulation on labour wages in Ethiopia;
- 8) **Institutional and Organisational Structures:** It was observed in Ethiopia that the lack of coordination among country (including inter-disciplinary) actors involved in PHL, the lack of support for PHL best practices and knowledge platforms, universities, research institutions, training centres, etc; and the lack of PHL skills, capacity and personnel for instance in the Ministry of Agriculture and Rural Development were major setbacks to promoting good post-harvest loss management practices;
- 9) **Financing and Investment:** Very critical to the whole issue of PHL is financial support throughout the agricultural supply chain. This is lacking in Ethiopia and furthermore, there has been limited budgetary resource allocation for PHL activities. The private sector have found little incentives to get involved in PHL issues; and

- 10) **Agri-Business / Agro-Processing:** The lack of involvement of the private sector in inputs production and distribution; the lack of support for industry in areas such as bag, sheller, thrasher manufacturing; and the lack of support for micro rural agro-processing of crops have all contributed negatively to improved PHL reduction in Ethiopia. The poorly developed agro-processing industry results in a situation where most grains have to be consumed immediately with little preservation for longer shelf life taking place.

With these challenges facing the Ethiopia grain industry, it went about developing its strategy on post-harvest loss management. The first draft strategy was produced in 2016 and through extensive internal consultative processes, the strategy was approved in 2018 by the Government of Ethiopia for implementation (FAO – interview with crop officer in the FAO Country Office, Addis Ababa).

I.3. Vision, Mission and Objectives

The strategic objective or goal of Ethiopia's PH Management Strategy in Grains is *to improve food availability, food access, food safety and nutrition, and farmer incomes through reduced post-harvest losses along the agricultural value chains of grains in Ethiopia* by:

- 1) Reducing, both quantitatively and qualitatively, food losses along the agricultural value chains of grains;
- 2) Improving agricultural input and output market efficiencies for grains with the view to enhancing post-harvest loss management practices;
- 3) Improving access to financing and investment for improved post-harvest loss management practices;
- 4) Supporting sustainable value addition enterprises throughout the agro-industry; and
- 5) Mainstreaming cross-cutting issues of significance to post-harvest loss management systems including gender, youth, HIV/AIDs, environmental factors and agricultural information management in all activities undertaken towards the attainment of the above specific objectives.

II. KENYA

II.1. Overview

According to the draft Kenya Strategy for Post-Harvest Loss Reduction (2018 – 02025) document, Agriculture in Kenya is the mainstay of that economy contributing from 25% in 2010, 30.4% in 2015 to 32.6% in 2016 to Kenya's Gross Domestic Product (GDP). The agriculture sector was reported to have performed poorly in 2017 with a decelerated growth rate of 1.6% against the previous year's growth rate of 5.1%. This was due mainly to drought and the invasion by pests such as the Fall armyworm in 2017.

Food crops in Kenya consist of cereals (maize, wheat, sorghum, rice, millet); pulses (beans, pigeon pea, cowpea, chickpea, green gram); and roots and tubers (sweet potato, Irish potato, cassava, arrowroot and yam). Food crops are reported to account for 32% of agricultural GDP, but provide only 0.5 % of export earnings, while the livestock subsector contributes 17 per cent of the Agricultural GDP and 7 per cent of exports. The livestock subsector accounts for 40% of agricultural GDP (10% of the overall GDP). It provides substantial foreign exchange through exports of live animals, hides and skins, dairy products, and some processed pork products. It also employs 50% of the overall agricultural labour force.

The dairy value chain is reported as one of the most dynamic sectors in Kenya contributing 6-8 percent of GDP with an estimated annual growth rate of 3 to 4 per cent. It is reported that dairy production is a major source of income for rural households estimated at 1.8 million producing 5.2 billion litres of milk annually of which 3.9 billion litres is from dairy cattle. In addition, the industry generates employment to over 1.5 million persons working directly in the subsector or in support services. Despite its low contribution to GDP at 0.4% in 2015, the fisheries subsector has an important role in Kenya's economy as it supports over 500,000 people directly employed by the subsector, with the freshwater fisheries supporting about 35,000 fishers, and marine fisheries over 8,000 fishers.

According to the draft Kenya Strategy for Post-Harvest Loss Reduction (2018 – 02025) document, it is estimated that post-harvest losses in Kenya contribute up to 30% of food losses raising therefore a serious challenge to the food security situation of Kenya. Despite these estimated losses, the Republic of Kenya does not have a strategy to focus on PHL, hence this draft strategy.

II.2. Vision, Mission and Objectives of the Strategy

The vision for the proposed Kenya's Post-Harvest Loss Reduction Strategy is to contribute to increasing the quantity and quality of food available and accessible in order to ensure that all Kenyans have an adequate, diverse and healthy diet. The goal of the strategy is to halve (decrease by 50%) the current levels of Post-Harvest Losses (PHL), by the year 2025 from 2018 as the baseline year. To achieve this goal, the overall objective of the strategy is to effectively guide and coordinate post-harvest loss reduction initiatives at the County and National Levels for key food supply chains in Kenya by:

- 1) Effectively implementing the post-harvest loss reduction policies and strategies in Kenya
- 2) Strengthening institutional capacity to implement PHL reduction interventions at national and county levels;
- 3) Implement good practices and technologies to reduce quantitative and qualitative post-harvest losses in Kenya's Food supply Chains;
- 4) Strengthening linkages between food supply chains and post-harvest reduction services in Kenya; and
- 5) Mainstreaming cross-cutting issues of significance to post-harvest loss reduction including gender, youth, environmental factors and agricultural information management in post-harvest reduction initiatives.

II.3. Strategic Issues in Post-Harvest Management in Kenya

The strategy is anchored on four pillars policies, Institutions, PHL reduction practices and PHL reduction services. These drivers address post-harvest losses in all food commodities and products. The strategic interventions identified, therefore, are applicable across a broad range of food supply chains and these are shown in the figure below.

Figure Post-Harvest Reduction Pillars and Initiatives

Effective Implementation of PH Policies	Enhanced Institutional Capacities	Effective PH Management Processes	Efficient PHL Reduction Services
<ul style="list-style-type: none"> •PH Policy Interventions •PH management technology & Innovations •PHL reduction programmes •PHL reduction platforms 	<ul style="list-style-type: none"> •PHL reduction standards/ regulations •PHL reduction Procedures & Guidelines •Coordination mechanisms •PHL Information System •Skills, Training and Human Development 	<ul style="list-style-type: none"> •PHL assessments & reduction measures •PH management, methods & technologies •PH Management Facilities •Food safety & quality assurance systems •Social & environmental considerations 	<ul style="list-style-type: none"> •Extension •Finance/ Credit •Market Information •Adaptive Research •Conformity assessment

III. TANZANIA

III.1. Overview

According to the second draft of the National post-harvest loss management Strategy (NPHLMS) (2017-2027) of the United Republic of Tanzania (URT), key among the policies that have given focus to post-harvest losses include the National Agriculture Policy (2013) and Agriculture Marketing Policy (2008) which acknowledge post-harvest losses as a challenge in achieving food security in URT. To implement these policies, a number of reforms have been introduced and implemented to varying success. Examples are the KILIMO KWANZA, Resolve, the Tanzania Agricultural and Food Security Investment Plan (TAFSIP) and Southern Agriculture Growth Corridor of Tanzania (SAGCOT). All these initiatives are linked to the Comprehensive African Agriculture Development Programme (CAADP),

Despite these efforts, the Government of URT continues to face serious challenges in addressing post-harvest losses. Key concerns include the inadequacy of post-harvest services, limited agricultural marketing infrastructure and shortage of relevant technologies, among others. Driven by these, the URT embarked on formulating the a PHLM strategy that would guide public and private sector efforts in addressing post-harvest losses.

Demonstrating the seriousness of the issue, the National Post-Harvest Management Strategy (2017-2027) of the United Republic of Tanzania reported that in Tanzania, despite the increase of cereal crops production at national level, estimated at 9.455 million tonnes on average per year, technologies used for harvesting and processing cereals are poor and this has led to PHLs in the region of 3.782 million tonnes on average per year, a staggering 40% loss in annual national production of cereals is lost due to PHLs.

III.2. Strategic Issues in Post-harvest loss management in Tanzania

According to the National Post-Harvest Management Strategy (NPHLMS) (2017-2027) of the United Republic of Tanzania (URT), it identified eight strategic issues to be addressed in an effort to reduce post-harvest losses in Tanzania. These are:

- 1) Inadequate awareness on post harvest losses including causes, impacts and solutions by actors along the value chain;
- 2) Limited access to appropriate and cost effective PHLM technologies;
- 3) Insufficient and poor marketing systems, including infrastructure;
- 4) Inadequate research and innovation efforts on PHLM;
- 5) Inadequate and poor enforcement of existing post-harvest loss management regulations and guidelines;
- 6) Limited institutional capacity, inadequate coordination, and little involvement of other stakeholders in post-harvest loss management;
- 7) Limited capacity to adapt and mitigate the effect of climate changes on PHLM; and
- 8) Inadequate financing of Post-Harvest Loss Management.

III.3. Vision, Mission and Objectives of the Strategy

Resultantly, the National Post-Harvest Management Strategy (NPHLMS) (2017-2027) of the United Republic of Tanzania (URT) has set its vision to *reduce post-harvest losses along the commodity value chains to adequately reward the actors and sufficiently contribute to national food and nutrition security and the economy*. To achieve this vision, it is the mission of the PHLM strategy to *ensure availability of appropriate post-harvest and value-addition practices and technologies, provide incentives for investment in marketing systems, as well as improve capacities and coordination of strategic interventions*.

IV. ZAMBIA

IV.1. Overview

According to the draft Post-Harvest Management Strategy for Zambia (2018 – 2025), policy interventions designed to reduce the devastating effects of post-harvest losses (PHLs) have not received much attention in Zambia until recently. The report further states that most interventions aimed at improving food security and ending hunger have focused on increasing food production, forgetting one complementary factor of reducing food loss and food waste.

IV.2. Strategic Issues in Post-harvest loss management in Zambia

According to the proposed draft post-harvest loss strategy for Zambia, the Post-Harvest Management Strategy for Zambia (2018-2025), which is still under formulation, the following are some of the key findings that impede effective post-harvest loss reduction efforts in Zambia:

- 1) Awareness creation of available PHL-reducing technologies;
- 2) Improving access to PHL reducing technologies;
- 3) Policy recommendations;
- 4) Education on best practices in harvest and post-harvest handling technologies;
- 5) Research on improved varieties for pre- and post-harvest loss reduction;
- 6) Exploitation of existing information exchange platforms or developing new ones;
- 7) Market and Marketing facilities including transport, storage, processing and packaging infrastructure and facilities; and
- 8) Strengthen research and farmer capacity building.

IV.3. Vision, Mission and Objectives of the Strategy

Unlike other standard strategies that outline the vision, goals, overall and specific objectives to be attained, the draft proposed post-harvest loss management strategy for Zambia outlines the vision and guiding principles and then specific objectives by crop under review. This raises the issue of standardisation in drafting PHLM strategies. Overall, the vision of the draft proposed post-harvest strategy for Zambia builds on the Malabo Declaration and Zambia's Second National Agricultural Policy. The vision desires *“An efficient agricultural sector landscape that assures reduced post-harvest losses, food and nutrition security and provides a pathway to ending hunger by 2025.”*

The formulation of the strategy is said to be guided by the following principles:

- a. The right to adequate and nutritious food;
- b. Value chain governance;
- c. Public sector facilitation of private sector led agriculture;
- d. Private sector-led agricultural development;
- e. Evidenced-based innovations;
- f. Affordability of technology;
- g. Gender responsiveness;
- h. Environmental awareness; and

- i. Zambia's commitment to the Malabo Declaration and Sustainable Development Goals.

V. ZIMBABWE

V.1. Overview

According to the Postharvest Management Strategy for Zimbabwe (2017 – 2025), the agricultural sector is the backbone of the economy of Zimbabwe. The sector contributes about 12% to the country's GDP and contributes 60% of raw materials for the agro-industry. About 70% of the Zimbabwe population that stood at approximately 16 million at the start of 2018 derive their livelihoods from the agricultural sector. The major source of food in Zimbabwe comes from maize, sorghum and milk.

In a statement in its postharvest management strategy, the Zimbabwe Government notes that one of the most important goals of the government is to achieve food and nutrition security of the population. The statement further notes that governments have mainly focused on increasing production and productivity in order to achieve this objective but often forgot that post-harvest losses exacerbate food insecurity (Zimbabwe, 2018). Until 2018, Zimbabwe did not have a Post-Harvest Loss Management Strategy which only came about in response to the call by the African Union Malabo Declaration of 2014. In the current formulation of its PH strategy, Zimbabwe prioritizes five commodities for reporting under the Malabo declaration, namely, two cereal staple commodities (maize and sorghum), two horticultural commodities (tomatoes and bananas) and milk.

V.2. Strategic Issues in Post-harvest loss management in Zimbabwe

Zimbabwe has for decades, maintained very highly formalized crop marketing systems with well laid out standards, regulations and controls, storage and processing facilities that generally were implemented by statutory marketing boards in association with the private sector. In recent years, with the privatization of most statutory marketing boards and the general agricultural market liberalisation, this situation has deteriorated. With the land redistribution that occurred starting in 2000, Zimbabwe's farming system saw significant changes both in terms of geographical spread of smallholder farmers and size of farm size. Resultantly, three categories of farming systems models now characterize Zimbabwe, namely, the communal areas under which land is communally owned and distributed; and the A1 and A2 farming models with a 99 year lease tenure issued by the Ministry of Lands, Agriculture and Rural Resettlement (MLARR). The A1 model are largely smallholder farming systems and the A2 model are medium to large farm lands. The majority of Zimbabwe's population remains agriculture based and generally as smallholder farmers.

The post-harvest loss management Strategy of Zimbabwe outlines in general the strategic issues it consider essential in post-harvest loss management. The strategy also outlines commodity specific challenges and therefore strategic issues that require attention by commodity. Outlined below are the general strategic issues on post-harvest issues in Zimbabwe cutting across cereals and grains, horticulture, fruit and vegetable and milk sub-sectors:

- 1) **Create conducive policy environment:** According to the strategy document, there is currently no policy in Zimbabwe focusing specifically on PHL. There is need to put in place a PH policy and strategy (which has now (2018) just been developed) that can inform and provide guidelines to both the public and private sector on prioritizing investments in PHL reduction towards achieving the Malabo Declaration commitments and targets;
- 2) **Institute a mechanism to coordinate post-harvest loss management:** The review of past and present policies indicates that there is lack of coordination of the various programmes and projects that have been implemented in Zimbabwe by non-government organizations and the public sector;
- 3) **Raise awareness on post-harvest losses:** Some of the causes of PHL can be mitigated if the actors are fully informed of the impact of PHL. Raising awareness is therefore important as it triggers understanding of the magnitude of the problem and enables value chain actors to put in place PHL reduction measures that ensure they derive maximum benefits from their activities;
- 4) **Implement agricultural systems and practices that support loss reduction:** One of the issues that is responsible for PHL in cereals for example is harvesting of the crops with high moisture content. This is mainly because farmers lack the necessary knowhow and importance of harvesting under the optimal conditions. Furthermore, the lack of equipment and appropriate technologies to determine optimal moisture content at harvest or after drying the commodity also add to the problem although there are practices that can be used for these purposes;
- 5) **Facilitate research and development on post-harvest loss management:** There are laboratories in both the public and private sectors that provide testing services. These laboratories can be strengthened to provide quality and research services relevant to PH management.
- 6) **Facilitate investments in technology, mechanization and general practices:** There are a number of technologies that have been produced but are not yet widely available in Zimbabwe. There is also generally very low uptake rates of these technologies in the country.
- 7) **Improve post-harvest extension and training:** Post-harvest loss management is a relatively new science that is not widely integrated and taught in universities and colleges. Most of the graduates therefore lack post-harvest loss management technical capacity and an understanding of the principles behind the discipline. Field extension workers have mainly accessed post-harvest technical training through capacity development programmes that have been implemented. There is therefore need to upgrade the skills of extension staff and integrate the teaching of post-harvest loss management at all levels of the education systems;

- 8) **Improve marketing infrastructure:** The rural road infrastructure is mainly composed of seasonal roads that are linked to the national network of all-weather roads. The roads in the rural areas become impassable particularly during the rainy season. There is a lack of marketing and aggregation structures in rural areas that allow for linkages with enhanced urban markets. There is need therefore to prioritize the maintenance of the rural roads given the importance in terms of movement of produce from the farms to the market and the installation of aggregation, storage and marketing facilities;
- 9) **Mainstream gender and the youth in post-harvest activities:** Men tend to dominate income generating activities in the smallholder areas. This is mainly because men have better access to resources compared to women and youth. In order to encourage and promote gender equity, there is need to promote investments that take into account the interests of women and youth. Appropriate PH management technologies developed and promoted should take into account labour saving technologies for activities that are mainly performed by women and youth in order to encourage their participation; and
- 10) **Promote post-harvest loss management processes that take into account the impact on the environment and climate change:** Environmental sustainability is important in order for the regeneration of the natural resource base. Use of PH management methods that deplete the environment without the requisite replenishment are not environmentally friendly. Examples can be found in the use of firewood, in boiling milk for pasteurization when alternative options such as the use of electricity, biogas and solar could be considered within the context of the impact on the environment.

V.3. Vision, Mission and Objectives of the Strategy

In the case of Zimbabwe, the strategy document is structured to outline the vision of the agriculture sector, policy objectives of the agricultural policy framework and strategic objectives of the strategy. Once again, the need for harmonised and standardized structuring of post-harvest loss management strategies across countries, whilst taking into account the specificities of each country, is evident.

The vision for the PHLM strategy for Zimbabwe, based on the comprehensive agriculture policy framework (2015-2035) of Zimbabwe, desires “*A prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security significantly contributing to national development*”. To achieve this, the policy objectives, again according to the comprehensive agricultural policy framework of Zimbabwe are to:

- a. Assure national and household food and nutrition security;
- b. Ensure that the existing agricultural resource base is maintained and improved;
- c. Generate income and employment to feasible optimum levels;
- d. Increase agriculture’s contribution to the Gross Domestic Product (GDP);

- e. Contribute to sustainable industrial development through the provision of home-grown agricultural raw materials; and
- f. Expand significantly the sector's contribution to the national balance of payments.

As outlined above, the strategic objectives of the post-harvest loss management strategy for Zimbabwe for the five national priority commodities (maize, sorghum, tomatoes, banana and milk) aim to:

- a. Create conducive policy environment
- b. Institute a mechanism to coordinate post-harvest loss management
- c. Raise awareness on post-harvest losses
- d. Implement agricultural systems that support loss reduction
- e. Facilitate research and development on post-harvest loss management
- f. Facilitate investments in technology, mechanization and practices
- g. Improve post-harvest extension and training
- h. Improve marketing infrastructure
- i. Mainstream gender and the youth in post-harvest activities
- j. Promote post-harvest loss management processes that take into account the impact on the environment and climate change

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