AGRICULTURE DEVELOPMENT STRATEGY (ADS)

ANNUAL PROGRESS REPORT
2018-19

The Government of the Republic of the Union of Myanmar
Ministry of Agriculture, Livestock and Irrigation

MYANMAR AGRICULTURE DEVELOPMENT STRATGEY (ADS)
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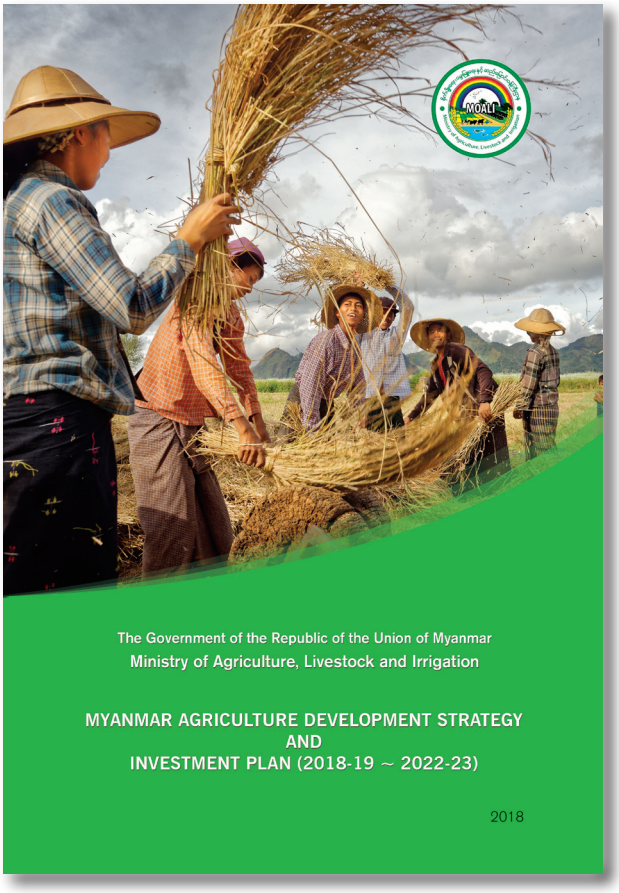

The Government of the Republic of the Union of Myanmar
Ministry of Agriculture, Livestock and Irrigation
MYANMAR AGRICULTURE DEVELOPMENT STRATEGY
AND
INVESTMENT PLAN (2018-19 ~ 2022-23)
2018


The Government of The Republic of The Union of Myanmar
Ministry of Agriculture, Livestock and Irrigation
The Investment Plan (2018-19 to 2022-23)
of
Myanmar Agriculture Development Strategy
2018

FOREWORD

The Agriculture sector is vital in leading the continued development of Myanmar, and for many of its citizens to climb out of poverty. It is imperative to the economy of Myanmar and the livelihood of our people. Since the sanctions were lifted and Myanmar has opened up for investment and trade, the Ministry of Agriculture, Livestock, and Irrigation (MoALI) has made significant progress. Developing a planning framework, and budget to transform MoALI into a practical, and service-oriented organization that implements targeted programmes to improve the livelihoods, nutrition, and food security of Myanmar's population has been our priorities.

MoALI is responsible for developing and implementing policies to build a competitive and prosperous agricultural sector of the country that will significantly and sustainably contribute to the Gross Domestic Product (GDP) growth and poverty reduction, and will address food insecurity, and undernutrition. Currently, the agriculture sector contributes nearly 30% of the country's GDP, with an average growth rate of 3.2% per year during the period 2010/11 to 2016/17. The agriculture sector accounts for circa 25% of total exports by value, with beans and pulses, rice, livestock, and fisheries being the largest agriculture export [1]. Currently, 56% of employment in Myanmar is from the agriculture sector [2].

Even though Myanmar's Government has placed high importance on agriculture, food security and nutrition, subsequent data indicated that 1.4 million (29%) children under five years are stunted, 7% are suffering from acute undernutrition or wasting, and 19% are underweight[3]. On the one hand, rural poverty is still high at 25.6%, with approximately 66.9% of total work force composed of working poor at purchasing power parity of $2/day and 85% of the poor living in rural areas and remote villages[4]. On the other hand, the rising income inequalities are threatening poverty reduction and slowing down progress to gender equality.

A year ago, MoALI decided to launch the first Myanmar Agriculture Development Strategy (ADS) and its Investment Plan to implement MoALI's Vision over the next five years (2018 to 2023). The ADS and its Investment Plan summarizes MoALI's Vision of an inclusive, competitive, food and nutrition secure, climate change resilient, and sustainable agricultural system, contributing to the socio-economic wellbeing of farmers and rural people and the further development of the national economy. It is composed of three strategic pillars, defined as (i) improved governance, (ii) productivity, and (iii) competitiveness. At the same time, the ADS highlighted MoALI's commitment to improving nutrition outcomes by contributing to the achievement of the Multi-Sectoral National Action Plan for Nutrition (MS-NPAN), in reducing all forms of malnutrition in the country, focusing on mothers, children and adolescent girls.

The information presented in this first ADS progress report is a synopsis of MoALI current efforts to operationalize the ADS, the progress of achieving the pillars, outcomes, and implementation of outputs. Despite the current limitations regarding the availability of a systematic data collection and analysis at the Union, States, and Regions, it is my firm belief that the report provides comprehensive

1 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

2 ditto

3 Demographic Health Survey 2015/16 (source: https://dhsprogram.com)

4 Integrated Household Living Conditions Survey (IHLCS), 2011 (source: https://www.undp.org/)

information and data that describes the key achievements, lessons learned, and presents the challenges that influenced the first year of the ADS implementation. The highlights of the report originate from the analysis of the Department's regular monitoring on ADS implementation and the contribution analysis [5] conducted by the Agriculture Development Strategy Implementation Support Unit (ADSISU).

The report indicates that current investments are not well aligned and consistent with the Investment Plan. As a result, only 105 outputs out of the planned 205 for 2018/19 were implemented. Given the ambitious ADS targets, MoALI needs to take steps towards strategic initiatives, robust, supportive and enabling policies, and a more effective institutional environment. In this sense, MoALI and stakeholders at Union, States, and Regions have to embrace the ADS fully and move towards identifying strategic programmes to innovatively carry out the necessary investments crucial to the achievement of the ADS and MoALI's Vision.

The ADS and its Investment Plan shall be used to facilitate discussion on how best to coordinate efforts to ensure coherence between MoALI's and stakeholders' strategic and results-oriented planning, budgeting, and implementation to enhance accountability and service delivery in the agricultural sector. Besides, the development of the rural agricultural sector cannot be undertaken by MoALI alone. Therefore, I would like to encourage the strong support from various actors (i.e private sectors, farmer organizations, civil society, Development Partners, etc.) and other sectors for coordination and collaboration of cross-sectoral public policy and investments. The MoALI has also to start thinking and dialoguing outside the agriculture box with an orientation towards innovation along agri-food systems.

In this opportunity, I would like to express my sincere appreciation to all who contributed to the preparation of this ADS progress report. These include the Deputy Minister, Permanent Secretaries, Deputy Permanent Secretaries, Director Generals, Deputy Director Generals, Directors, ADSISU, and MoALI staff at all levels for showing their leadership and commitment. My gratitude goes to the Development Partners, particularly the European Union, for providing the technical and financial support during the preparation of the report. I hope that the information in this report will further inspire national and sub-national efforts for joint policies and actions.

The MoALI remains fully committed to contribute to the achievement of Myanmar's overall development, as described in the Myanmar Sustainable Development Plan (MSDP). Therefore, appropriate and efficient monitoring shall be carried out to regularly report on ADS progress and impact. On behalf of the Ministry of Agriculture, Livestock and Irrigation of Myanmar, I pledge my full commitment to the implementation of the ADS and Investment Plan.

Dr. Aung Thu
Union Minister
Ministry of Agriculture, Livestock and Irrigation

5 The contribution analysis identifies the current MoALI capital budget execution against the ADS Investment Plan

ACKNOWLEDGEMENT

The successful completion and the publication of the first ADS progress report (2018/19) would not have been possible without the significant contributions of many individuals and numerous key stakeholders. We want to give acknowledgements to some of these contributors, though we may not be able to acknowledge all.

To Dr. Aung Thu, Union Minister of Agriculture, Livestock and Irrigation (MoALI) and U Hla Kyaw, Union Deputy Minister of MoALI, who have provided strategic guidance and accorded high priority in preparing the first ADS progress report, we are very grateful.

Our gratitude to Permanent Secretaries (PS) of MoALI, U Kyaw Min Oo, PS for Agriculture and Irrigation, U Khin Zaw, PS for Livestock and U Kyaw Ngwe, PS for Cooperatives, as well as the Deputy Permanent Secretaries U Myo Tint Tun and U Hla Tun, for providing technical inputs.

All of MoALI Director Generals, particularly U Kyaw Swe Lin, Director General (DG) for Planning (DOP) and Dr. Thanda Kyi, Deputy Director General (DDG) for Planning, for their excellent leadership, supervision and willingness to provide dedicated staff who were involved in the contribution analysis and the report preparation.

Appreciation is also acknowledged to Daw Yin Yin Nwe and the ADSISU Team for their hard work and commitment in collecting data, consolidating information, and unwavering support in realizing the significant effort of producing a meaningful contribution analysis and publication of a pragmatic ADS progress report.

Special thanks to the technical contributions and inputs from Mr. Pedro Campo Llopis, Deputy Head of Cooperations, Mr. Alvaro Ortega, Programme Manager of Rural Development and Food Security, EU Delegation to Myanmar and technical expertise provided by the EU international and national consultants Ms. Marrie-Ann Merza, Mr. Evert de Witte, Mr. Ricardo Monteiro, Ms. Sylvie Zaitra, Ms. Aye Mya Thu, Mr. Myint Lwin and EU/FAO First Officer Ms. Annalisa Noack. Without EU technical and financial assistance, the successful contribution analysis and preparation of the report would not have been possible.

Our appreciation is also for the outstanding support from the MoALI Public Finance Management Team, especially to Daw Naw Tyrina and U Ko Ko Naing for providing vital financial information and the M & E Team headed by Dr. San San Yi for the regular monitoring and reporting of ADS output indicators.

Taking this opportunity, we are deeply indebted to all Development Partners, CSO, Government and Private Sectors, and Farmers who have put concrete and energetic efforts and support for the birth of the first Myanmar ADS. Finally, we would like to acknowledge the significant contribution of all MoALI Department ADS focal points and M & E staff, without whom the information crucial to publish the report could not have been collected successfully.

ACRONYMS AND ABBREVIATIONS

AA	Anthrax
ABSS	Android-Based Survey Solution
ACIAR	Australian Center for International Agricultural Research
ACL	Asia Crafts Link
ADS	Agriculture Development Strategy
ADSP	Agriculture Development Support Project
ADSICWC	Agriculture Development Strategy Implementation Working Committee
ADSISU	ADS Implementation Support Unit
AE	Actual Expenditures
AI	Artificial Insemination
AMIA	Agriculture Market Information Agency
AMD	Agriculture Mechanization Department
AnGR	Animal Genetic Resources
APC	Agricultural Planning Commission
APU	Agriculture Policy Unit
ARDSCG	Agriculture and Rural Development Sector Coordination Group
APPT	Agri-product processing technology
APTERR	ASEAN plus Three Emergency Rice Reserve
ASEAN	Association of Southeast Asian Nations
ASTI	Agricultural Science and Technology Indicators
ASSCS	Agriculture Supply Services Cooperative Society
ATMI	Agricultural Transformation and Market Integration
AWPB	Annual Work Plan and Budget
AVE	Audio Visual Equipment
AVRDC	Asian Vegetable Research and Development Center
AWP	Annual Work Plan
BASc	Bachelor of Animal Science
BB	Bacterial Blight
BE	Budget Estimates
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BOD	Board of Directors
BPH	Brown Plant Hopper

BS	Budget Support
BVSc	Bachelor of Veterinary Science
BQ	Black Quarter
CAHW	Community Animal Health Workers
CASP	Core Agriculture Support
CBDRM	Community Based Disaster Risk Management
CBO	Community Based Organization
CCA	Canadian Cooperative Alliance
CD	Cooperative Department
CDD	Community-driven Development
CESD	Centre for Economic and Social Development
CFAVC	Climate-Friendly Agribusiness Value Chain
CGIAR	Consultative Group for International Agricultural Research
CIBTCAS	Chengdu Institute of Biology-ChineseAcredamy of Science
CIG	Common Interest Group
CIRAD	Center for International Development
CLRDTC	Central Land Records Development Training Center
CMS	Cytoplasmic Male Sterility
CPD	Continuous Professional Development
CSA	Climate Smart Agriculture
CSA	Clinical Studies Association
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSO	Central Statistics Office
DACU	Development Assistance Coordination Unit
DP	Development Partners
DABMI	Department of Agribusiness and Market Information
DALMS	Department of Agricultural Land Management and Statistics
DAR	Department of Agricultural Research
DOA	Department of Agriculture
DOP	Department of Planning
DRD	Department of Rural Development
DVM	Doctor of Veterinary Medicine
EAFM	Ecosystem Approach to Fisheries Management
EDMS	Electronic Document Management System

EGS	Early Generation Seed
ELIB	Electronic Library
ERLIP	Enhancing Rural Livelihoods and Income
EU	European Union
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
FAREC	Freshwater Aquaculture Research and Extension Center
FARM	Fostering Agriculture Revitalization in Myanmar
FDA	Food and Drug Administration
FERD	Foreign Economic Relations Department
FFS	Farmer Field Schools
FIRST	Food and Nutrition Security Impact, Resilience, Sustainability and Transformation
FMD	Foot and Mouth Disease
FMS	Farmer Marketing Schools
FT-NIR	Fourier Transform Near Infrared
FOAU	Farmer Organizations Affairs Unit
FTC	Fertilizer Technical Committee
FYM	Farm Yard Manure
GAD	General Administration Department
GAP	Good Agriculture Practices
GAHP	Good Animal Husbandry Practices
GAqP	Good Aquaculture Practices
GDP	Gross Domestic Product
GHG	Green House Gas
GHP	Good Hygiene Practice
GI	Geographical Indications
GIS	Geographic Information System
GMP	Good Manufacturing Practices
GPMS	Government Personnel Management System
GSCAAS	Graduate School of Chinese Academy of Agriculture Sciences
GPS	Global Positioning System
GoM	Government of Myanmar
HACCP	Hazards Analysis and Critical Control Points
HAFL	University of Helsinki

HCG	Human Chorionic Gonadotropin
HPLC UV	High-Performance Liquid Chromatography Ultraviolet
HS	Haemorrhagic Septicaemia
IAEA	International Atomic Energy Agency
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communication Technologies
IEC	International Electrotechnical Commission
IHLCS	Integrated Household Living Conditions Survey
IMT	Irrigation Management Transfer
INGO	International Non-Government Organization
IP	Investment Plan
IPC	Investment Promotion Committee
IPR	Intellectual Property Rights
IRRI	International Rice Research Institute
ISF	Irrigation Service Fee
ISNAR	International Service for National Agricultural Research
ISO	International Organization for Standardization
ISSD	Integrated Seed Sector Development
IUU	Illegal, Unreported and Unregulated
IWRM	Integrated Water Resources Management
IWUMD	Irrigation and Water Utilization Management Department
JICA	Japan International Cooperation Agency
KC	Knowledge Centre
KIT	Karlsruhe Institute of Technology
KOICA	Korea International Cooperation Agency
KSA	Knowledge, Skill and Ability
LBVD	Livestock Breeding and Veterinary Department
LIFT	Livelihoods and Food Security Fund
LMMA	Locally Managed Marine Area
LN2	Liquid Nitrogen
LRT	Larval Rearing Tank
LSA	Livestock Studies Association
MDD-W	Minimum Dietary Diversity for Women
M&E	Monitoring and Evaluation

MIPP	Myanmar Investment Promotion Plan
MIS	Management Information System
MLC	Mekong Lancang Cooperation
MS-NPAN	Multi-Sectoral National Plan of Action on Nutrition
MoALI	Ministry of Agriculture, Livestock, and Irrigation
MoHS	Ministry of Health and Sports
MoPFI	Ministry of Planning, Finance and Industry
MoNREC	Ministry of Natural Resources and Environmental Conservation
MOU	Memorandum of Understanding
MSU	Michigan State University
MTEF	Mid-term Expenditure Framework
MVA	Myanmar Veterinary Association
MVM	Master of Veterinary Medicine
MVSc	Master of Veterinary Science
NADSCC	National ADS Coordination Committee
NADSIC	National ADS Implementation Committee
NAPA	National Adaptation Programme of Action
NARC	National Agriculture Research Council
NARES	National Agriculture Research and Extension System
NARS	National Agriculture Research Systems
NCI	Non-Conventional Irrigation
NEP	National Electrification Project
NGO	Non-Government Organization
NIWRMP	National Integrated Water Resources Management Policy
NLUP	National Land Use Policy
NPC	National Planning Commission
NPOA-IUU	National Plans of Action on Combating IUU Fishing
NSA	Nutrition-Sensitive Agriculture
NSRC	Nutrition Sector Reform Contract
NPSC	National Project Steering Committee
NSW	National Single Window
NWP	National Water Policy
OA	Organic Agriculture
ODA	Official Development Assistance

OF	Organic Farming
O&M	Operation and Maintenance
OPV	Open Pollinated Varieties
PER	Public Expenditure Review
PIM	Participatory Irrigation Management
PIT	Passive Integrated Transponder
PMU	Project Management Unit
PPP	Public Private Partnership
PPR	Peste de Petits Ruminants
RBR	Results-Based Reports
PCR	Polymerase chain reaction
QR	Quick Response
RE	Budget Revised Estimates
RF	Result Frameworks
R&D	Research and Development
RRC	Regional Research Center
RTK	Real Time Kinematic
SAEM	Strengthening Agricultural Extension in Myanmar
SAI	State Agriculture Institute
SDG	Sustainable Development Goals
SCF	Sustainable Coastal Fisheries
S&E	Science and Engineering
SGA	Seed Grower Associations
SME	Small-medium Enterprises
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
SMS	Subject Matter Specialist
SOP	Standard Operating Procedures
SPANA	Society for the Protection of Animals Abroad
SPS	Sanitary and Phytosanitary
S/R	States and Regions
SRI	System of Rice Intensification
SSID	Small Scale Industries Department
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TA	Technical Assistance

TBGRSD	Trainings on Basic Geographic Information System (GIS), Remote Sensing and Database
TFA	Trade Facilitation Agreement
TYLCV	Tomato Yellow Leaf Curl Virus
TOF	Training of Facilitator
TOR	Term of Reference
ToT	Training of Trainers
TCP	Technical Cooperation Project
TTF	Training of Technical Facilitator
UAV	Unmanned Aerial Vehicle
UMFCCI	Union of Myanmar Federation of Chamber of Commerce and Industry
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFPA	United Nations Fund for Population Activities
UN-HABITAT	United Nations Human Settlements
UPOV	Union for the Protection of New Varieties of Plants
UVS	University of Veterinary Science
VDP	Village Development Plan
VE	Village Embankment
VERU	Veterinary Emergency Response Unit
VFRDC	Vegetables and Fruit Research and Development Centre
VFVLM	Vacant, Fallow and Virgin Land Management
VI	Village Irrigated
VMS	Vessel Monitoring System
VTS	Vessel Tracking System
WAC	Water Association Committees
WTO	World Trade Organization
WUA	Water User Association
WUG	Water User Group
YAU	Yezin Agricultural University
YSI	Young Scientist Initiative


MINISTRY OF AGRICULTURE, LIVESTOCK AND IRRIGATION
LAUNCHING CEREMONY OF AGRICULTURE DEVELOPMENT STRATEGY (ADS)
AND
7th JUNE 2018

EXECUTIVE SUMMARY

Accelerating agricultural growth, promoting inclusive and competitive agricultural food, and nutrition secure systems have been MoALI's main objectives. Investment in agriculture is a fundamental instrument in enhancing productivity, production, and rural livelihoods, as well as ensuring environmental sustainability, reducing poverty, and achieving food and nutrition security.

MoALI is making every effort to speed up a much-needed agricultural transformation process and become a driver for the country's modernization and development. Therefore, the formulation of the Agriculture Development Strategy (ADS) and its Investment Plan (IP) is principal to reshaping and aligning MoALI's policies, activities, and priorities.

The ADS has been implemented for over a year since the fiscal year 2018/19. The objectives of this 2018/19 report and of subsequent ADS annual reports are to outline the ADS implementation progress, and results achieved under each pillar, as well as the financial execution, in a context of assessing the performance of the Ministry of Agriculture, Livestock and Irrigation (MoALI) in the implementation of the ADS. The information was compiled from relevant MoALI Departments and Divisions monitoring and contribution analyses, using participatory approaches. Also, critical feedbacks from senior-level MoALI officers have been considered in measuring the progress of the ADS implementation. The findings and analysis of challenges and areas requiring attention for the remaining ADS timeframe are also outlined in the report. These are fundamental to develop a strategic road map for effective implementation of the ADS, not only by the Government at the Union, States, and Regions but also by Development Partners (DPs) and other stakeholders in the agriculture sector.

The details of the report are presented in five different sections. The first section is an introduction that describes the current state of the agriculture sector and its contribution to Myanmar's economy, as well as the approaches and strategies to implement the ADS. The results and the subsequent analysis of outcome achievements, implementation of outputs, and execution of IP are presented in Sections 2 and 3. Section 4 illustrates the contribution of the ADS to the Multi-Sectoral National Plan of Action on Nutrition (MS-NPAN), and Section 5 discusses the challenges and way forward. Finally, a conclusion and an Annex conclude the report.

The analysis of the 2018/19 ADS implementation performance shows that the ADS is positively progressing although MoALI faces macro-level challenges, constraints at the sub-sectoral and organizational levels, issues relating to clarity of mandates and assigned ADS outcome, inconsistencies, and unmatched ADS IP outcomes, and outputs. All 13 MoALI Departments and the Minister's Office contributed in one way or another in advancing the ADS implementation. From the planned 205 outputs for implementation in 2018/19, 105 were implemented, for which 20 outputs under Pillar 1, 61 outputs, and 23 outputs under Pillar 2 and 3, respectively. The outputs that were lagging are to be addressed critically by MoALI and the stakeholders in terms of their planning, budgeting, and programme implementation processes in subsequent years.

In 2018/19, MoALI received an overall budget envelope (revised Budget Estimates including loans and grants) of 1,065,153.41 million kyats, for which MoALI has spent 983,197.21 million kyats or 92%. Of the total spending, 413,729.11million kyats or 42% were used as pivotal capital investment. About, 376,355 million kyats were actually spent to implement interventions of the 75 ADS outputs of which 57% represented loans, 10% grants, and 33% from the Government budget. The additional 30 outputs were implemented using the recurrent budget, mostly on strengthening human resources capacities such as training, seminars, workshops and education.

From the overall actual ADS-related expenditure of 376,355 million kyats, 51% were spent to implement outputs under Pillar 2, while 47% served the implementation of actions under Pillar 3 (Competitiveness). The remaining 2% was capitalized for interventions that promote the strengthening of Governance (Pillar 1).

During the reporting period, the most valuable achievements under Pillar 1 (Governance) includes setting up a groundwork for more effective integrated planning and Monitoring and Evaluation (M&E) system and the establishment of the ADS Implementation Support Unit (ADSISU), a fundamental unit to institutionalize the ADS implementation and coordination mechanisms. Other milestones were on strengthening the land administration services, agricultural statistics, and the provision of capacity building to manage cooperative societies, including farmer's associations. Also, the Agricultural Policy Unit (APU) was established that carried out key policy talks. The cooperation, coordination, and negotiations with international loan/grant assistance projects for MoALI were pursued during the reporting period.

Progress under Pillar 2 (Productivity) concerned the increase of agricultural productivity, primarily employing irrigation system improvement with increased farmer's access through Participatory Irrigation Management (PIM). Increased access to agricultural inputs and strengthening of seed research stations, as well as the promotion of seed grower association and operation of seed laboratories and seed certification, have been achieved. MoALI has successfully promoted the agriculture extension service delivery on crops, livestock, and fisheries with investments on agriculture machinery, training, and education facilities and provision of systematically improved farming practices and technologies, critical for Good Agricultural Practices (GAP), Good Animal Husbandry Practices (GAHP), Good Aquaculture Practices (GAqP) certifications. Moreover, MoALI increased investments for access to mechanization with improved engagement of the private sector.

Regarding progress under Pillar 3 (Competitiveness), despite reported excess capital investments, little progress has been achieved in advancing planned inclusive market linkages and sustained competitiveness, specifically improving farmer access to financial services and encouraging supportive private sector investment. Progress on outcome indicators for food safety through laboratory facilities upgrading, testing, and tracing food standards and safety was minimal. The investment focus was on rural infrastructure and rural development planning for which exceeds 3% of the projected capital investment of 138,199 million kyats.

Overall, MoALI reported a financing gap of 113,176 million kyats on capital investment in 2018/19, including the non-investment of the planned new Department of Agribusiness and Market Information (DABMI). Nonetheless, MoALI managed to execute 91% of the 2018/19 capital investment plan for ADS implementation. Also, MoALI delivered a better execution against the revised aggregate budget estimates, spending 92% of the 1,065,153.41 million kyats revised Budget Estimate. The report shows an almost equal budget allocation on recurrent (44.7%) and capital (45.3%) budgets, with an average Departments spending performance of 87%.

Furthermore, to address the high prevalence of malnutrition, MoALI has been actively contributing to implementing the Multi-Sectoral National Plan of Action on Nutrition (MS-NPAN). Since the MS-NPAN was endorsed on 26 November 2018, MoALI has co-led the Ministry of Health and Sports (MoHS) towards achieving key activities during the inception phase. One milestone achieved in 2018/19 was the development of 5 States and Regions specific costed action plan in Shan State, Ayeyarwaddy Region, Chin State, Kayin State, Kayah State, the States and Regions (S/R) with the highest burden of malnutrition.

Besides, the active involvement of MoALI in the three MS-NPAN work streams of (i) prioritization of interventions, (ii) capacity assessment, and (ii) monitoring and evaluation led to the articulation

of the agriculture sector's contribution to nutrition. MoALI's prioritized 24 specific interventions of nutrition-sensitive indicators are integrated into the MS-NPAN narratives that emphasize dietary diversification and links between the diversification of agriculture production systems, income generation, and livelihoods improvement. Likewise, MoALI has championed the Multi-Sectoral National Plan of Action on Nutrition (MS-NPAN) during the methodology development and sub-national planning, organizing nutrition focal points, and working closely with development partners to integrate the multi-sectoral components of nutrition.

Additionally, efforts have been made to align the ADS with the MS-NPAN and the Myanmar Sustainable Development Plan (MSDP). During the reporting period, of the 24 MoALI's prioritized nutrition-sensitive interventions, at least 16 have positively progressed. Although, some issues still have to be addressed to operationalize the ADS at Union and sub-national levels effectively. Advocating for the relevance of the ADS and its IP in the Government of Myanmar planning, budgeting, and decision making processes remains critical. The current ADS financing gap of 23% of the IP estimated for 2018/19, and the lack of strategic allocation of ADS in the budget is a risk of jeopardizing the overall achievement of MoALI's strategic development.

Improving the ADS operation requires the strengthening of MoALI's capacity at Union, States, and Regions. Specifically, the consolidation of ADSISU as the main driver for the successful ADS implementation is vital. It is crucial to increase the ADSISU's capacity to carry out its mandate and core functions fully. The ADSISU has to operate based on sufficient funding, strong technical and organizational capabilities, and a clear definition of mandates, with adequate devolution of a higher authority.

It is fundamental to mobilize resources to increase the financial allocation for ADS and project implementation. However, effective resource mobilization is only possible once the National ADS Implementation Committee (NADSIC) and National ADS Coordination Committee (NADSCC) or similar bodies are fully operational. Besides, these committees' function is to cement intra/inter coordination at the Union, States, and Regions and various stakeholders working in the agriculture sector. To create an environment for participatory bottom-up and demand-driven planning with enhanced engagement of all relevant stakeholders at Union, States, and Regions is fundamental. Also, the integration of ADS outputs into relevant stakeholders' plans and budgets, is crucial.

The ADS support systems development and institutionalization (i.e., M & E/ MIS, ADS financing and contribution tracking system) have to be operationalized at Union, States, and Regions. These systems will provide timely data collection, rigorous analysis, and reporting using improved Information and Communication Technologies (ICT). Failure to have reliable ADS support systems will prevent MoALI's vision to promote evidenced-based planning, increased fiscal allocation, and targeted service delivery.

Finally, it is imperative to consolidate the ADS interface into the MS-NPAN and MSDP, mainly to ensure investments for nutrition-sensitive agriculture (NSA) and the allocation of resources for ADS implementation at States and Regions. The NSA output and outcome indicators have to be articulated in the ADS Result Framework. Most outcomes areas in the ADS have the potential to contribute to the achievement of food security and nutrition. At the same time, the MS-NPAN presents an opportunity for MoALI to contribute to the eradication of hunger and malnutrition in the country.

SECTION – I

INTRODUCTION

1.1 AGRICULTURE DEVELOPMENT STRATEGY BACKGROUND

Myanmar is considered the fastest-growing economy in Southeast Asia with a Gross Domestic Product (GDP) expanding by over 8% per year during the period 2010/11 to 2016/17, with the agricultural GDP contributing an average growth rate of 3.2% [6]. Considering Myanmar's abundant natural resources, diverse and fertile agro-ecological land, Myanmar has enough potential to foster diversification of agriculture, livestock, fisheries, and forestry. There is significant potential to boost productivity and improve the quality and marketability of agricultural products and food commodities. However, the insufficient and imbalanced investments on necessary infrastructure, connectivity, access to timely and quality inputs, land distribution, weak research, extension, finance support services and inadequate marketing systems are hampering the productivity enhancement and competitiveness of the agriculture sector.

In 2017, after the merging of the three former Ministries of Agriculture and Irrigation; Livestock and Fisheries and Rural Development; and Cooperatives, the new Ministry of Agriculture, Livestock and Irrigation (MoALI) has been making a determined effort to accelerate this transformation process. A strategic step was the development of an Agriculture Development Strategy (ADS) for a period of five years from 2018-19 to 2022-23. The ADS is considered a key instrument for MoALI to pursue the necessary agricultural development and to substantially contribute in lifting Myanmar's rural economy, while addressing the underlying causes of food insecurity and malnutrition in line with those in the Myanmar Sustainable Development Plan (MSDP) and Multi-Sectoral National Plan of Action on Nutrition (MS-NPAN). As such, the ADS was developed in a participatory manner, ensuring that intended agricultural transformation will address systemic issues, and is according to the aspirations of Myanmar society.

The primary objectives of the ADS are for MoALI to harmonize and integrate development plans, strategies, roadmaps, and approaches currently developed by various stakeholders, and align its Vision with States/Regions and national objectives accordingly [7]. Also, the ADS defined the role of the Government and the various stakeholders in the agriculture sector necessary to align plans and budgets according to MoALI's Vision. The ADS envisages coordinating activities, programmes, and policies, as well as advocating investments for the sector, and building capacities for joint monitoring and evaluation of results, for MoALI's informed decision making.

Broadly, the ADS integrates a holistic approach, encompassing the production sectors (crops, livestock, fisheries), processing, trade, and support services (research, extension, storage, transportation and logistics, finance, and marketing), critical to achieving financially sustainable smallholder farming production and farmer cooperatives. This approach aims to fulfill MoALI's Vision and resonates with MSDP [8] and MS-NPAN that aligns with the global sustainable development agenda.

Explicitly, the ADS Pillars 1 and 3 aim to support the achievement of the MSDP Goal 3, job creation and private sector-led growth by improving an enabling environment that helps in achieving (i) increased productivity and farmers' income, (ii) enhanced governance and capacity of institutions responsible for agricultural development, (iii) enhanced market linkages and competitiveness, (iii) legal and regulatory frameworks which provide a clear and stable foundation for businesses, applied

6 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

7 ditto

8 Myanmar Sustainable Development Plan 2018 – 2030 (source: https://www.mopfi.gov.mm)

equitably, and transparently, (iv) robust environment for sustainable trade and investment to facilitate inclusive growth and (v) enhanced role of small-medium enterprises (SMEs) in local, sub-national and regional development.

In addition, the ADS Pillars 2 and 3 aim to support the achievement of MSDP Goal 4 and 5, and principally to increase secure access to food that is safe and well-balanced to improve nutrient intake across the population through (i) increased and diversified domestic food production and (ii) a clean environment together with healthy ecosystems, (iii) increased climate change resilience, reduced exposure to disasters and shocks, protecting livelihoods, and facilitate a shift to a low-carbon growth pathway, (iv) safe and equitable access to water and sanitation in ways that ensure environmental sustainability and (v) provision of affordable and reliable energy to populations and industries via an appropriate energy generation mix.

To achieve the above and in order to primarily address fundamental issues that are affecting the overall development of the agriculture sector (Figure 1), the ADS prioritizes the three strategic pillars of Governance (Pillar 1), Productivity (Pillar 2), and Competitiveness (Pillar 3).

Furthermore, in order to effectively implement the ADS, an Investment Plan (IP) was developed with investment projections calculated by Pillar, outcomes and outputs for the five-year period 2018/19 to 2022/23. The ADS IP was prepared based on the World Bank 2017 Public Expenditure Review (PER) and the Mid-term Expenditure Framework (MTEF), as well as donor pipelines and MoALI's budget trends and programming priorities, including inputs from wide-ranging consultations. The five-year period of the ADS IP is intended to guide allocation of investments of 66.6% from the Government of Myanmar (GoM), 31% from the Development Partners, 3% from the private sector and an in-kind contribution equivalent to 0.6% from farmer organizations.

Figure 1. ADS strategic Pillars and key challenges

Pillar 1: Governance
The challenges the ADS aims to address are:

- Commodity (rice)/sub-sector focus policy and planning.
- Systems that set arbitrary targets, not taking into account market demand and potential productivity gains and constraint faced by the producers.
- Not conducive enabling environment for private sector.
- Centralised and not participative planning process.
- Lack of reliable data and statistics.
- Unsystematic monitoring and evaluation of policy implementation.
- Ineffective monitoring and evaluation of planned outcomes.
- Weak capacity on policy, planning, monitoring and evaluation.
- Unbalance budget allocation.
- Farmer's cooperatives are still at a nascent stage and lack capacity.
- Myanmar Cooperative Societies Law does not meet yet the international norm.
- Government and NGO weak partnership.
- Unresolved land rights and land-property issues/ land grabbing/land confiscation..
- Farm Land Law does not provide sufficient security of tenure to smallholders.
- Definition of farmland does not cover other agrarian production systems that are important for food security and nutrition.

Pillar 2: Productivity
The challenges the ADS aims to address are:

- Research and extension has been commodity and productivity (yield) focused that neglect other issues relevant to farmers such as production cost, profitability, etc.
- Fragmented and duplicated researches with no national level research plan.
- Agricultural research and extension are grossly underfunded.
- Weak post-harvest systems, marketing and processing within all sub-sectors.
- Limited value addition on cash crops.
- Weak non-farm sector/ limited off-farm employment.
- Increasing outmigration from agriculture and rural areas.
- Poor water management and use.
- Timely access to crop inputs and mechanization services needs improvement.
- Sustainable practices in a agriculture, livestock and fisheries need to be mainstreamed.
- High exposure to a range of natural hazards.
- The annual expected agricultural losses from natural hazards, assumed to get inflated by climate change.

Pillar 3: Competitiveness
The challenges the ADS aims to address are:

- The business environment is currently not an enabler for agribusiness to prosper with several legal and procedural issues.
- Absence of intellectual property laws and systems.
- Rural infrastructure not supporting private sector, and agribusiness growth.
- Underdevelopment of smallholder farmers and small medium enterprises.
- Quality standardization not allowing farmers to spell their products for a fair price.
- Poor rural infrastructure, thus less connectivity.
- Inefficient operation and maintenance of infrastructures.
- Rural areas limited access to electrification.

1.2 MOALI MISSION AND VISION

Vision: "An inclusive, competitive, food and nutrition secure and sustainable agricultural system contributing to the socio-economic wellbeing of farmers and rural people and further development of the national economy".

Mission: "To enable rural population and agribusiness enterprises earning profit from production and trade of diverse, safe and nutritious foods and agricultural products using innovative and sustainable production, processing, packaging, logistics and marketing technologies to meet growing domestic and global demands".

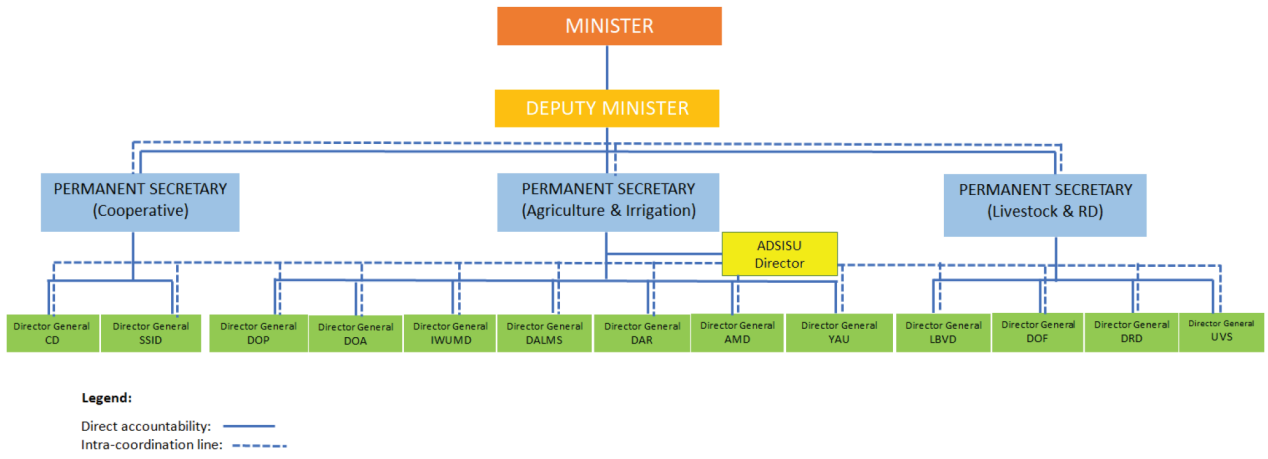
1.3 MOALI ORGANIZATIONAL STRUCTURE

The below organizational structure of the Ministry of Agriculture Livestock and Irrigation (MoALI) is a result of the Government of Myanmar's decision in 2015 to consolidate the previous three ministries into one unified Ministry. MoALI became thus responsible for both the systemic nature of the agricultural sector (including crops, livestock, and fisheries) and the linkages between farm and non-farm activities.

The merging of the three ministries was foreseen as a critical element in advancing the vision to transform the agriculture sector into an integrated and modernized industry. Also to promote strong linkages between the agriculture and the economic sectors, for which the development of the agriculture non-farm activities are crucially considered for the overall robust rural economy and employment generation.

During the reporting period, MoALI's hierarchical structure was as depicted below (Figure 2). It illustrates both the direct accountability for each of the Department and the intra-coordination between Departments. A mechanism that was put in place to mitigate the risk of the 13 Departments operating in silos implementing activities and projects. The structure also demonstrates the emerging role of the newly established Agriculture Development Strategy Implementation Support Unit (ADSISU).

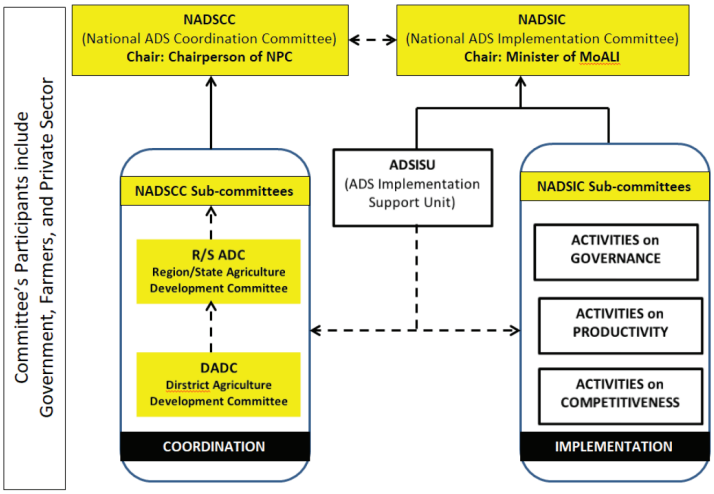
Figure 2. MoALI's Organizational Chart



To safeguard the implementation of the ADS, for which the MoALI is the primary responsible Ministry, the below institutional mechanisms for implementation and coordination was anticipated[9]. Primarily, the implementation of the ADS is under the responsibility of MoALI's Departments that are expected to take the lead for planning, coordination, implementation, and monitoring. However, due to the intricacy and inclusive nature of the ADS, it necessitates a wide-ranging implementation arrangement that includes collaborations from Union, States, and Regions of various stakeholders and organizations both in the public and private sectors.

Figure 3 demonstrates the accountability of MoALI to lead the ADS implementation while the National Planning Commission (NPC) will provide the overall policy and planning coordination [10].

Figure 3. ADS institutional mechanisms for implementation and coordination



1.4 APPROACHES AND STRATEGIES OF ADS AND ITS PILLARS

Experiences from Asian economies demonstrate that creating an enabling environment stimulates the growth in the agriculture sector. And for growth to be sustainable, it needs to be rooted in structural changes and improvements that do not depend on external funding or evaporate with fluctuations in global prices, the occurrence of hazards, and risk[11].

The strengthening of governance at Union, States, and Regions was considered a priority, including the re-structuring of MoALI to consolidate its functions. The critical role that MoALI has to perform to promote the much-needed policy transformation that reassures participation, accountability and transparency, are crucial.

The ADS underlines that during the implementation process, MoALI has to pursue reasonable approaches, such as:

i) linkages across agricultural subsectors and between the agricultural sector and the agri food sector;

9 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: http://www.moali.gov.mm)

10 ditto

11 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: http://www.moali.gov.mm)

ii) coordination for improved policy making and implementation;

iii) integrated and effective MoALI structure;

iv) monitoring the effectiveness of policy implementation that enhances accountability; and

v) regional planning.

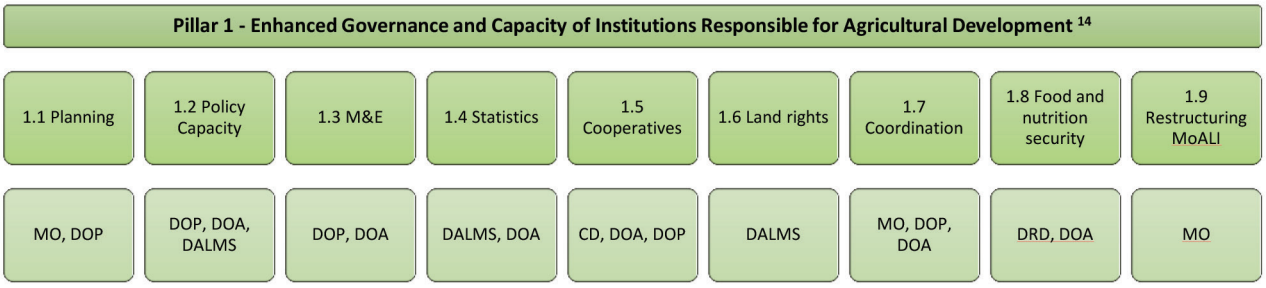
To ensure achievement of **Pillar 1 (Governance)**, the ADS details out logical approaches that include (i) the promotion of effective and integrated planning at the Union and sub-national level (States/ Regions, Districts, Townships, and Village Tracts); (ii) policy analysis, formulation, and review;(iii) monitoring and evaluation informing a web-based management information system (MIS) and (iv) sound statistics and data gathering system for evidence-based decision making[12]. The approaches and systems mentioned above for enabling environment shall be established, for the ADS to be implemented fully and efficiently.

Addressing land issues is a critical element of governance and the success of the ADS. Progress regarding the promotion of land rights, particularly the functioning of the inter-sectoral National Land Use Council is crucial. The land law that comprehensively addresses legislation and regulations of the National Land Use Policy will need to be passed, accordingly.

In addition, alleviating programmes on food and nutrition security is another fundamental governance task which is articulated in the ADS. A key to improving the food and nutrition security programming is through multi-sectoral initiatives. Therefore, collaboration and partnerships with other Ministries and stakeholders in the agriculture and nutrition sectors are vital, including the harmonization of food and nutrition interventions. To do so, MoALI has to engage all its Departments at Union, States and Regions to achieve the mid- and long-term food and nutrition security objectives, primarily for the most vulnerable members of population.

During this transition period, MoALI has to work on policies and incentives to actively engage smallholder farmers and agro-enterprises from sub-national to the Union level. The ADS emphasizes the establishment of viable farmer associations and cooperatives and supporting their involvement and participation in sub-sector policies, plans, legislation, and monitoring and evaluation. Also, the development partners, the private sector, and Non-Government organizations (NGOs) have significant roles in this transformation process. Nevertheless, to safeguard the successful implementation of Pillar 1, primary responsibility was assigned to MoALI's Departments illustrated below (Figure 4).

Figure 4. Primary Responsible MoALI Departments on Pillar 1



13

12 ditto

13 Departments under each of the outcomes depicted above are principally responsible for its implementation and coordination. This does not exclude the responsibilities of the other tasks, i.e. planning, M&E, etc.

As described in the ADS, a fundamental step to achieve **Pillar 2** includes the effective delivery of agricultural research and extension, efficient use of agricultural inputs, adoption of efficient and sustainable farming practices, and increased resilience to climate change and disasters.

One strategy to address the underfunded and fragmented agriculture research system is for Department of Agriculture (DOA) and Department of Agricultural Research (DAR) to design a functional National Agriculture Research Systems (NARS) and the establishment of the action research fund. These are fundamental attributes to guide the operation of the National Agricultural Research Council (NARC) once founded. In addition, the institutionalization of the National Agricultural Research and Extension System (NARES) is considered essential to link research and extension service delivery that is responsive to the evolving need of farmers and players of the agro-food system. Involvements of the private sector for a diverse public-private extension system are encouraged, particularly for promoting sustainable farming practices [e.g Good Agricultural Practices (GAP), Organic Farming (OF)].

The strategies mentioned above are essential to stimulate the process of consolidating agricultural education systems. As mentioned in the ADS, the objective is to build the human capital in the agriculture and food sectors through intensive training and education grounded from research and extension. It is anticipated for the Yezin Agriculture University (YAU) to take the lead with support from the University of Veterinary Science (UVS) and the Cooperative Department (CD), facilitating the participation of the Cooperative Universities and Colleges.

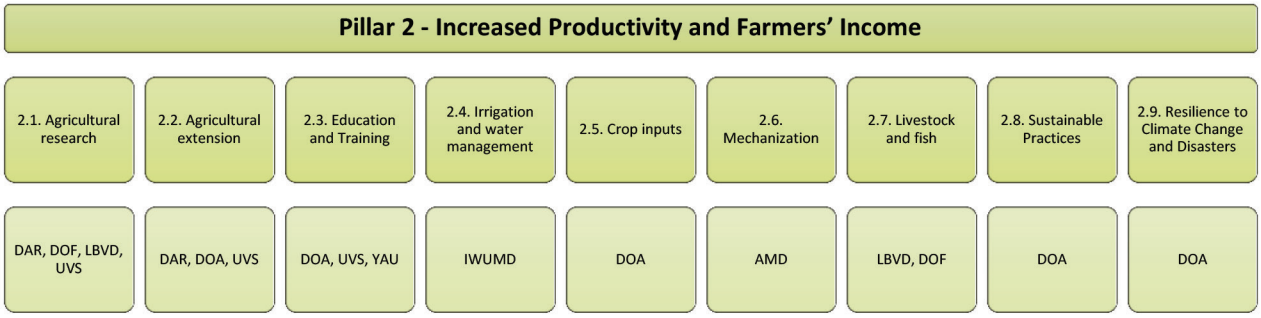
Furthermore, the provision of alternatives for farmers to have better access to all-year-round irrigation systems for diversified food crops and agriculture has been highlighted as a priority. The promotion of Non-Conventional Irrigation (NCI) systems (e.g. gravity piped water, small-scale pumped and rainwater harvesting) especially in hills and mountainous areas shall be in line with the National Integrated Water Resources Management Policy[14]. Also, the engagement of the private sector in rural areas is an essential component for sustainable mechanization service delivery to contribute to achieving an increase in agriculture productivity and diversity. The Irrigation and Water Utilization Management Department (IWUMD) and the Agriculture Mechanisation Department (AMD) are the primary responsible MoALI entities to carry out these approaches.

Furthermore, the ADS indicate for the Livestock, Breeding and Veterinary Department (LBVD) and Department of Fisheries (DOF) exploring options to promote livestock and fisheries sub-sectors potential to improve food diversity and rural livelihoods. The restructuring and expansion of the aquaculture technology centers are central to create income generation for small-scale producers. A National Strategy and Action Plan for Animal Genetic Resources (AnGR) is relevant in preparing legislation and guidelines, for the nationwide artificial insemination (AI), a programme supplementing pure breed production. On this, the role of the private sector, cooperatives, and the community animal health workers (CAHWs) is essential.

Finally, the ADS emphasize the importance of building resilience for farmers to climate change. Measures to reduce the adverse effects and impacts of climate change on the agriculture sector shall be grounded on research. The DAR, DOA, and DOF are responsible for promoting practical application of Community Based Disaster Risk Management (CBDRM) to help farming communities to better prepare and respond to risks.

14 Table 18, Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: http://www. moali. gov.mm)

Figure 5.Primary Responsible MoALI Departments on Pillar 2



An evident approach laid out in the ADS to achieve Pillar 3 is the immediate establishment of a secure connection of agricultural value chains to local, national, and international markets, in order to transform the agriculture sector to be a commercialized and competitive industry[15]. The ADS foresees an inclusive transformation process with a substantial number of farmers and agro-enterprises' engagement from input supply, service provisions to the marketing of products in a sustainable manner.

The ADS describes strategies for MoALI's Departments (CD, DOA, LBVD, DOF, Department of Rural Development (DRD), Small Scale Industries Department (SSID) and the supposed new DABMI) to implement the programmes in a coherent and integrated manner, while targeting improved business environment[16] and key support services[17] of the agriculture value chain as well as the inclusion of gender equality.

To realize the vision of sustainable agro-enterprises development, the ADS focuses on prioritizing value chains that have a sustainable competitive advantage. A significant milestone being the utilization of investments from the Core Agriculture Support Program (CASP) Phase II and Cross-Border Economic Zones Development Project for the production and marketing of safe and environment-friendly agro-based products.

In addition, the ADS propose pursuing the initiatives for integrating agriculture and rural development through community development planning processes. The Department of Rural and Development (DRD) is responsible for championing these actions, principally responding to the need for improved rural infrastructure, energy and water, to support farmers, small and medium agro-enterprises' needs.

Furthermore, the ADS underline elements of enhancing food quality and safety. These elements are crucial for Myanmar agriculture value chain and food products accessing international markets. The critical aspect of food safety standard is the establishment of the sanitary and phytosanitary (SPS) measures for both plants and animals. One suggested approach in the ADS is to establish one health, integrated health surveillance and diagnostic protocols.

The strategies mentioned above oblige the need for substantial coordination, collaboration and cementing partnerships with various Government entities, stakeholders in the agriculture, economic,

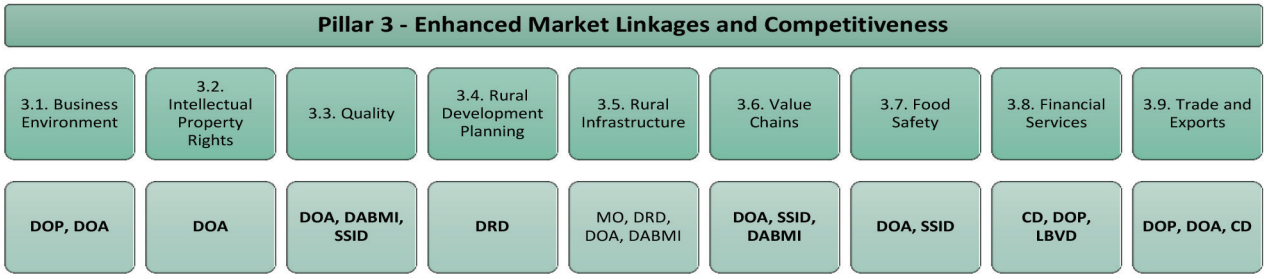
15 Subsection 8.5, Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: http://www. moali. gov.mm)

16 An investment environment that facilitates better the private agribusiness sector on efficient legal and procedural issues, as well as protection on price volatility, demand and supply shares by strengthening market information.

17 such as infrastructure to facilitate connectivity, communication, reliable energy, value chain infrastructures (e.g storage, pack houses, collection centers, markets) financial services, food safety, intellectual property rights and among others.

health and other sectors that are relevant to successfully achieve Pillar 3. Nonetheless, Figure 6 depicts MoALI's Departments that are primarily accountable for the implementation of Pillar 3.

Figure 6.Primary Responsible MoALI Departments on Pillar 3



In summary, Figure 7 illustrates the ADS planned sustainable and long-term impacts in relation to improving food and nutrition security, reduction of rural poverty, increasing smallholder farmer's income, competitiveness on agricultural trade and ensuring farmer's rights.

Figure 7. ADS planned impacts

1.5 OBJECTIVES, STRUCTURE, METHOD, SCOPE AND LIMITATIONS

1.5.1 Objectives of the Report

The primary objective of the ADS annual progress report is to present the significant milestones of the ADS implementation. The focus is to describe the progress and key achievements of outputs and outcomes under each Pillar, and ultimately toward the overall intended ADS impacts.

Specifically, the annual report intends to:

1. Describe progress against ADS outputs, outcomes, and objectives/pillars' key indicators.
2. Report actual budget execution against ADS Investment Plan, per outcomes and pillars.
3. Reveal the potential financing gap to align MoALI, Development Partners, and other stakeholders in the agriculture sector's future allocation of investments, planning, and budgeting.
4. Present challenges, learning, and illustrate good practices in implementing the ADS.
5. Establish benchmarks that can later be used, during crucial intervals, to evaluate progress against key outcomes, objectives, and impacts.

1.5.2 Report structure

This report is comprised of five sections. The first section describes the current state of the agriculture sector in Myanmar and the rationale of the ADS. The mission and vision statements, MoALI's organizational structure, and illustration of the ADS implementation and coordination mechanisms, as well as the approaches and strategies to implement the ADS, are also covered in the first section. Moreover, it includes a description of the objectives, report structure, methodology, scope, and reporting limitations.

The second section illustrates the achievement of outcomes from the analysis of output indicators and the overall progress per Pillars. It also has sub-sections on milestones of 'quick-wins' and consolidated presentation of lagging outcomes and outputs.

Furthermore, the third section presents the results from the analysis of MoALI's budget execution against the ADS investment plan, highlighting funding sources and financing gaps. Also, it describes the notable trends of MoALI's capital budget allocation and overall absorption capacity. Section 4 reports the interface of the ADS and MS-NPAN and MoALI's contribution during the inception phase and progress in achieving the 24 key nutrition-sensitive agriculture interventions.

Finally, the report concludes with final section on challenges, the way forward and conclusion statement, outlining critical steps to operationalize the ADS effectively. Besides, the tables on output indicators achievement are annexed in the report.

1.5.3 Methodology and analysis

The report's information was collected from the contribution analyses and quarterly results-based monitoring and evaluation using participatory approaches that involve all Departments and Divisions in MoALI and complemented with the feedback from senior-level MoALI leadership. It is principally made up the consolidated information of output indicators and narrative of outcome progress.

On the other hand, the contribution analyses were mainly based on the actual capital expenditure of fiscal year 2018/19 with limited inclusion of the recurrent budget execution, primarily budget spent for strengthening human capital. The MoALI's Public Finance Management (PFM) contributed all relevant financial data, analyzed by ADSISU and its Technical Assistance (TA) team, and verified by the PFM EU-MoALI consultants.

Moreover, a series of discussions and validations to analyze and verify the output and outcome indicators were applied. The analysis was done in a participatory process with 13 MoALI Departments and Minister's Office, Department's M&E units, ADSISU, and the M&E Division, involved in articulating

relevant progress against verifiable ADS outputs and outcomes indicators, used for reporting.

1.5.4 Scope and limitations

In the absence of a fully functioning MoALI M&E system to collect ADS outputs and outcomes indicators, the way this first ADS annual report was developed is pragmatic in nature. Since the official endorsement of the ADS, the awareness of the ADS and familiarity with monitoring and reporting against the ADS output and outcome indicators was limited.

Therefore, the development of the ADS report is restricted only on the data and information provided by Union MoALI Departments and based on the initial design of the ADS M & E framework, for which indicators, baseline, and targets, often lacking, are not quantifiable, and not fully coherent.

Moreover, it is to be noted that this report covers the first year of the ADS implementation. Hence, ADS information and management systems to capture evidence on ADS progress are yet to be fully established at the Union, States, and Regions.

On the other hand, currently, there is limited fiscal space for the ADS, and there is no tracking system allowing reporting on ADS spending. The ADSISU initiated an ADS contribution analysis but the exercise is subject to different errors arising from a weak understanding of the link between MoALI budget lines and ADS outputs, reporting bias, calculation errors, and data editing and processing errors. Nevertheless, the first ADS report covers all the components of the ADS progress and provides very useful insight on the way to improve the ADS integration in MoALI systems.

SECTION – II

ADS PROGRESS PER PILLAR, OUTCOME AND OUTPUT

2.1 OVERVIEW

In this section, progress on quick wins and detailed progress against ADS outputs and outcomes, under each pillar are assessed. This report covers the first year of the ADS implementation (2018/19) and presents the achievement of outcomes based on the output level indicators. A summarized overview of progress per pillar is shown in subsections 2.5 and 2.7 including details of outcomes and outputs that are lagging.

The progress concerns the 24 outcomes and 105 ADS outputs implemented against 27 outcomes and 205 outputs planned respectively by 13 MoALI's Departments and the Minister's Office as responsible entities to implement the activities guided by the Investment Plan.

2.2 QUICK WINS

To gain broad support during the first year of ADS implementation, both within MoALI and across key stakeholders, some quick wins were identified as entry points to operationalize the ADS. The quick wins were designed to be achievable within first year of the ADS implementation. The progress is depicted in Table 1 below.

Table 1.Progress of ADS Quick Wins

PILLARS	QUICK WINS	STATUS	RESULTS (key achievements)
PILLAR 1 GOVERNANCE	NADSCC, NADSIC and ADSISU operational		The ADSISU was established and operational following the official order No. 12 and No. 62/2019 issued by Minister's Office, recognizing ADSISU staff under the Minister's office. Following the orders, seven staff were deployed to ADSISU, while the European Union (EU) deployed Technical Assistance (TA) to strengthen the capacity of ADSISU and improve ADSISU's staff competencies and skills. An official order on establishing the National ADS Implementation Committee (NADSIC) and Terms of Reference (ToR) was released, although, is yet to be operationalized. Also, the National ADS Coordination Committee (NADSCC) or similar body is yet to be organized.
	MoALI Policy and M&E Divisions established		An M&E Division under DOP, which included an Agriculture Policy Unit, was created. M&E unit for each MoALI Department were created and staffed.

PILLARS	QUICK WINS	STATUS	RESULTS (key achievements)
	MoALI DOC farmer organizations registration unit operational		MoALI, through Cooperative Department (CD), supported the establishment and registration of 77 new cooperatives, which led to a total disbursed amount of 621.6 billion kyats for increase services, products and trade. However, the farmer organizations registration unit is yet to be established.
	MoALI restructuring plan drafted with stakeholder participation		MoALI broader restructuring was delayed, however, the M&E units and APU were created and operational.
	National Land Use Council operational and Umbrella land law drafted with stakeholder participation		The National Land Use Council has been meetings regularly. During the reporting period the Agriculture Development Strategy Implementation Working Committee (ADSICWC) was established. The umbrella land law is yet to be drafted.
PILLAR 2 PRODUCTIVITY	National Agriculture Research Council established and Master Plan for Research finalized		Instead of organizing the National Research Council, the Technical Committee on Agriculture, Livestock and Natural Science was formed by MoALI which is under the National Science, Technology and Innovation Council established by the Ministry of Education. With support from Michigan State University (MSU) and International Food Policy Research Institute (IFPRI), an initial mission was deployed to develop the Agricultural Research Master Plan Road map.
	Action Research Fund established		An Action Research Fund is yet to be established.
	Law on Extension drafted with stakeholder participation		The Law on Extension is yet to be developed, as well as a national extension policy and strategy. However, funding was secured and preparatory activities are under way. Development of agricultural extension manual, curricula, training materials and e-extension and information system were being planned under the Strengthening of the Agricultural Extension in Myanmar (SAEM project).

PILLARS	QUICK WINS	STATUS	RESULTS (key achievements)
	Formulate, approve, and disseminate at least 2 GAP standards for important crops, (eg. Mango, and Corn)		GAP guidelines for each crop were developed. A National Laboratory for GAP was established leading to 3,017.72 acres and 243 farms of GAP certified farms according to the Myanmar GAP protocols that is consistent with the ASEAN GAP guidelines.
	Sold out and transfer assets from at least three agricultural mechanization stations		7,072 units of farm machinery were sold and handed over to farmers and 365 units through private sector collaboration.
PILLAR 3 COMPETITIVENESS	Financial and economic analysis of value chains engaged in the 7 priority commodities completed and value chain s with adequate resources for at least two prioritized value chains (eg. rice and pulses) established.		A tomato and pulses value chain studies were conducted.
	One agribusiness incubator established		MoALI started the process of establishing the agribusiness cell to facilitate the agribusiness incubator.
	Department of Agribusiness and Market Information established		Delayed
	At least 2 Geographical Indications (GI) approved		The IPR law has been promulgated but it will be effective after a year, which is necessary for registration of 2 GI for Mango and Paw-San Rice.
	Establish agricultural innovation competitions and award prizes to initial region/ state winners		Delayed

2.3 PILLAR I – GOVERNANCE

This subsection presents the progress of outcomes under Pillar 1, particularly the achievements of 7 outcomes from the 9 planned outcomes[18] for which referenced to the key strategies highlighted in the ADS. It also includes execution of 20[19] outputs of the implemented outcomes of which 13 outputs were achieved using the capital budget and 7 outputs executed using the recurrent budget.

The details on lagging outcomes 1.8 (improved food and nutrition security) and 1.9 (MoALI restructured to integrate existing units better and become more responsive to farmer's enterprises, and civil society) are explained in subsection 2.5. Meanwhile, the key challenges and recommended actions to speed up the lagging outputs for each outcome are elaborated below:

2.3.1 Progress of Outcome 1.1 on Planning

For MoALI to function effectively, the planning process must be performed efficiently and professionally [20]. The ADS laid out priority strategies for MoALI to perform this particular critical function. The emphasis is to establish a participatory planning process within the first two years of the ADS implementation. A planning process that will create an avenue to increase agriculture stakeholder's engagement and address issues on duplication of MoALI's Department activities, under investments of key sub-sectors and weak targeting to improve the current inadequate service delivery.

The ADS underlines the integration, alignment, and unifying of MoALI's Departments, States/ Regions plans with Union plan and vice versa, with established baselines and targets using harmonized methodologies and templates that can be periodically monitored and evaluated. MoALI is expected to develop a broader ADS planning coordination by creating Union, States, and Regions' Agricultural Planning Commission (APCs) that regularly reviews progress and achievements of results providing basis for decision making and policy change. Moreover, the use of a server or a cloud space is encouraged, including promoting an e-Government system to improve the platform to share information, knowledge, and stakeholders' access to MoALI's relevant policies, plans, and reports.

In 2018/19, of the six outputs planned[21], five were implemented. MoALI has been focusing on achieving the critical deliverables mentioned above. Particularly on the foundation to transform Ministry's planning process by integrating project work plans to MoALI's Department's annual work plan and budget (AWPB) (output 1.1.1). The assessment on the effectiveness of methodologies and the relevance of existing planning templates were pursued, as well as investment in improving office

18 Although the ADS IP indicated investment estimates for 11 outcomes.

19 Outputs 1.1.8 and 1.7.3 are counted as one as they are the same.

20 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

21 While ADS Investment Plan include budgets for 9 outputs.

facilities and staff working environment to facilitate the intended transformation process. At the sub-national level, the Village Development Planning (VDP) Project of the Department of Rural and Development (DRD) facilitated 10,450 village development planning exercises using participatory methodologies (Annex Table 1).

A review of MoALI's Department's result framework is on-going to align with the ADS and MS-NPAN, including improvement of baselines, targets, and making outputs and outcomes indicators verifiable and Specific, Measurable, Achievable, Relevant and Time-bound (SMART). The Department of Planning consolidates all Departments' monthly loans/grants projects and quarterly results-based reports that were submitted to the Project Appraisal and Progress Reporting Department and the Treasury Department of the Ministry of Planning, Finance, and Industry (MOPFI), as well as to the Foreign Economic Relations Department (FERD). In addition, during the reporting period, two units of Electronic Document Management System (EDMS) were procured to increase the Department of Fisheries monitoring activities (Annex Table 1).

On the other hand, the Minister Office already provided cloud space for each Department. Thus, MoALI has been working on updating the website to publish relevant policies, Department's profiles and activities, annual work plans, and budgets (AWPBs), M&E result frameworks, as well as quarterly/results-based yearly reports. At the same time, the e-Government system and Knowledge Center (KC) under the supervision of the Minister Office at Union level were established (output 1.1.6). The 18 Knowledge Centers were equipped with agricultural instruments and Audio-Visual Equipment (AVE). The KC is MoALI's recent initiative to create space for stakeholders to access agricultural information and technology (Annex Table 1).

Despite the positive achievements and the successful implementation of the village-level participatory planning processes, the outcome progress is still far from its targets. The outputs 1.1.2 (introduce participatory methodologies) and 1.1.3 (ensure integration of States and Regions and Union plans) on promoting an integrated, participatory, decentralized, bottom-up planning process, especially ensuring integration of States and Regions and Union plans have been delayed. Generally, the MoALI planning process is still centralized and has limited space for the stakeholders to participate and Departments discussions on priority actions based on evidence for better targeting, service delivery and addressing the imbalance allocation of investments. On this, MoALI has to immediately create a planning mechanism at all levels (Union, States, and Regions), either by establishing the APC and or other ADS planning, implementation, and coordination body as described in the ADS (output 1.1.5). Otherwise, ADS coordination mechanism can be integrated into the Terms of Reference (ToR) of the Agriculture, Livestock, and Rural Development Supervising Committee that MoALI planned to establish. The experience and methodologies from the village level planning process can also be capitalized in pursuing outputs 1.1.2 and 1.1.3.

Notwithstanding the significant progress of output 1.1.4 (monitor plan implementation regularly), the inclusion of monitoring under this outcome will be continued until the sound M&E system has been established as part of outcome 1.3 (achievements on monitoring and evaluation).

Finally, outputs 1.1.7 (make provisions for Minister level meetings with ASEAN countries and development partners) and 1.1.9 (make provisions for outfit and travel for international training and meeting), that are currently not articulated as ADS strategies under outcome 1.1 but rather under outcome 1.7 (on Coordination and Participation), shall be reviewed and harmonized in the ADS publication and in the Investment Plan.

2.3.2 Progress of Outcome 1.2 on Policy

Responding to the need to consolidate and harmonize the existing various policies, strategies, laws,

and regulations, the Department of Planning (DOP) established the Agricultural Policy Unit (APU). An initiative that is very timely to ensure achievement of ADS outcome 1.2 on improving MoALI's capacity on policy analysis and formulation. The ADS emphasises a focus on strengthening the ability of the APU to facilitate the formulation of new policies, review of ongoing policies, and to assess their implementation. The APU is expected to guarantee the consistencies of continuing policies, laws, and regulations with new policies and to facilitate commissioning policy studies, as needs arise that are important for decision making processes.

Considering that APU is new, the ADS emphasises on reinforcing the staff capacity to carry out their functions and mandates. Therefore, the ADS indicates the need for considerable technical assistance in policy analysis and formulation during the ADS's initial year.

In 2018/19, the Terms of Reference (ToR) for APU was outlined that focus mainly on conducting policy reviews/ studies/ research and formulation/ preparation of revised/new policies and regulations, as indicated in the ADS. The 11 policy officers performed efficiently and initially achieved the APU's milestones in preparing a policy brief on the critical role of a strong national agricultural research and extension system and organizing nine policy discussions or free talks on (i) Vacant, Fallow and Virgin Land Management Law (VFVLM); (ii) ADS and some lessons learned on evidence-based policy for agricultural development; (iii) ADS and participatory Irrigation Management (PIM); (iv) Myanmar agricultural research policy (draft version) as a basis for the development of a robust agricultural research system for the ADS and MS-NPAN; (v) MS-NPAN and ADS: from strategy to implementation; (vi) contract farming and standard operation procedure; (vii) Myanmar education policy; (viii) rural finance policy and (ix) private sector/s perspectives on agriculture and agro-based industries: policy operation and recommendation (Annex Table 2).

Two field surveys were conducted for ADS and MS-NPAN analysis in the Ayeyarwaddy Region and Shan State, while an initial gap analysis on loan projects was prepared. The revision of the existing Biosafety Framework and Law was conducted through workshops participated by the Government agencies and farmer associations. Also, research on pulses value chain was carried out under the Project on Agricultural Transformation and Market Integration in the Association of Southeast Asian Nations (ASEAN) Region (ATMI-ASEAN). This project aims to respond to the food security and inclusiveness in the region through the effort of the Centre for Economic and Social Development (CESD). Two policy round tables were organized that discussed the results of the pulses value chain study and the challenges and opportunities of Agri-food trade. Other policy research and studies on migration, irrigation, non-farm studies, and land tenure security and vegetable value chain were organized with support from Michigan State University (MSU) (Annex Table 2).

However, despite the progressive achievements of outcome 1.2 indicators, the expected results are not fully achieved. The APU and the staff capacities remain limited to perform their mandates adequately. Most of the policy officers are junior with limited knowledge and skills to conduct policy review/ analysis and formulate new policies. The reported APU's achievements were due to the substantial technical assistance from Food and Agriculture Organization (FAO), Michigan State University

(MSU), and partnership with ASEAN organizations. Therefore, the plan to strengthen APU's capacity shall be continued to increase APU's ability to perform its functions effectively, especially in facilitating policy reviews, analysis, and research to provide sensible recommendations for new policy formulation, especially those mentioned in the ADS.

2.3.3 Progress of Outcome 1.3 on Monitoring & Evaluation

Monitoring and Evaluation (M&E) are essential to define measures and evaluate performance as a critical condition for accountability and policy decision making. During the ADS development process, MoALI was able to establish an M&E unit under the Department of Planning (DOP). Thus, a similar mechanism was envisaged for other Departments at Union, States, and Regions to perform monitoring, analysis, and reporting of the agriculture sector outcomes and impacts, instead of just monitoring activities and reporting financial expenditures.

The ADS enunciates that the investment of a web-based Monitoring and Information System (MIS) is required from MoALI to operate an effective, efficient, and reliable M&E system during the ADS period. It also requires methodologies that consider periodic surveys and missions guided largely from the M&E framework that has SMART indicators, baselines, targets, means of verifications, and reporting [22]. On the other hand, to support evidence-based planning, transparency and access to information, an annual M&E reports are planned to be made available online, a function that can be embedded in the web-based MIS.

22 Outcome 1.3 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

During the reporting period, significant efforts were utilized to achieve the critical deliverables mentioned above. The Department of Planning facilitated the establishment of all Departments' M&E units with at least five dedicated staff for each unit that is functioning according to their Terms of Reference (TOR). Through close consultation, an M&E results framework and a basic guiding template for each Department have been developed. Also, a monthly two-day coordination meeting was regularly carried out, as a means to strengthen coordination across Departments' M&E units and the Agriculture Development Strategy Implementation Support Unit (ADSISU). Besides, an action of enhancing the M&E staff knowledge through sharing of learning and experiences in using the newly introduced M&E methodologies and templates was carried out, including the preparation of the quarterly Result-Based Report (RBR) (Annex Table 3).

The Strength, Weakness, Opportunities, and Threat (SWOT) analysis result conducted to understand MoALI Departments' current level of knowledge and skills on M&E was leveraged in designing and delivering two comprehensive M&E workshops and training. The subjects covered were on conducting annual outcome surveys, monitoring Overseas Development Assistance (ODA) loan projects, data analysis, and preparation of quarterly RBR.

On the other hand, meetings were conducted with the existing 18 ODA loan projects. It was agreed that a coordinated mechanism for project M&E will need to be established. Moreover, a review of the ADS M&E framework is currently being carried out. A process aimed at resolving existing issues of inconsistencies while improving the framework relevancy, feasibility, and technical applicability to guide a pragmatic ADS monitoring and evaluation that is harmonized with the Departments' result frameworks, MS-NPAN, and MSDP. Finally, the Department of Fisheries (DOF) invested in establishing a Vessel Monitoring System (VMS) to effectively monitor marine resources, particularly protecting native and threatened species from degradation (Annex Table 3).

Despite the advances mentioned above, the first year progress was marginal of the expected results. Only two outputs have been implemented from the four outputs with investment estimates and were planned to be achieved in 2018/19. The outputs 1.1.3 (conduct joint M&E missions including Government, Farmers, Private Sector and Development Partners) and 1.1.4 (DOP prepares overall ADS M&E reports and makes them available online) were not carried out. Therefore, implementation of these lagging outputs shall be prioritized during the second year of the ADS. These are essential elements of a results-based M&E system, particularly in obtaining feedback from stakeholders to complement the MoALI Departments' RBRs.

The review and adjustment of the ADS M&E framework shall be continued. Ensuring to resolve the existing inconsistencies of outputs and outcomes in ADS and Investment

Plan, define SMART indicators, and establish statistical baselines and targets to monitor progress (including agronomic, economic, social, and nutrition variables). Methodologies for data collection and frequency of data collection shall be designed, including establishing an evaluation system that guarantees the measurement of ADS higher-level impacts. The reporting of the ADS indicators shall highlight the contribution to MS-NPAN and MSDP national targets as defined in each of these higher policy results log-frames. It will be useful also to include Cost-Benefit or Rates of Return analyses for ODA loan projects and contribution to the achievement of ADS impact to provide decision-makers with essential criteria to decide future ODA loans and investments.

Currently, MoALI is utilizing evidence from monitoring for management, planning, and decision making. Therefore, it is critical that the RBR and ADS report be widely circulated, available, and easily accessible to decision-makers and stakeholders. Hence, the Management Information System (MIS) shall be established and operational at Union and, if possible, to extend to States and Regions, along with the formation of the M&E unit in States and Regions as pre-condition in rolling out a nationwide M&E system.

Finally, for the ADS M&E framework to effectively and efficiently operate, the mandate and ToR for each of the Departments, particularly the M&E Division under DOP and ADSISU shall be streamlined. The responsibility of the M&E Division and ADSISU shall be harmonized in terms of data collection, analyses, data storage, and management, as well as how the data will be used to provide recommendations for ADS.

2.3.4 Progress of Outcome 1.4 on Statistics

The lack of quality data hinders the development of a sound statistics system. The ADS emphasizes developing an improved statistics system that not only collects and reports structural information on agriculture but also agro-economic variables such as prices and margins at different stages of the value chain [23]. Modern technologies such as remote sensing and communication-based systems were recommended to improve efficiency in data collection, analysis, and management.

One crucial strategy suggested in the ADS is for MoALI to organize a comprehensive agriculture census that will include livestock, fisheries, and detailed information on land use and tenure. The census will be complemented with periodic surveys conducted mainly to gather evidence on emerging issues that require new policies.

In 2018/19, out of the three planned outputs under outcome 1.4, two outputs (1.4.1 [conduct agricultural, livestock and fisheries census] and 1.4.2 [improve current system of collection on agricultural statistics using ICT and remote sensing]) have had positive progress. Although, results of output 1.4.1 were limited only on the preparation for the next planned agriculture census using Information Communication and Technology (ICT) and a workshop on building master frame with the integration of Geographic Information system (GIS/Satellite imagery (Annex Table 4).

In addition, other workshops such as the use of Electronic Document Management system (EDMS) software and Government Personnel Management System (GPMS) were conducted as part of MoALI's readiness efforts to improve the agricultural statistics data collection system using ICT (output 1.4.2). On the other hand, the MoALI such as the information through the Agri-business Journal, the Farmer

23 Outcome 1.4 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

Journal, and Market Information Service (MIS) unit had established a Facebook page that published market information and data, in addition to circulating market information through the Agribusiness Journal, the Farmer Journal, and Agriculture Market Information Agency (AMIA).

Moreover, the Livestock Baseline Survey report was published with statistical data for informed decision making for livestock subsector growth. This report complemented the earlier publications, including the Statistics Yearbook by the Central Statistics Office (CSO) and the Agriculture at a Glance and in Brief published by MoALI's Department of Planning.

Moreover, the annual coordination workshop of market data collectors from 16 key markets in the country was carried out that discusses strategies and plans to improve the Market Information Services (MIS).

The positive progress described above clearly demonstrates that the agriculture statistical system is improving in a direction foresees in the ADS. These advances shall be capitalized to achieve the outcome in the remaining ADS period. At present, the use of a paper-based documentation system in the Department of Agricultural Land Management System (DALMS) and other Departments remains a significant challenge. Investments to adapt and roll-out ICTs for statistical data collection and reporting shall be a priority. Achieving outcome 1.4 is under the primary responsibility of DALMS; therefore, DALMS shall mobilize resources and build a close partnership with competent technical agencies (e.g., UNFAO, UNESCAP, UNFPA, UNHABITAT, etc.). The focus of the cooperation shall be on increasing the capacities of MoALI to operationalize an improved agricultural statistical system for all MoALI's Department and at all levels (Union, States, and Regions).

The agriculture census planned for 2020 has to be integrated with livestock, fisheries, land use, and land tenure. It has to adopt the concepts, definitions, and operational guidelines of the World for the Census of Agriculture 2020, a blueprint for conducting a census, particularly on using ICTs to carry out an agricultural census efficiently. The agriculture census shall also provide sampling frames for the follow-up agricultural periodic surveys indicated in the ADS (output 1.4.3).

2.3.5 Progress of Outcome 1.5 on Associations and Groups

One critical milestone anticipated in the ADS is the strong participation of farmer organizations during the ADS implementation. The ADS foresees implementing actions focusing on the bottom-up formation of farmer organizations and the provision of capacity building, as well as promoting the comparative advantage of farmer's agricultural products [24].

Also, the ADS indicates the plan to establish a new unit of Farmer Organizations Affairs (FOAU) under the Department of Cooperative (CD). The unit's primary function is to support farmer organizations registration and facilitate capacity building through closer collaboration between farmer organization and MoALI's technical Divisions on extension, rural development, and other Divisions that are primarily providing services to farmers.

During the first year of the ADS implementation (fiscal year 2018/19), two outputs (1.5.2 (provide capacity building for effective management of farmer organization) and 1.5.3 (conduct annual meetings with farmer organizations) from the five planned outputs [25] were implemented. The capital

24 Outcome 1.5 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

25 Although indicated in the IP are 6 outputs with budget estimates.

budget complemented with funds from the recurrent was capitalized to achieve planned targets. Generally, the progress is on increasing the capacities of farmers' cooperative societies through the provision of around 98 training, 7 field days, and three forums for the effective management of farmer organizations. These training, field days, and forums were participated by 26,565 members of the cooperative societies, board members, farmers, and the 2,821 States and Regions technical officers of MoALI. Besides, training facilities and working environments for facilitators were up-graded for

quality capacity strengthening activities delivery (Annex Table 5).

On the other hand, an annual meeting was conducted under output 1.5.3 on harmonizing the sugarcane production and sugar market that was attended by 39 farmers, two cooperative representatives, 54 committee members, 51 from the private sector, 121 MoALI Staff, and 34 from other institutions.

Finally, MoALI supported the establishment and registration of 77 new cooperatives, which led to a total disbursed amount of 621.6 billion kyats to support cooperative societies to increase product volume, services and trading. Moreover, 11.2 billion kyats worth of agricultural inputs has been distributed to Agriculture Supply Services Cooperative Society (ASSCS) members through a hire-purchasing system. These included 51,137 bags and 243,754 bottles of pesticides, and 297,212 bags of fertilizer, which were distributed using the same system mentioned above (Annex Table 5).

However, the progress described above still fractional of the envisaged improvements of farmer's participation in the formulation of the agriculture sector policies, plans, legislation, monitoring, and evaluation. The current state of farmer associations remains nascent and un-organized. Strengthening the capacities of cooperatives and farmer associations are essential for the ADS to operate effectively. Besides, these farmer associations/federations/cooperatives are vehicles in advancing rural development particularly that their role in the agriculture sector is emerging and is gaining momentum. Additionally, the private sector is supporting farmers' progressive role towards the long-term and sustainable development of the value chain and the overall agri-food system. Therefore, the current strengthening initiatives of farmer associations/ federations/ cooperatives capacities shall be

continued. But, the delivery of supports shall be strategic to leverage farmer's role for the successful and sustainable development of the agri-food system.

The farmer associations/ federations/ cooperatives registration shall be pursued with the establishment of the FOAU (output 1.5.5), to facilitate the process as planned under the ADS. This unit is seen providing services during the second year of the ADS, to speed up achievements of the lagging output 1.5.4 (conduct annual meetings with industry associations). Also, to create a link with Union of Myanmar Federation of Chamber of Commerce and Industry (UMFCCI) and Ministry of Commerce to mitigate the risk of possible overlapping service provision. Moreover, to safeguard achievement of outcome 1.5, collaboration with four farmer and agriculture committees at the parliaments shall be formed. These committees are the Agriculture Livestock and Fishery Development Committee (Amyotha Hluttaw), the Farmer Affair Committee (Amyotha Hluttaw), Farmer Affair committee (Pyithu Hluttaw), and an Affair Committee for Agriculture, Livestock & Rural Development (Pyithu Hluttaw).

Finally, implementation of actions under outcome 1.5 shall be carefully carried out and, if possible in an integrated manner with strong linkage of interventions under Pillar 3, especially under outcomes 3.3 (on quality system), 3.6 (on agro-enterprise development) and 3.8 (on financial services), mainly to improve financial access, incentivizing farmer services and increasing farmer competitiveness.

2.3.6 Progress of Outcome 1.6 on Land Rights

In Myanmar, it's been over five decades that poor land governance confronted the massive caseload of land confiscations, land allocation, and land re-distribution[26]. Only recently, with determination, the Government started finding solutions to reduce the growing landlessness and increasing risk of land conflicts that undermine rural development. The ADS realizes that efforts to address challenges surrounding land rights are difficult to achieve within the ADS timeframe. Although a few reasonable interventions can be implemented, for which specific results could be a foundation for long-term sustainable solutions. These actions are intended to safeguard Myanmar people's land rights, especially smallholder farmers, people living in poverty, and the most vulnerable individuals that they will not be left behind for the country's overall development.

One specific strategy offered by the ADS is the strengthening of the capacities of the institutions involved in agricultural land management and administration services. These institutions shall actively participate in the land reform process through the National Land Use Council and the upkeep of cadastral information, register land titles, document customary land rights, and other functions to support the efficient and improve service delivery. Facilitating the formulation of the umbrella land law in an inclusive and participatory manner and removing restrictions by increasing land use categories and classification systems will allow smallholders to secure land tenure and use of the holding. These are essential actions that can be implemented along with the enforcement of the Vacant Fallow and Virgin Land Management Law (VFVLM), which requires a large scale of land inventories

26 Outcome 1.6 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

and updating cadastral information of landholdings. The ADS also underscores the importance of establishing a platform for easy public access to information; conduct agro-ecological zoning while developing a clear legal and institutional framework to address land conflicts.

The progress in 2018/19 demonstrated that some of the deliverables mentioned above were partially achieved. The land management and administration services have successfully conducted land surveys and inventories, updated the cadastral information, produced 5,034 digital "kwin" maps for 83,591 land holdings, issued land tenure rights, and registered land titles (Annex Table 6).

Also, the strengthening of the land management and administration services at Union, States, Regions, Districts, and Townships was achieved that enables in providing better guidance to farmers in processing land titling. During the reporting period, the land management and administration services technical officers received capacity strengthening on improving skills and knowledge in using technologies. These training were focused on using Android-Based Survey Solution (ABSS), Geographic Information System (GIS), Remote Sensing and Database, Unmanned Aerial Vehicle (UAV), Aerial Imaging for Surveying, Mapping, and Satellite Photogrammetry. These are recent technologies used to facilitate efficient land surveying and inventories as well as land title recording (Annex Table 6).

Moreover, The institutionalized Central Land Records Development Training Center (CLRDTC) was able to roll-out training courses, workshops, and on-the-job training not only for the technical staff of the land management and administration services but also with the members of the District and Townships land management committees and the General Administration Department (GAD). The objective is to principally upgrade the capacities of the land management and administration services, to satisfactorily respond to clients (mostly farmers) support needs during land titling and handling land conflicts.

However, the achievements mentioned above are partial. Out of the 16 outputs planned to be achieved in 2018/19, only two outputs were budgeted and implemented. The 14 outputs that were considered

priorities to build a solid foundation for a long-term sustainable solution on land rights issues were not carried out. These strategies are crucial and have to be executed immediately; otherwise, the achievement of ADS outcomes and impacts is at risk of jeopardizing.

Therefore, it is vital for ADSISU to immediately facilitate discussion with DALMS for planning pragmatic approaches to achieve the targets. Given the complexity of the issue, careful analysis of packages of actions and investments shall be prioritized. The up-coming support from the European Union under the Nutrition Support Reform Contract (NSRC) shall be used to speed up the implementation of activities. A particular focus is advancing outputs 1.6.3 (removing restriction for small landholders securing land titles) and 1.6.5 (enforcement of VFVLM law) but also building the progress of 1.6.6 (update existing cadastral information of landholding) by integrating 1.6.14 (develop agro-ecological zoning for the country based on the principle of Global Agro-ecological Zones).

On the other hand, to facilitate the achievement of outputs 1.6.1 (participate in a national land use council or equivalent to take forward the land reform process), 1.6.2 (participate in developing the umbrella land la), and 1.6.9 (strengthening the capacity of land administration services), by capitalizing learning from the remarkable work done by the civil societies, LANDESA and other development partners. Moreover, a programme shall be developed to mobilize resources to advance the implementation of other lagging outputs, including output 1.6.11 (ensure that the public has easy access to information).

2.3.7 Progress of Outcome 1.7 on Coordination and Participation

The ADS was designed to be comprehensive to achieve the vision of an inclusive, competitive, food and nutrition secure, climate change resilient, and sustainable agricultural system, contributing to the

socio-economic wellbeing of farmers and rural people and the further development of the national economy. With this, it requires the engagement of diverse stakeholders in the agriculture, nutrition, and rural development sectors in Union, States, and Regions.

The ADS emphasizes that it is vital to establish a functional ADS implementation unit to make sure that essential implementation and coordination mechanisms are in place and functioning to

operationalize the ADS fully [27]. Therefore, it was foreseen the need for Technical Assistance (TA) at the early stages of the ADSISU operation, to prepare ADSISU to leverage their strategic role in ADS coordination, planning, policy formulation, legal advisory, resource mobilization, monitoring, and evaluation.

The ADS also anticipates that MoALI would create a platform for periodic dialoguing with civil society, private sector, and farmers at Union, States, and Regions, underpinning ADS implementation. At the same time, to closely coordinate with the Agriculture and Rural Development Sector Coordination Group (ARDSCG) and build cooperation with international donors to ensure that s/projects ma inly funded and implemented through loans or grant assistance are aligned with the ADS. Besides,

working with various stakeholders is vital to mobilize resources to implement priority interventions of the ADS, especially the implementation of "quick wins."

Moreover, the ADS website that uploads periodic ADS M&E reports shall be established as an additional platform of the planned ADS information desk that will be created under the Department of Planning at Union, States, and Regions.

During the first year of the ADS implementation (fiscal year 2018/19), outputs 1.7.1 (establish coordination unit), 1.7.2 (provide TA to the coordination unit), and 1.7.3 (provisions for cooperation with international partners) were achieved. Despite the six months delay in establishing the ADSISU, the unit is now operational to carry out its core functions related to ADS. It has a growing commitment of rolling out the planned ADS decentralization to States and Regions in close coordination with the MoALI's Departments, especially the Department of Planning, and the States and Regions Government units. In fact, the exposure of ADSISU during the development of the European Union (EU) Budget Support (BS) and the involvement of ADSISU in formulating projects for ODA exposed ADSISU on the areas of project formulation, policy dialogue and resource mobilization, which are critical areas of the project cycle management (Annex Table 7).

As envisaged in the ADS, the Technical Assistance (TA) was deployed to strengthen the capacity of ADSISU. Substantial effort and technical support were provided to empower ADSISU and to enhance the institutional capacity as well as to ensure adequate uptake of knowledge, skills, and abilities (KSAs) with the organizational culture of leadership that build trust and encourage staff members to innovate

27 Outcome 1.7 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

and engage. As a result, during the reporting period, ADSISU able to undertake the development of a mechanism to conduct a pragmatic contribution analysis as an initial step to prepare the first ADS progress report in close coordination with 13 MoALI's Department and Minister's Office. In this regard, ADSISU staff started gaining skills and knowledge to operate the office, and development partners are beginning to recognize the relevance of ADSISU to influence support to implement the ADS.

On the other hand, MoALI was performing well in coordinating and negotiating investments for the agriculture sector. During the reporting period, MoALI signed 3 ASEAN level Memorandum of Understanding (MoUs) and a protocol to amend the ASEAN plus Three Emergency Rice Reserve (APTERR). Also, MoALI organized the 3rd Agriculture Rural Development Coordinating Group (ARDSCG) and hosted the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Agriculture Ministers meetings. The regular National Project Steering Committee (NPSC) meetings for international loans and grants were conducted, particularly for the FARM project (Annex Table 7).

The negotiations with the EU providing 112 million Euro budget support to implement ADS nutrition-related outcomes as a contribution to the MS-NPAN was finalized. The Climate-Friendly Agribusiness Value Chain (CFAVC) Sector Project was also approved, for which the implementation started during the fourth quarter of fiscal year 2018/19. While, in the pipeline, is the 5th Japan-Myanmar Cooperation and the World Bank loan project in relation to building the national food and agriculture system.

Nevertheless, the positive progress above is still an initial achievement of the intended outcome. Considering the current advancement of the ADS implementation, critical learning, and challenges, the effectiveness of ADSISU has to be improved. The current uncertainties on accountability and overlapping Terms of References (ToRs), mainly with Divisions or Units under DOP, undermine the full operation of ADSISU. Also, organizational strengthening and improving staff competencies have to be continued for ADSISU to ably facilitate the decentralization of the ADS to States and Regions and to establish the ADS implementation and coordination mechanisms.

The engagement of different stakeholders to implement the ADS has to be formalized. Therefore, the NADSIC shall be operationalised immediately to guide ADSISU in creating a pragmatic coordination mechanism such as the National Agriculture Development Strategy Coordination Committee (NADSCC) or similar coordination bodies at different levels of operations. The principal to the success of the ADS operation is a strong commitment from various stakeholders. Therefore, the delay of establishing the coordination mechanism at Union, States, and Regions implies the non-achievement

of the ADS vision.

Moreover, DOP and or ADSISU has to facilitate implementing the outputs 1.7.4 (establish and maintain an ADS website), 1.7.5 (establish an ADS information desks), and 1.7.6 (periodic uploading of ADS M&E Reports), which are essential for an effective, efficient, and sustainable ADS operation.

2.4 PILLAR 2 – PRODUCTIVITY

This subsection presents the progress of the 9 outcomes planned and implemented under Pillar 2, that are referenced to the critical strategies highlighted in the ADS. It includes the achievements of 62 outputs, for which 47 outputs were implemented using the capital budget and 15 outputs implemented using recurrent budget.

The key challenges and recommended actions to speed the progress of the lagging outputs per outcome were also elaborated below.

2.4.1 Progress of Outcome 2.1 on Research

Agriculture research will continue to play a vital role in enhancing productivity. The ADS underscores that one measure to raise agricultural productivity requires effective agricultural research of which the process has to be changed from the current top-down to be more responsive to farmers, market demands, and agro-ecological opportunities [28]. The research efforts shall be coordinated and managed effectively with the specific institutional house. On this, the ADS highlight the importance of continuing the Department of Research (DAR) initiated action to establish a harmonized National Agricultural Research Systems (NARS) with the National Agricultural Research Council (NARC) that will guide the various research efforts. The NARS and NARC are foreseen remedies to address the existing challenges of research fragmentation. In addition, an integrated Research Master Plan is essential to enumerate research priorities from significant agricultural subsectors and various research institutions. The plan shall consider not only basic and applied researches but also action research on crops, livestock, and fisheries that promotes engagement of the private sector and farming community–based organizations (CBOs).

Besides, the ADS envisage that the current limited research focus on natural sciences will be complemented with socioeconomic research on agricultural development. An agricultural research human resources development plan to ensure delivery of capacity strengthening is anticipated. Also, it is expected to form partnerships with international research centers (e.g., Consultative Group on International Agricultural Research

28 Outcome 2.1 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

(CGIAR) and the establishment of an action research fund to facilitate the significant transformation process on research development and implementation.

To strengthen a closer link between research and extension, the ADS underline the institutionalization of a National Agricultural Research and Extension System (NARES). The NARES is expected to produce joint farmer-friendly manuals on applications of farming technologies, promotion of improved and agricultural good practices that are founded from biological/physical/applied, and action researches. The organizing of joint training exercises, farm demonstrations, and research-extension meetings are expected to be entrenched that will eventually promote coherent and collective research and extension action approaches and methodologies.

During the reporting period, the advancement of the outcome deliverables mentioned above is progressive. Four MoALI Departments (i.e., DAR, YAU, DOF, and DOA) reported positive progress in carrying out several biological, chemical, physical, socio-economic, and post-harvest types of research. The fish disease laboratory and Freshwater Aquaculture Research and Extension Center (FAREC) were established and carried out 15 successful fisheries applied biological, chemical, and physical researches. The 41 crops and other products applied biological, chemical, and physical analyses, as well as three soil sciences types of research and 20 research and development studies, were also conducted. There were 15 agricultural economics and three types of research on marketing, including gender roles in agriculture. The 23 research on post-harvest technologies to improve maize, chickpea, hybrid rice, green gram, mango, rice, and tomato were carried out. These researches were conducted with great efforts from DAR, DOA, DOF, and YAU (Annex Table 8).

On the other hand, capital expenditures were incurred for engineering, an extension of laboratories for drying fruits and spices, and procurement of machinery and equipment for processing, coffee pulping, and roasting and planter for sugarcane. Twenty four new research infrastructures were built, 32 farm facilities and 2 Histopathology laboratories, and a Molecular laboratory were improved. The existing research facilities were furnished with 139 new laboratory equipment, and farm machinery and surveys were conducted to assess the current condition of the Zalot and Aungban research farms for future upgrading purposes.

Nevertheless, research dissemination systems were established that include continuous broadcasting of research findings and information on Good Agricultural Practices (GAP), improved agricultural technologies, suitable machinery, and equipment for Myanmar farming activities at the farmer channel. About 12,973.97 acres of demonstration plots were established for various crops, including demonstrations on rice cultivation (sowing system, cropping pattern, and System of Rice Intensification (SRI) experiments), high yielding native and hybrid mulberry, and silkworm germplasm. Ninety-one farmer field days attended by 5,278 people on research results on improved production practices and technologies on sugar cane, cotton, jute, kenaf and mulberry, mushrooms, coffee, and seasonal crops were organized. Three structured meetings to promote sericulture research and development, 13 workshops on maize and other cereal crops (i.e., rice, wheat) variety protection, post-harvest, plant protection were conducted, including an annual DAR - DOA joint research findings presentations. All research dissemination initiatives were targeted for farmers, community-based organizations (CBOs), privates sector, and various research organizations to uptake new information and technologies. Finally, the Private-Public Post-harvest conference on onion was facilitated to further stimulates Public-Private Partnership (PPP), a journal and a compilation book of various research findings, results, and learning was published and distributed (Annex Table 8).

Other milestones achieved were on strengthening the institution and human resources of the agricultural research services. All agriculture field extension officers and 156 Doctor of Veterinary Medicine (DVM) students received knowledge and skills strengthening on research and extension services and GAP/GAHP. At the same time, 44 MoALI technical officers participated in the production and distribution of animal feeds and domestic market development research training. Additionally, three hundred participants under the Agriculture Development Support Project (ADSP) attended six of the capacity strengthening, including 45 training sessions on maize and other cereal crops (i.e., wheat, rice), pulses, and horticulture, agricultural economics, plant variety protection, computer skills, post-harvest, and rice Bio Park (Annex Table 8).

MoALI researchers, laboratory technicians, and technical officers were also participated in international training courses and fellowships on the early detection of Foot and Mouth Disease (FMD), research laboratory management, and operation, as well as developing animal feeding strategies for enhanced food security. Moreover, the Young Scientist Initiative (YSI) was established by DOA to increase agricultural researchers' numbers. The YSI presents monthly scientific papers on recent research efforts and their results (Annex Table 8).

Furthermore, MoALI is closely collaborating with Michigan State University (MSU) in preparing an agricultural research master plan and the road map to achieve output 2.1.16 (establish the National Agricultural Research and Extension System (NARES). Besides, the University of Veterinary Science (UVS) signed MOUs that cemented partnerships with Japanese Universities and Society for the Protection of Animals Abroad (SPANA) for various research works. Also, UVS is exploring

research collaborations with the Australian Center for International Agricultural Research (ACIAR), Commonwealth Scientific and Industrial Research Organisation (CSIRO), and Australian Universities.

Additionally, the Yezin Agricultural University (YAU) signed MoUs and commenced partnerships with Wagening University and Research, Jiangsu Academy of Agricultural Science, Graduate School of Chinese Academy of Agricultural Sciences (GSCAAS), Cologne University Applied Sciences, Chengdu Institute of Biology Chinese Academy of Science (CIB, CAS), Nakamura Gakeun University and Nakumara Gakeun Junior College and Sungkyunkwan University for joint research, workshops and staff exchange. On the other hand, YAU has on-going research partnerships with Kyushu University, MSU, Yunnan Agricultural University, Karlsruhe Institute of Technology (KIT), Kyoto University, and Seoul National University, as well as the Embassy of the Netherlands. Besides, YAU is undergoing several discussions for possible research collaboration with the French Agricultural Research Center for International Development (CIRAD), University of Helsinki, Bern University (HAFL), GRET professionals for fair development, Chonnam National University, Chiba University and Maejo University.

As mentioned above, the overall progress of outcome 2.1 is positive. Of the 19 outputs planned, 11 outputs were implemented. However, eight outputs with investment estimates and expected implementation in 2018/19 were not budgeted. The delay in achieving these outputs presented a risk in meeting the outcome targets. Nevertheless, the on-going efforts in establishing NARC (output 2.1.1) and NARES (output 2.1.16) shall be pursued. These actions are considered critical in addressing the current research fragmentation and in harmonizing the role of the researchers, extension officers, educators, and other research-related service providers. Besides, the NARC and NARES will help set research agendas, approaches, and innovation systems closely linked to extension services that address the farming communities and private sector needs. Also, the conducive environment to allow the transformation and changes to happen, including establishing an incentive system based on the performance assessment (output 2.1.13), shall be executed.

Experience from other countries has shown that agricultural research and development efforts generate high rates of return on investment. Although fixing the current underfunding and fragmentation issues in research requires additional resources, as it is evolutionary, therefore, it requires a long-term commitment. Moreover, MoALI has to investigate the underlying factors on the non-achievement of the lagging outputs and decide if these outputs shall be continued or considered to be dropped. An option is to simplify the outputs that are similar and making them achievable. A critical consideration is its relevancy and the likelihood of achieving the outputs within the ADS timeframe.

2.4.2 Progress of Outcome 2.2 on Extension

Delivery of effective and efficient extension services is crucial to improve agricultural productivity and farmer's competitiveness. The promotion and dissemination of improved farming technologies and practices are essential for the sustainable adoption of a value-added agricultural system.

The ADS highlights addressing the current issues of underfunding, inadequate extension approaches, and weak research and extension linkages. Diversifying extension services driven by ICTs to increase farmer's access to subject matter specialists (SBS) were underscored. An innovative solution for a

bottom-up, farmers focused, and problem-solving extension services such as the use of a voucher system for farmers to select the extension and advisory services of their choice were envisaged to be piloted and eventually rolled-out nationally once proven effective. On the other hand, the current limited skills, knowledge, and abilities of extension officers to handle the planned transformation process were emphasized in the ADS.

With the privatization of industrial crops, the extension for these commodities had been partially transferred to the private sector [29]. Therefore, this calls for more effective partnerships, including the emerging role of the Non-Government Organizations (NGOs) to harmonise extension service provision. Also, foreseen in the ADS is the formulation of an extension policy that captures the vision to transform the agricultural extension services and systems in Myanmar.

In 2018/19, outcome progress was limited on milestones achieved under outputs 2.2.4 (strengthening the agriculture, livestock, and fisheries extensions services institutions and staff capacities), 2.2.5 (carrying out extensions services at the village level), 2.2.8 (strengthening farmer organizations), and 2.2.12 (disseminating farmer-friendly technical documents). Also, notable progress was on outputs 2.2.1 (review and formulation of the national extension policy), 2.2.3 (identifying extension priorities and developing village extension plan), 2.2.10 (establishing information and knowledge system) and 2.2.13 (promote ICT to link subject matter specialist, extension workers with farmers interactively) (Annex Table 9).

Specifically, the extension priority needs assessment was conducted in targeted States and Regions. The village extension plans were formulated, and the agri-extension services were provided in 250 villages of the 89 village tracts. The staff training needs assessment was facilitated as a basis for developing a training plan for the Department of Agriculture (DOA) technical and extension officers. A total of

29 Outcome 2.2 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

340 types of training were conducted to approximately 23,092 DOA extension and technical officers. Eighty-two different livestock extension and human resource development training, including the Continuous Professional Development (CPD) were provided to 2,946 veterinary technical officers, veterinarians, UVS staff, and students. Also, 1,346 fisheries and aquaculture extension and technical officers were trained on 55 various fisheries and aquaculture training (Annex Table 9).

On the other hand, funding was mobilized to buy and distribute transportation facilities (i.e., motorcycle, motorboats, and cars), equipment (e.g., PH meter and moisture meter, digital balance, gasifier, GPS, water coolers, voyeurs, etc.) and machinery (e.g., paddy milling, drying facilities, ice maker, generator, etc.). The extensions services also received new units of office amenities (e.g., computers, printers, furniture, etc.) and ICT facilities (e.g., multimedia, camera, televisions, projectors, etc.). At the same time, the UVS launched a well-equipped mobile animal clinic that is providing extension services to livestock communities. The information and knowledge system was established, for which 63 centers are operational, and the server for DOF knowledge management was installed. Besides, the Freshwater Aquaculture Research and Extension Center (FAREC) was constructed, and 579,108 pamphlets, manuals, and handbooks of various subject matters were produced and distributed to farmers. Moreover, the DOA provided 6 types of grants to 9 villages as part of the livelihood capacity building (Annex Table 9).

With the investments mentioned above, 3,221 extension activities on improved/GAP technologies and research-based knowledge on crops (e.g., mulberry cultivation, silk-worm breeding techniques, mushroom cultivation, coffee seasonal crops, and jute production) were organized. Fifteen field demonstrations on rubber and compost making were conducted, as well as the 18 rubber field training and lecture attended by 432 farmers were facilitated. Forty-four percent of intensive coaching and training of seed producers were delivered, and 41% of local seed business formations were achieved. Other capacity-building opportunities provided to 218 existing and new farmer organizations were the food safety and hygiene Training of Trainers (TOT), machine, and waste cleaning training (Annex Table 9).

Nonetheless, 198 seed grower associations from 13 States and Regions were organized and registered under the Union of Myanmar Federation of Chambers of Commerce (UMFCCI) and 60% of the regional seed growers' associations established in Nay Pyi Taw, Mandalay, Sagaing, and Bago Regions.

The progress reported above showed that of the 16 outputs planned for 2018/19, only 8 have achievements. The other 8 outputs were not budgeted, therefore not implemented. These outputs are 2.2.2 (develop, document and regularly update extension procedures), 2.2.6 (strengthening the capacity of extension staff on participatory methods, Farmer Field Schools (FFS) and Farmer Marketing Schools (FMS), 2.2.7 (increase number and capacity of subject matter specialists), 2.2.9 (involvement of farmers and farmer's organizations in the formulation of annual work plan), 2.2.11 (facilitating direct contact with SBS), 2.2.14 (pilot voucher system for extension and advisory services), 2.2.15 (introduce FMS and 2.2.16 (gender, social inclusion and nutrition sensitization with MoALI field personnel). On the other hand, several targets of the 8 implemented outputs were also not met, such as the review of the extension system, formulation, and enactment of the national extension policy, publication of information and provision of significant communication facilities to effectively facilitate farmer's access to information and knowledge system.

Considering that these outputs and targets were delayed, the planned transformation process for extension services was inadequate. A review of these outputs and targets is required to decide approaches to accelerate achievements, mainly on strategic measures to address the issues confronting the current less effective extension services. The priority is to focus on strategic outputs to resolve underfunding issues, inadequate extension approaches, and weak research and extension linkages.

Nevertheless, the 8 outputs that have positive progress shall be continued. Fundamental is the review of the extension system, the formulation, and enactment of the national extension policy (output 2.2.1), as it is crucial in the institutionalization of a demand-driven, holistic and integrated extension system that allows farmers, private sector, and NGOs strong engagement. The use of a voucher system for farmers to select the extension and advisory services (output 2.2.14) has to be piloted, in order to start the process of a bottom-up and farmers focused extension services.

2.4.3 Progress of Outcome 2.3 on Education

Like research, the agriculture education system is also underfunded and fragmented [30]. Improving human capital in the agriculture sector is one of the crucial considerations highlighted in the ADS. Therefore, approaches were laid out to strengthen the agriculture education system through consolidating the universities and colleges into one integrated institution that will offer upgraded sectorial disciplines that respond to the evolving needs of farmers, markets, and private sectors.

Also, the ADS envisages that the higher agricultural education system would be complemented with the upgraded State Agricultural Institutes (SAI) 3 years diploma curriculum, as well as the revival of the high school level training and other vocational training.

In 2018/19, the achievement of the agriculture education outcome is minimal. Of the 3 outputs planned for implementation, only output 2.3.2 (sectorial disciplines in Yezin and other universities established/ upgraded) has been implemented fractionally. The most relevant progress was the discussion between the University of Veterinary Science (UVS) with Massey University (New Zealand) to upgrade the curriculum of the Bachelor of Animal Science (B.S A. Sc.). Also, Livestock Studies Association (LSA) and Clinical Studies Association (CSA) were organized, to promote learning by doing through field exposures to UVS students. On this, field exposures on livestock production and animal health were conducted for 52 (36 male and 16 female) Bachelor of Science (B.S. A. Sc) students and 156 Master of Veterinary Medicine (MVM) students (70 female and 86 male). Besides, 100 undergraduate students from UVS attended lectures on animal clinics by experts from the Society for the Protection of Animals Abroad (SPANA), and post-graduate students joined the continuous professional development training also conducted by SPANA (Annex Table 10).

In addition, the Yezin Agricultural University (YAU) facilitated 37 training courses for the dissemination of modern agricultural technologies to students in collaboration with the

30 Outcome 2.3 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

Department of Agriculture (DOA), JICA-TCP, Agricultural Mechanization Department, and Private Sector organizations. About 2,362 students were enrolled in the Yezin Agriculture University (YAU), taking up various sectorial disciplines during the academic year 2018/19. Besides, 5 Cooperative Universities and Colleges learning facilities and its environments were upgraded and 30 agriculture training centers in State and Regions were improved for an effective training service delivery.

On the other hand, the capacity strengthening of universities and colleges faculty and teaching staff were carried out. One hundred thirty-six YAU and UVS faculty and teaching staff received training on laboratory enhancement operations, application of polymerase chain reaction (PCR), and research ethics. Also, 545 Cooperative Department staff officers at Union, States, and Regions attended the different capacity building opportunities to improve service delivery for rural cooperatives.

The outputs 2.3.1 (upgrading the Yezin Agriculture University into one consolidated university) and 2.3.3 (three-year diploma curriculum of SAI in all States and Regions is upgraded to provide training

on all key sectorial disciplines) are lagging. In this regard, a task force shall be formed to formulate concept notes and develop methodologies as well as to facilitate consultations and discussions. This way, it will accelerate the achievement of results during the remaining ADS period. On the other hand, the task force has to work closely with a champion to facilitate close coordination with National Education Policy Commission (NEPC).

Moreover, many of the Universities under MoALI have been conducting training and education programmes; however, the training and education programmes are yet to be delivered supporting the ADS results' achievements. Besides, to achieve output 2.3.3, the DOA has to consider forming collaboration with YAU, UVS, LBVD, and other Departments.

Furthermore, almost two-thirds of the Myanmar population lived in rural areas, making their living on crop production and animal farming. Therefore, the enhancement of human resources in these two areas is critical to the country's economic development. Realizing this potential, the Government has to develop human resources in the livestock subsector. As a component of the Government intervention, the UVS has taken full responsibility in providing animal science professionals and veterinarians for the livestock sector [31].

31 UVS quarterly result –based progress report 2018/19

The objective of the UVS is to become an internationally recognized University in the field of veterinary and animal sciences, with strong academic performance, quality laboratory facilities, and advanced research and development activities. The purpose of the UVS is to produce internationally recognized veterinarians and animal science professionals of high caliber for sustainable development of the livestock sector in Myanmar [32].

In 2018/19, the UVS improved 28 infrastructures and two laboratories to strengthen research capacity, teaching, and learning environments. Three laboratory equipment units were procured, while the International Atomic Energy Agency (IAEA), a partner of UVS, supported laboratory equipment for the Department of Physiology and Biochemistry. Additionally, the Information and Computer Technology (ICT) was upgraded with the installation of the internet and LAN connections for students and teaching staff (Annex Table 10).

As previously described, since this outcome is not indicated in the ADS publication, the ADSISU has to facilitate reviewing on its relevance during the ADS result framework's alignment process. Considering that UVS is related to education, research, and extension, this outcome could be integrated under outcome 2.3 (on Education) with some of the outputs that can be considered under 2.1 (on Research) and 2.2 (on Extension). Besides, more outputs relevant to the UVS mandate could be added, while reviewing the two current outputs to improve clarity.

2.4.4 Progress of Outcome 2.4 on Irrigation and Water Management

Increasing agricultural production means more efficient use of available water. Even though IWUMD received a significant portion of the infrastructure investment budget, the irrigated area remains minimal. Most of the potential areas possible for irrigation systems are currently underutilized. The ADS mentions that rainfed agricultural farm systems and soil and water management practices and technologies are not sufficiently used and promoted [33].

The irrigation systems required re-orientating, and shall be grounded with the National Integrated Water Resources Management Policy (NIWRMP). An appropriate local institutional mechanism for efficient management of various irrigation schemes for diversified agriculture shall be developed. Strategies ensuring increasing cropping intensity and improving irrigated areas productivity through improved water-use efficiency shall be implemented. The ADS emphasizes facilitating on-farm water use management to enable crop diversification and diversified cropping system. Capacity building for Water User Association (WUA), adoption of integrated water resources management, mechanism to address drainage issues destroyed by floods, and investment in drainage systems, particularly on rainfed areas are equally important.

During the reporting period, progress was positive on outputs 2.4.3 (establish on groundwater development), 2.4.4: (rehabilitate system and modestly expand command area in village irrigated (VI) dam and village embankment systems (VE) of less than 200 acres command areas), 2.4.8 (rehabilitate reservoir dam irrigation systems (with command areas of >1000 acres), and 2.4.9 (improve management of irrigation systems and on-farm water). Generally, milestones achieved were the operation, maintenance, and monitoring of existing irrigation systems nationally. The groundwater irrigation sources covered 244,648 acres of irrigated areas, and 2,822,382 acres of the irrigated area

32 UVS quarterly result –based progress report 2018/19

33 Outcome 2.4 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

increased in 15 States and Regions from the rehabilitated and newly constructed irrigation systems that were operated and maintained for regular and efficient use of water. Also, 2,813,056 acres were irrigated from the rehabilitated and newly constructed village embankments, and 3,153,559 acres were supplied with water from existing reservoirs, weirs, lakes, and ponds, sluice gate, and pumping stations. The positive results mentioned above were also from the rehabilitation and improvement of the existing irrigation schemes, expansion of canal networks, construction of permanent headwork, and upgrading of main canals (Annex Table 11).

On the other hand, the Participatory Irrigation Management (PIM) and the PIM Task Force has been formed. An initiative resulted in the approval of the PIM guideline and technical manual. A total of 1,048 Water Users Groups (WUG) were formed in 15 States and Regions, and the construction teams organised 323 WUGs . According to the PIM guideline and Technical Manual developed, the construction teams selected 5 Water Users Associations (WUA) to manage portions of the existing irrigation systems. Besides, 2,621 WUG/A members, farmers IWUMD technical officers, received capacity strengthening on PIM such as operation and management, water tax, water management, irrigation asset management, GIS, heavy machinery operation, and tube well drilling (Annex Table 11).

Moreover, machinery and equipment were provided to four IWUMD mechanical branches to timely implement irrigation related works. Furthermore, maintenance work has been carried out for the existing drainage that irrigated 897,241 acres (output 2.4.2), and training on the Myanmar National Water Policy was facilitated to partly progress the achievement of output 2.4.1 (develop Regulations for the Myanmar National Water Policy) (Annex Table 11).

The outputs that planned for 2018/19 but were not achieved are outputs 2.3.5 (rehabilitation of small dam irrigation system (500 – 1000 acres), 2.4.6 (Establishment of medium pond/recharge basins), 2.4.7 (establish non-conventional irrigation (NCI) system), and 2.4.10 (establish funding system and guidelines for operations and maintenance). On the other hand, despite the positive progress of outputs 2.4.1 and 2.4.2, achievements are insignificant against what was planned. The irrigation system regulations and by-laws were not developed, enacted, and enforced. The water use management on rainfed agriculture was not conducted, including other planned water management activities in rainfed agriculture such as demonstrations and extensions.

Considering the number of lagging outputs, ADSISU has to coordinate closely with IWUMD during planning and budgeting. These lagging outputs and targets shall be integrated into IWUMD annual plans and budgets. The vision of having a comprehensive irrigation scheme inventory, research, and testing alternative irrigation systems must be carried out. Likewise, the establishment of non-conventional irrigation shall be pursued. Most importantly, sound irrigation regulations and the National Water Policy shall be enforced fully. The ADSISU and DOP can play a vital role in facilitating the process with NADSIC's guidance.

2.4.5 Progress of Outcome 2.5 on Crop Inputs

To transform the low current ratio of farm input use and improved technologies in Myanmar, the ADS highlights priority strategies crucial in promoting sustainable access of high-quality inputs, seed, planting and stocking materials, including technologies. The emphasis is on establishing a seed sector that is strongly anchored on seed research, farmer and private sector engagement, and the enforcement of policies and related laws on seed, fertilizer, and pesticides. The current seed law is planned to be amended to protect farmer's rights on seed ownership and promotion of community-based seed production.

Also, the ADS lays out several long-term interventions such as (i) strengthening of the certification of multiplied seeds, (ii) promotion of hybrids (local and import), (iii) plant disease management through promotion of integrated pest management (IPM), (iv) establishment of quality assurance and safety standards on pesticides, fertilizers, and herbicides use through enforcement of fertilizer and pesticides laws and policies, (v) improving plant and animal quarantine, and (vi) establishment of an information system on seed demand and supply [34]. These strategies are known to be the backbone in accelerating smallholder farmer's growth in the seed supply chain and agri-food system.

During the reporting period, 9 outputs of the 14 outputs planned for implementation in 2018/19 have positively progressed. Most of the achievements are on outputs 2.5.3 (strengthening the certification of the multiplied seed), 2.5.4 (building the capacity of the seed research to produce breeder and foundation seeds), 2.5.5 (production of local and imported hybrid seeds) and 2.5.9 (development and promotion of integrated pest management (IPM). The other progress was on outputs 2.5.7 (implementation

34 Outcome 2.5 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

of varietal conservation), 2.5.11 (quality assurance for pesticides and other plant protection products), and 2.5.12 (plant and animal quarantine).

Explicitly, 61 seed laboratories and 40 seed farms were upgraded. Nine certified seed crops were produced, and approximately 702.95 acres were used for seed multiplication of 21 types of cereals, legumes, vegetables, oilseeds, tubers, perennial cash, and industrial crops. On the other hand, 51.75 acres were used for varietal selection/trials/research of 19 crops (i.e., rice, maize, legumes, vegetables, spices, perennial cash crops, etc.) and 40.92 acres for breeding 18 crops such as rice, maize, tubers, vegetables, legumes, herbs, including crop varieties with promising yield in different agro-ecological zones. Besides, breeder and foundation seeds collection and maintenance were conducted on 21.84 acres farm, including germplasm collection of 6 industrial crops (e.g., sugarcane, cotton, jute) and rice (Annex Table 12).

On the other hand, the advances in local and imported hybrid production were on selecting two imported F1 hybrids of rice. Approximately 25.38 acres were used to hybridize 11 food, industrial and high-value crops, including open-pollinated varieties of legumes and 34.15 acres for the production of F1 hybrid maize, sunflower, and rice seeds. Also, 735.07 acres were used for seed productions of the breeder, foundation, registered and certified cereals (rice and wheat), legumes, spices, vegetables, oilseeds and nuts (groundnut, and sesame), as well as cotton. Moreover, 10,392.47 acres were maximized to produce good quality food crops seeds, 75,000 packs of mushrooms planting materials, 187 boxes of silkworm eggs, and 62,640 viss cotton seeds. As a result, high-quality seeds and planting materials of coffee (189 kgs and 83,000 hills seedlings), silkworm eggs (309 boxes), cotton (33,294 visses), sugarcane (319,087 tons), and rubber (334,360 hills seedlings) were distributed to farmers and crop producers (Annex Table 12).

Simultaneously, the gene bank was established under the varietal conservation programme that stored 21,838 diverse genetic resources of wild, landraces and released varieties of crops such as the resistant varieties of rice, maize, and legumes. Two Hundred traditional crop varieties of upland rice, NaMaThaLay local rice, pulses, and vegetables, were also conserved at the gene bank. Nevertheless, 198 seed growers associations and seed businesses were certified (Annex Table 12).

The promotion of the efficient use of fertilizer was carried out. The Fertilizer Technical Committee (FTC) was formed to provide advice and perform enforcement of fertilizer quality assurance through regular market inspections of counterfeit and unregulated fertilizers' selling. Approximately 1,007.53 tons of 46 kinds of illegal fertilizer products were confiscated, and 1,179 liters of unregistered liquid pesticide and 4,986 kilograms of pesticide powder were seized and destroyed. However, 1,068 types of fertilizers were registered and licensed. On the other hand, 21,203 retail and wholesale shops of fertilizers, pesticides, and herbicides were authorized to operate, and 3,801 pesticide distributors were certified. Besides, 7 demonstrations on proper fertilizer application were organized, and 50

packages of groundnut rhizobium fertilizer were produced and distributed. At least 130.54 acres were used for 108 types of researches/experiments/studies and testing on the effect of commercial inorganic and organic/bio-fertilizers applications on crop yield and quality. Furthermore, 245 soil samples have been analysed, and 64 plant samples in selected areas of Myanmar were examined on spatial variability and fertility. A workshop to establish a database system for soil classification based on geographic data and protect land resource degradation was facilitated (Annex Table 12).

Furthermore, 7 plant pathology and 40 types of various research studies on Integrated Pest Management (IPM) and bio-control of weeds were conducted, as well as entomology research/experiments/studies and pesticide residue testing on food. The field research detected brown planthoppers resistant varieties of 72 rice varieties, 37 irrigated rice varieties, 23 rainfed rice varieties, and 12 drought-tolerant rice varieties. Also, collections of Trichoderma and Mycorrhiza fungi were carried out for experiments. Likewise, a primary insect-pest warning model using defining distribution map for insect pests and natural enemies on rice and pulses was established. Simultaneously, 2 plant protection liquid chromatography-mass spectrometry (LCMS) laboratory machines and high-performance liquid chromatography ultraviolet (HPLC UV) detectors were purchased to strengthen the pesticides herbicides laboratories (Annex Table 12).

Finally, the skills and capacities of MoALI technical staff and farmers were strengthened. One hundred fifteen of MoALI technical staff and farmers attended training on seed and planting materials breeding and four seed quality inspections on green grams and sesame. Post-harvest technology training to maintain seed vigor and quality control on chickpea, sunflower, groundnut, green gram, pigeon pea, and a black gram was provided. Also, 26 training on seed certification and multiplication on various cereals, legumes, vegetables, and fruits and the submergence tolerant and black turmeric, were organized. Three training on the implementation of the fertilizer law and regulation and balanced nutrient fertilizer application was conducted. Additionally, 7,985 MoALI technical staff and farmers participated in the various types of capacity building of different subject matters. Besides, 6 training was facilitated on the operationalization of animal quarantine stations attended by 93 LBVD technical officers (Annex Table 12).

Moreover, 12 training on certified pesticide applicators were conducted in 4 States and Regions. These training were attended by 1,815 participants from concerned public organizations and importers/dealers/retailers of fertilizers, pesticides, and herbicides. Printed pamphlets and bulletins on fall armyworm trapping and integrated pest management methods and extension materials were distributed to MoALI technical staff and farmers.

However, despite the positive advances described above, 5 outputs were entirely not implemented, while some targets of the 9 implemented outputs were not achieved. These lagging outputs and targets are crucial in attaining the sustained outcome on the increased production and use of high-quality agricultural inputs and technologies. Therefore, ADSISU has to pro-actively facilitate the integration of these outputs to the Department's annual planning and budgeting. Specifically, outputs 2.5.1 (undertake a review of the seed policy), 2.5.2 (amendment of seed law), 2.5.12 (strengthening of plant and animal quarantine) shall be prioritized as these outputs were entirely not budgeted and implemented.

Nonetheless, a review of some outputs shall be carried out to consolidate the outputs that are similar. For example, output 2.5.14 (enforcement of fertilizer and pesticide law) and 2.5.11 (establish quality assurance on pesticides and other plant protection) can be combined as these two outputs shared common objectives and targets. In contrast, output 2.5.13 (encourage the provision of quality control and certification from the private sector) shall be clarified of its relevancy and applicability.

2.4.6 Progress of Outcome 2.6 on Mechanization

Myanmar agriculture is currently characterized by low productivity. One of the underlying causes is the low level of utilization of farm machinery in the agri-food system. In general, farmers have limited access to agricultural mechanization services to maximize the agriculture potential in different agro-ecological zones. To increase production and create the necessary surpluses for economic take-off, an extensive (area/number expansion) approach is crucial. Increasing the agri-food system efficiency will largely depend on the application of improved technologies and practices. Therefore, the ADS envisages transforming the Myanmar agriculture mechanization standards, enforcement of regulations, capacity strengthening, and helping farmers make an informed decision using financial analysis results [35].

The ADS also emphasises developing the private sector in rural areas to accelerate the use of technologies and for a continued efficient mechanization service provision in the agri-food systems. It is expected that AMD will transfer the mechanization services to the private sector and create an enabling environment for private financial institutions, expanding credit to the farmers and Small Medium Enterprises (SMEs). These are long-term solutions envisaged to enable higher agriculture productivity.

During the reporting period, the positive advancements were on outputs 2.6.1 (encourage farmers to consolidate their fields to promote mechanization of land preparation, seedling, transplanting and harvesting), 2.6.3 (ensure a gradual handover of the hiring services and its related capital stock, 2.6.4 (train and demonstrate machine use, repair, and maintenance), 2.6.5 (promote the emergence of the rural workshop for agricultural machinery repair and maintenance) and 2.6.7 (provide financial analysis for the use of alternative machinery to guide investment decision of farmers under different agro-ecological conditions) (Annex Table 13).

Specifically, 1,102,447 acres were serviced for land preparation, 2,562.5 acres for transplanting, and 68,664.5 acres combined for harvesting. Likewise, 6,827.66 acres have been transformed into systemic mechanized farms, and 1,040 acres of terraces, . The 121 private hiring mechanization associations have been established in 13 States and Regions that are providing mechanization services to farmers. Simultaneously, 7,072 farm machinery units were sold to farmers, either cash or short-term installment, and 365 units were sold through private companies that granted a long-term installment to farmers. Besides, 50 units of farm machinery are accessible by rentals at the AMD mechanization stations (Annex Table 13).

On the other hand, capacity building and strengthening opportunities were provided to AMD staff and farmers. There were 4 Training of Trainers (ToT) attended

35 Outcome 2.6 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

by 76 AMD technical officers, and 8 AMD staff participated in two international training on farm machinery use and management in Japan. At the same time, 3,597 farmers received training on farm machinery operation & maintenance (O&M), while 941 farmers attended farm machinery repair and maintenance. About 13,931 farmers participated in 420 demonstrations of different farm machinery, including rice planting and drying machines, land preparation, transplanting machines, and harvesting. Moreover, the AMD invited farmers to view modern mechanized farms while six buildings were constructed in training centers located in Bayargyi , Bago Region, and Meikhtila , Mandalay Region (Annex Table 13).

Furthermore, 62 workshop facilities were upgraded, including the 2 base workshops in Mingalardon, Yangon, and Kyaukse, Mandalay Region that were accessed by approximately 1,133 farmers. A mechanization testing center equipped with 15 units of machinery was established, and 61 types of research were carried out on crops seeding and transplanting, crop digging and harvesting, tillage, weeding, and weed control. Simultaneously, research on straw management and 112 joint research with Agricultural Machinery System and Engineering Co. Ltd (AGM S & E) on land preparation and harvesting were organized (Annex Table 13).

However, despite the positive progress, the 2 outputs and key targets planned for implementation in 2018/19 are lagging. The outputs on improving the enabling environment for private financial institutions to expand credit to farmers and SMEs (output 2.6.2). However, for farmers to afford to buy farm machinery, AMD arranged installment schemes (short-term and long-term). Establishing collaboration with the private sector to ensure timely availability of spare parts (output 2.6.6) was entirely not implemented. Also, some key targets under output 2.6.7 (provide financial analysis for the use of alternative machinery), including the provision of financial analysis to farmers to guide in deciding investments were not achieved. Nonetheless, as mentioned above, AMD researched farm machinery applications to Myanmar's condition. Besides, the mobilization of the water user associations to promote consolidation of farms (output 2.6.1)was partially achieved by cooperating with IWUMD in organizing administration committee that later on could be organized as water user associations/ group. This administration committee is valid until the land consolidation works finished.

These strategies are very crucial to increase agri-food system productivity and diversity. Therefore, the implementation of these lagging outputs and targets shall be sped up. The ADSISU has to facilitate discussion with AMD to find mechanisms to address the issues that hinder the achievement of these two outputs and targets. At the same time, ensuring that the current positive momentum of 5 advancing outputs shall be maintained supporting the transformation of conventional to the mechanized farming system.

2.4.7 Progress of Outcome 2.7 on Livestock and Fishery

Livestock and fisheries subsectors are contributing more than 7 % of the total national GDP in 2018/19[36]. It contributed significantly to better the food and nutritional status of all people in Myanmar. By volume, fish is the second to rice in its contribution to the Myanmar diet, the most important protein source, and a significant source of year-round employment in the coastal areas [37]. On the other hand, the livestock subsector is a rapidly growing income source with increasing export to China. However, despite these sub-sectors' potential, livestock and fisheries productivity and production are still relatively low. The ADS highlights the importance of the Myanmar agriculture sector development to evolve from a crop agriculture focus to one diversified agri-food system that maximizes the livestock and fisheries' growth.

The ADS emphasizes dividing the responsibility between the public and private sectors on animal and fish breeding, husbandry, and health services. It foresees Government accountabilities for ensuring food safety and sanitary inspection, animal health, feed product testing, and registration. The epidemiological surveillance and statutory control of declared enzootic and epizootic and cross border diseases, animal registration, and movement control. While the private sector is responsible for supplying genetic material and approved breeding services, animal feeds, and animal nutrition advice. Preparation of national strategic action plan for animal genetic resources was planned, as well as legislation and guidelines. Also, the National artificial insemination (AI) and a pure breed production roll-out were planned to start in 2018/19.

On the other hand, the animal and aquaculture health information systems are expected to be strengthened, and a National Animal Health and Disease Surveillance Plan, including a contingency action plan for existing and emerging animal diseases and threats, were about to be developed. The Community Animal Health Workers (CAHWs) are expected to be recruited to increase the efficiency of livestock health services and extension in rural areas. Besides, the national forage production strategy and plan are to be formulated during the early years of the ADS implementation that will guide the improvement of pasture, fodder, grazing, and feeding practices. Lastly, the feed testing laboratories' capacities are to be improved to support the testing and registration of quality fodder and feed genetic materials for multiplication and production.

36 Myanmar at a glance (source: http://www.fao.org)

37 ADS background description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

For the fishery subsector, the emphasis is to develop the aquaculture by restructuring and expanding seedling infrastructure and increasing production and distribution of fingerlings and shrimp seeds. The network of aquaculture technology centers with supporting laboratories was planned to be operational, including the optimization of land development, cage, and pen technology. It foresee conducting fishery resource inventory for conserving adaptable fish species and preparation of the new Fisheries law.

In 2018/19, the deliverables mentioned above were achieved partially. From the 18 outputs planned, 14 outputs have positively progressed, mainly outputs 2.7.3 (establishment of the nation-wide artificial insemination (AI) programme / industry), 2.7.4 (strengthening the animal health information systems, including the National Animal Health and Disease Surveillance Plan), 2.7.5 (strengthening the production/importation and distribution of vaccines, including cold-chain management through private sector investment), 2.7.10 (strengthening the physical, human resource and financial capacity of the Livestock Breeding and Veterinary Department (LBVD) Feed Testing Laboratory), 2.7.12 (preparation and adoption of the Good Animal Husbandry Practices for livestock production), 2.7.14 (improvement of the aquaculture seedling infrastructure (hatcheries & breeding ponds)2.7.15 (establishing the identification, inventory and fishery resource conservation of adaptable fish species), 2.7.17 (facilitated provision and availability of fishing infrastructure and aquaculture initiatives including land development and cage and pen technology), and 2.7.18 (preparation of a new Fisheries Law). Other progress, despite minimal, were on outputs 2.7.1 (development and maintenance of the Myanmar Animal Genetic Resources Information System), 2.7.9 (compilation of inventory and database on animal pastures, fodder, and feed systems), 2.7.11 (preparation of the national animal feed strategy), and 2.7.16 (establishing of a network of Aquaculture Technology Centers with supporting laboratory facilities). For details, please see Annex Table 14.

Investments to implement the national AI programme were allocated. Seven laboratories equipped with AI facilities and liquid nitrogen (LN2) were operational that served the 40,000 livestock farmers and 3,500 commercial farms. A total of 97,586 cattle, goats, and swine were inseminated. On the other hand, the AI training was carried out in targeted States and Regions for which 140 LBVD staff, including veterinarians and 40 farmers were trained. Five National animal health and disease surveillance plans on Foot Mouth Disease (FMD), African Swine Fever, Peste de Petits Ruminant (PPR), Avian Influenza, and Rabies were developed and implemented with PPR field visits on goats and 30 field visits on native chicken production and surveillance vaccination against Newcastle Disease (I2 vaccine) in 6 States and Regions. Also, 30 vaccination and surveillance visits

were conducted on FMD, particularly in 3 Regions and 2 States with FMD outbreaks. Simultaneously, 3 surveillances on swine diseases were organized in the northern and eastern parts of Shan States. Besides, one animal hospital located in Insein Township, Yangon, was upgraded to support effective and efficient animal health, and disease treatments, and UVS arranged a meeting to establish a one health programme in Myanmar (Annex Table 14).

In addition, four laboratory facilities were renovated. One reagent for Brucella and nine domestic vaccines were produced such as the Bovine Haemorrhagic Septicaemia (HS), Bovine Anthrax (AA), Bovine Black Quarter (BQ), Bovine Foot and Mouth Disease (FMD) "O," Pig FMD, Hog Cholera, Avian Newcastle Disease (I2), Elephant AA, Rose Bangal Antigen. A laboratory room dedicated to producing the FMD vaccine was built, and six cold chains in Yangon, Mandalay, and Nay Pyi Taw are now fully operational. As a result, 1,601,110 cattle & buffalos were vaccinated with Bovine HS, 9,347,090 vaccinated with Bovine Anthrax (AA), and 1,121,776 were vaccinated with Bovine BQ. Similarly, 7,598,976 chickens were vaccinated with I2 for Newcastle Disease, whereas 474 companies were registered and licensed to produce and import livestock inputs such as veterinary drugs, animal feeds, vaccines, and allied livestock inputs. On the other hand, two research facilities for testing honey were constructed (Annex Table 14).

Also, investments were allocated to strengthen the capacity of LBVD human resources and feed testing laboratories. An infrastructure equipped with laboratory tools for feed testing was built, and three straw warehouses and machines for pasture and feeding practices were constructed. At the same time, 15 modified animal genetic conservation farms were established and maintained. Eight training was conducted on laboratory management, good clinical practices for veterinary practitioners, China-Myanmar cross-border animal epidemic, and beef cattle breeding technology. Likewise, training on the use of nuclear-derived techniques for early detection of Foot and Mouth Disease (FMD) and differentiation of priority and zoonotic, surveillance, and diagnosis development of FMD and detection of multiple pathogens for differential diagnosis and syndrome surveillance for trans

boundary animal disease were carried out. Additionally, a workshop on animal feeding strategy was organized, and 4,411 farmers and LBVD technical officers were trained on Good Animal Husbandry Practices (GAHP). Furthermore, 1,020 beekeepers participated in the apiculture training, for which 999 farmers were eventually engaged in the industry.

Moreover, the fishery industry's progress during 2018/19 was on the improvement of the aquaculture seedling infrastructure (hatcheries & breeding ponds) for the production and distribution of fish and shrimp seeds. Four marine and freshwater treatment tanks with 20 tons holding capacity were constructed for Kyauk Tan Freshwater Prawn Hatchery. Simultaneously, a nursery of Tilapia brood fish was improved, and a building of RC Shrimp Hatchery was built, including 20 larval rearing tanks (LRT).

Improvements of the Nat Yay Khan Fishery Station (Amarapura), Mandalay Region, Kyauk Phyu Shrimp Hatchery in Rakhine State, Kyauk Phyu Township and Ayeyarwaddy Region Pantanaw Fishery Station were completed. Consequently, an inch of 30,000 Rothee alfredian carplet fingerlings have been distributed to farmers, and 80,000 juveniles have been released to the water, including the 0.1 million fingerlings that were released in Ayeyarwaddy River (Annex Table 14).

A Freshwater Aquaculture Research and Extension Center (FAREC) was established in Thayetkone Fishery Station. A data collection system was in-placed that records the frequency of marine fishing activities, the number of licenses issued for fishing vessels, seed production, and export volumes. Simultaneously, research and inventories were conducted to investigate fish species such as Nga Myin (Giant Butter Catfish) and Nga Tha Lauk (Hilsa illisha) that are adaptable and potential for aquaculture farming. The analysis of fish species' fluctuation with local communities was carried out, including comparing Human Chorionic Gonadotropin (HCG) and Superfecthormons and rearing Thai sliver barb in ordinary Sei Daw Gyi Dam water and poorly filtered water. Also, experiments were conducted on induced breeding of Nga Phae Oung (Rohtee belangerii), Nga Phan Ma (Rothee alfredian carplet), Nga Phae (Notopterus notopterus), Nga Myin (Silonia silondia) and Viet Nam Climbing Perch (Nga Pyay Ma) (Annex Table 14).

Nonetheless, 24,643 acres of Locally Managed Marine Areas (LMMAs) were established, including an extension of the new conservation area at the View Point in Kathar Township, Kathar District, Sagaing Region. The Vessel Monitoring System (VMS)/ Pelagic Data System (PDS) to monitor

inshore and offshore fishing in Myanmar waters were installed. These are principal mechanisms that were established to conserve the fishery resources in Myanmar. Other fishery conservation activities carried out were on the awarding of certificate for coastal co-management area, regular patrolling and field visits for unregulated electric fishing, and awareness of the benefits of fisheries resources. The fishery law pamphlets were distributed, and awareness posters were set up (Annex Table 14).

Furthermore, the preparation of the new Marine Fisheries Law and Aquaculture Development Law is underway. Several consultations and discussions were facilitated with the Union Attorney General Office, Pyithu/Amyotha/Pyidaungsu Hluttaw, Myanmar Fisheries Foundation, relevant ministries, and communities. These laws are already a bill that is expected to be finalized in 2022. On the other hand, the freshwater fisheries legal framework was transformed that which authorizes States and Regions to develop their own freshwater fisheries law. In fact, some States and Regions have had finalized the approval of their own freshwater fisheries law, except Nay Pyi Taw Council, that still in progress. Besides, the enforcement of the existing fisheries legal framework is on-going such as the amended 1993 law for foreign fishing vessels, aquaculture law, 1991 freshwater law, and amended 1993 marine law. The National Plan of Action on Illegal, Unregulated and Unreported (IUU) Fishing was prepared, and 86 unregulated and unlicensed fishing vessels, including three foreign fishing vessels, were confiscated and fined (Annex Table 14).

Despite the positive achievement of outcome 2.7, four outputs are lagging. These outputs were completely not implemented, such as 2.7.2 (development of the national strategy and action plan for animal genetic resources (AnGR), 2.7.6 (institutionalization of the community health workers (CAHWs), 2.7.7 (establishment of contingency planning and financing for emerging animal disease and threats) and 2.7.8 (implementation of farm animal population and baseline survey). On the other hand, some achievements were not reported, such as the type and volume of imported livestock vaccines and the percentage of farming households with increased income from apiculture activities. Progress on the privatization of aquaculture seedling infrastructure (hatcheries & breeding ponds) and cage and pen technology integration to existing ponds are not evident. In this regard, urgent investment is needed to implement the lagging outputs and targets and maintain the 14 implemented outputs' positive progress, including developing the aquaculture industry, implementing the pure breed livestock production, and improve private sector engagement. Besides, a reprioritization of results and targets is required. The primary consideration is on ensuring meeting the intended ADS impacts.

2.4.8 Progress of Outcome 2.8 on Good Agricultural Practices

Food safety is an integral part of food security. It has recently gained increasing importance due to its significance in health and trade perspective, particularly towards increasing competitiveness in export markets. Implementing sustainable farming, Good Agricultural Practices (GAP), Good Animal Husbandry Practices (GAHP), Good Aquaculture Practices (GAqP), and Organic Agriculture (OA) are of immense importance for ensuring safe food supply and consumers protection from the hazards of foodborne illnesses [38]. Besides, implementing GAP will help promote sustainable agriculture that contributes to meeting the national and international environmental and social developmental objectives.

38 A scheme and training manual on good agricultural practices for fruits and vegetables (source: http://www.fao.org)

The ADS highlights strategies to speed up the promotion and adoption of sustainable farming practices. It underscored formulating standards of GAP, GAHP, GAqP, and OA that is consistent regionally (e.g., ASEAN GAP) and globally (e.g., GLOBAL GAP), as well as the delivery of tailored extension programmes [39]. It foresees the coordination of relevant stakeholders to formulate regulations, protocols, and guidelines of Myanmar, good and sustainable food production practices to increase production, value addition, and consumption of safe agricultural products.

During the first year of the ADS implementation (fiscal year 2018/19), the achievement of establishing and adopting sustainable farming practices, GAP, GAHP, GAqP, and OA was fractional. Some notable progress was on output 2.8.1 (formulation and elaboration of protocols, guidelines, laws, and regulations to promote concepts of sustainable farming, GAP, GAHP, GAqP, and OA). Primarily, advancements were on developing the GAP guidelines for each crop based on the safe use of fertilizers, pesticides, post-harvest practices, and the National Aquaculture Development Plan that underline the adoption of GAqP. Additionally, GAHP guidelines for commercial swine farming, backyard swine, layer, broiler, backyard poultry and bee have also formulated. For details, please see Annex Table 15.

Specifically, the notable achievement was on the capacity development/strengthening of the DOF technical staff and the Analytical Laboratory Unit's accreditation by ISO / IEC 17025:2005 to issue lab test reports for frozen freshwater fish, seawater fish, shrimp, crustaceans, and dried fish and shrimp. Likewise, 9,254.74 acres and 8 companies were GAqP certified. Sixty-eight Hazards Analysis and Critical Control Points (HACCP), 6 Good Manufacturing Practices (GMP), and 6,069 health certificates were granted. Food safety quality certificates were issued for four different types of fish and fishery products, namely frozen, chilled, live, and dry forms for export to the European Union, Korea, and Saudi Arabia (under exploration). Additionally, 2 GAqP training and one ISO 9001:2015 certificates training for laboratory staff were organised (Annex Table 15).

Simultaneously, 342 acres were used for different GAP demonstrations, and 56 field days were carried out. GAP certification of 3,017.72 acres of the 132 farms was issued according to the Myanmar GAP standards following ASEAN GAP guidelines. A total of 211 GAP training and a GAP forum on coffee were organized. Moreover, enforcement of good practice protocols was controlled through regular monitoring, field survey, and visits of GAP certified farms and products (Annex Table 15).

On the other hand, 185 GAHP training was facilitated. Surveillances were conducted for GAHP backyard, and commercial swine certified farms. Furthermore, 20,600 handbooks and 215,394 pamphlets were distributed to farmers and commercial farm operators for broader awareness,

39 ADS Outcome 2.8 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

understanding, and adoption of sustainable farming practices, increasing crop production, backyard/commercial swine layers, broiler, and native chickens under GAP and GAHP (Annex Table 15).

The positive progress mentioned above demonstrated that 2 of the three outputs planned had significant progress. Output 2.8.3 (establishment and exploitation of "Myanmar Brand" of GAP and OA products in the domestic and international markets) lags with no achievement during the reporting period. The GAP Unit was not established. Therefore, value chain analysis and studies for GAP niche products with market potentials were not carried out. The private sector and stakeholders' engagement in the agriculture sector to promote and adopt a sustainable agri-food system is yet to be explored.

Besides, it is necessary to review and simplify the three outputs. Some targets are similar to those under outputs 2.7.12 (Good Animal Husbandry Practices for livestock production) and 3.3.4 (to support the national standards council to expedite the passage of key national standards related to agriculture, including meat and fish). Also, some of the deliverables within the outcome are redundant. Importantly, actions that will encourage the promotion of the optimum use of resources such as pesticides, fertilizers, and water, and eco-friendly agriculture, and protecting the farmers and agricultural workers' health from improper use of chemicals and pesticides, shall be prioritized.

2.4.9 Progress of Outcome 2.9 on Resilience

Myanmar's scientific weather models forecasted scenario of an increased risk of intense and extreme natural hazards such as flooding, cyclones/strong winds, flood/storm surge, heavy rains, extremely high temperatures, and sea-level rise. Currently, Myanmar is experiencing climate change with variable temperatures across the country and unpredicted or unbalanced rainfall patterns, as well as a decrease in the duration of the southwest monsoon resulting in a late-onset or early start of the season [40].

The ADS recognises climate-related threats and potential impacts on the agriculture sector. Thus, a combination of adaptation and mitigation measures to build households and communities' resilience is laid out in the ADS. The plan was to start implementing these outputs during the 2018/19 fiscal year. The proposed vital strategies were to research stress-tolerant varieties of crops, livestock, and fish that can endure salinity, drought, and flood. To promote landscape–based measures through Community Based Disaster Risk Management (CBDRM) to help farming households and communities better respond to risks by adapting structural and non-structural measures. The strengthening of the Early Warning System (EWS) and climate information was emphasized in the ADS, and installation of preparedness, mitigation, and adaptation, to ensure adequate food and seed reserves. The insurance system for crops and livestock was planned to be

40 National Adaptation of Action (source: http://www.unfcc.int)

explored to protect farmers' livelihood and income from the negative impact of hazards and risks [41].

Despite Myanmar ADS and National Adaptation Programme of Action (NAPA) shared objectives on building farmers' resilience to climate change, the progress of outcome 2.9 was minimal. From 10 planned outputs for implementation in 2018/19, only outputs 2.9.1 (conduct research on stress-tolerant varieties) and 2.9.6 (improve the capacity of extension and farmers in climate-smart agricultural (CSA) practices) were able to advance (Annex Table 16).

Specifically, positive advances were on research/studies/trials/varietal selections of tolerant varieties of crops. During the reporting period, 25 types of research/studies/trials/varietal selections were carried out on submergence, salt and drought-tolerant rice varieties, and drought-tolerant groundnut, cotton, and sugarcane. Experiments were conducted to select yellow mosaic resistant green gram and tomato varieties suitable for adverse climate conditions. Other studies organized were on the analysis of Brown Plant Hopper (BPH) resistant of 37 irrigated rice varieties and 23 rainfed rice, as well as 12 Yeanaelo rice varieties. Also, varietal development of Sinthukha and Sinthwelatt rice with the integration of submergence tolerance, salt tolerance, and Bacterial Blight (BB) resistant genes were pursued. Simultaneously, a comparison on the effect of climate change and cropping pattern on the yield of the rice-black gram, rice-soybean, rice-niger, rice-sunflower, rice-cow pea were evaluated. The studies on Greenhouse Gases (GHG) emission on rice fields were organized with farmers' participation, including selecting biotic and abiotic tolerant rice varieties. Approximately 10.21 acres of farms were used for these researches/studies/trials (Annex Table 16).

As a result, 402 rice varietal lines resistant to flood were identified, and 130 lines from 12 parental submergence tolerant rice lines were selected, while 160 salt-tolerant rice lines from 7 parental lines were chosen. Similarly, three varietal lines that are more resistant in the salt prone area and four drought-tolerant rice varieties with good eating quality lines were identified. Eight pods of mosaic virus resistant soybean varieties (Yezin 3 and Yezin 10) were selected, and the production of adaptable and resilient varieties of rice, maize, and mung bean was facilitated. Likewise, 29 rice varieties of four heat-tolerant rice experiments and 94 varieties of five Yeanaelo rice experiments were harvested in the summer season. Furthermore, a drought-tolerant rice variety was released for mass production (Annex Table 16). All these researches were conducted through DAR, DOA, and YAU climate change resilience-related projects.

The capacity of extension staff and farmers in climate-smart agricultural practices were improved through training, Farmer Field Schools (FFS), and demonstrations. A total of 26,658 farmers and extension officers attended the 82 Climate-Smart Agriculture (CSA) training on various crops. Fifty education tours for farmers on CSA rice production were organized, and 3 FFS meetings on CSA were conducted. Also, extension officers were provided the opportunity to attend the regional workshop on Innovative Rice-Fish climate-resilient Tilapia farming in the Asia Pacific. Finally, 195 acres of 26 demonstration plots and 23 field days were conducted for farmers learning CSA practices. Besides, 23,000 CSA manuals and pamphlets on cotton and allied fiber crops and 3,887 CSA pamphlets and handbooks on Mushroom production were distributed (Annex Table 16).

Moreover, programmes were implemented on mitigation and resilience of livestock, fisheries, and crop farmers to climate change, natural disasters, and other risks. The project Fish Adapt was implemented to strengthen fisheries' adaptive capacity and resilience and aquaculture dependent livelihoods in

41 ADS Outcome 2.9 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

Myanmar, particularly the Rakhine States, Yangon, and Ayeyarwaddy Regions. Mitigation actions such as the strengthening and maintenance of flood protected embankments and animal shelter for the prevention of damage caused by natural disasters were built. About 2,813,056 acres of embankment and 897,241 acres length of drainage canal was established and maintained, and 9,385 acres flood-prone areas were protected (Annex Table 16).

As mentioned above, the progress of outcome 2.9 was very minimal. The implementation of the six outputs was delayed, and some of the targets of the partially achieved four outputs were not carried out. In fact, the outputs that were not implemented are crucial pillars in building climate-resilient communities. Myanmar is very vulnerable to climate change, and under a changing climate, losses in agriculture-based livelihoods and employments are expected to be significant. It is most likely that the impact of climate change on a climate-sensitive sector, such as agriculture, will undermine Myanmar's development and economic growth. Hence, the Myanmar NAPA included agriculture and early warning systems as priorities under the 32 priority adaptation projects. In this regard, investments to achieve outcome 2.9 have to be apportioned considerably. To establish collaboration with the Ministry of Transport and Communication, being the responsible Ministry to implement the NAPA is crucial. Particularly to achieve outputs 2.9.3 (establish climate early warning system), 2.9.4 (establish climate information and weather indexation systems designed to provide information to farmers) and 2.9.4/2.9.5 (strengthening of food, seeds, and feed reserve system). The ADSISU has to facilitate collaboration and discussion with NADSIC to call the MoALI Departments' attention responsible for achieving outcome 2.9.

Furthermore, the implementation of output 2.9.10 (carry out CBDRM) shall be pursued. The current DRD village/community-driven development processes and s offer a high possibility of integrating the CBDRM. The most important is to reduce climate change vulnerability of rural and subsistence farmers and communities through a holistic approach to establish resilient farming systems.

2.5 PILLAR 3 – COMPETITIVENESS

This subsection presents the progress of outcomes under Pillar 3, particularly the achievements of 8 outcomes from the 9 planned outcomes that were referenced to these key strategies. It also includes milestones of the 23 outputs of the implemented outcomes, for which 15 outputs were positively advances using the capital budget and 8 outputs executed using the recurrent budget.

The details on lagging outcome 3.8 (improved access to a range of financial services for farmers and agribusiness) are further explained in subsection 2.5. Meanwhile, the key challenges and recommended actions to speed up the lagging outputs per outcome are also elaborated below.

2.5.1 Progress of Outcome 3.1 on Business Environment

The aim of outcome 3.1 is to promote private sector engagement in agribusiness. The ADS highlights creating an enabling environment to encourage business operations and private sector growth as critical action that shall be pursued. Improvement of the institutional, legal and regulatory services and reforms to reduce transaction costs is fundamental to increase investments from the private sector for the agriculture sector competitiveness [42]. The ADS anticipates strengthening the legal institutions to facilitate commercial and labor contracts, especially under the contract farming schemes. Guidelines and laws are to be formulated to facilitate the effective regulation and implementation of contract farming, especially in resolving contract disputes.

The ADS also emphasises supporting the preparation and implementation of an investment promotion strategy and plan for the agriculture and food sector under the new Investment Law. Strengthening market information using ICT to increase the accessibility of farmers and agro-enterprises is to be facilitated.

However, during the first year of the ADS implementation (2018/19), all ten planned outputs were technically delayed. Little progress has been reported on outputs 3.1.4 (design and implement an investment promotion strategy for the agriculture and food sector) and 3.1.5 (help strengthen the capacity of Myanmar Investment Commission to expedite investment applications in the agriculture sector). Achievements are limited with the three training facilities and six rubber factories built to promote the agricultural products. The Investment Promotion Committee (IPC) first meeting was organised to present the Myanmar Investment Promotion Plan (MIPP), introduce the IPC and the 5 Task Force groups. The meeting was attended by 150 participants, including MoALI representatives from DOP, DOA, Small-Scale Industries Department (SSID), and ADSISU that are members of the task force on investment-related policies, investment promotion, infrastructure development, business-related system, and local industries (Annex Table 17).

The other eight outputs critical in addressing the agribusiness procedural challenges were delayed, including improving farmers and agro-enterprises access to market information. The delay in implementing these outputs is a risk of not achieving the envisaged enabling business environment and increasing market linkages for farmer's competitiveness. Therefore, ADSISU, as the responsible unit that coordinates the ADS implementation, shall facilitate a dialogue with NADSIC members and liaise with the Department of Planning as responsible MoALI Department to achieve the outcome.

To advance the implementation of output 3.1.9 (enhance and use of ICT to ensure market information

42 ADS Outcome 3.1 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

and intelligence), the existing market information services and agribusiness facilities shall be maximized. However, for this to happen, significant resources are required. Besides, to support that, other lagging outputs can be simplified and integrated, especially those with similar deliverables and outputs under outcomes 2.1 (on Research) and 2.2 (on Extension), for example, output 3.1.10 (ensure research and extension services). Likewise, output 3.1.2 (develop and implementing regulations on consumer protection and processing of complaints) can be incorporated into one of the outputs under outcome 3.7 (on Food Quality and Safety).

Moreover, ADSISU and the other MoALI's IPC task force members shall continue to support in sustaining the current progress momentum of output 3.1.5 (to help strengthen the capacity of Myanmar Investment Commission), and ensuring the implementation of outputs under outcome 3.5 on market and logistic infrastructures, particularly investment for the special agro-industrial economic zones under the MIPP initiative.

2.5.2 Progress of Outcome 3.2 on Intellectual Property Rights

With Myanmar's growing economy, the country has to establish a comprehensive and useful intellectual property protection system to safeguard the country's local living organisms, including microbes, plants, and animals, and their parts or components, while welcoming foreign investment and technology transfer as well as industrial development [43]. With Myanmar engaging in growing free trade agreements and treaty memberships, intellectual property rights are worth protecting, both domestically and internationally. Intellectual Property Rights (IPR) protection is vital for Myanmar's growth in research, significant domestic innovation, and increased technology diffusion and employment.

During the development of the ADS, laws related to IP protection are yet to be approved. The ADS highlights the importance of strengthening the IPR system to control counterfeit agricultural inputs and import products. The approval, of the Plant Variety Protection Law is considered a priority [44]. However, the Trademark Law and Patent Law were also foreseen vital to propel intellectual property protection on agribusinesses.

In 2018/19, of the four planned outputs, only output 3.2.1 (develop, approve, and implement a Plant Variety Protection Law) has progressed. The Myanmar Plant Variety Protection Law, following the International Union for the Protection of New Varieties of Plants (UPOV), has been enacted on 24 September 2019 as the Pyidaungsu Hluttaw Law number 29.

The outputs that were lagging are 3.2.2 (approval of the Trademark Law), 3.2.3 (strengthening of the IPR protection), and 3.2.4 (approval of the Patent Law). During the ADS's remaining timeframe, these outputs have to be prioritized to safeguard Myanmar's agro-enterprises, agribusinesses, and consumers against the influx of counterfeit agricultural inputs and products. Considering that the establishment of the IPR protection system is not entirely under the mandate of MoALI, coordinating with the appropriate national IPR bodies to ensure the outcome's achievement shall be carried out.

43 Panel of eminent experts on ethics in food agriculture (source: http://www.fao.org)

44 ADS Outcome 3.2 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

2.5.3 Progress of Outcome 3.3 on Quality System

Food quality is a complex concept. It has an intricate relationship with food safety. In fact, safety cannot be viewed totally as an independent aspect from a quality. However, it has to be managed separately with the complexity of both concepts, hence, the ADS outcome 3.3.

The ADS describes improving the quality system for farmers and food processors to get higher prices. This means food quality system control and assurance shall be established, including developing product standards and certifications, quality grading, and control measures. Under the ADS, the revision of the Law on Standardization and the Law on Meteorology that will enable the establishment of a National Accreditation Bureau for testing processes and a National Meteorology Institute for measurements will be facilitated. These are essential to support the National Standard Council to expedite approvals of the agriculture product's national standards [45].

Also, the ADS envisages developing and implementing quality control assurance systems across the full range of crop, livestock, fisheries, and forestry products based on the widely accepted international standards available for the agri-food industries in Myanmar such as Good Manufacturing Practices (GMPs), Good Hygiene Practices (GHPs), Good Agricultural Practices (GAPs), Hazard Analysis Critical Control Points (HACCP), International Organisation for Standardisation (ISO) and other prerequisites for food quality systems [46].

During the reporting period, out of the 7 planned outputs with investment estimates for 2018/19, only outputs 3.3.1 (develop product standards and certifications, quality grading, quality control measures, and reliable conformity assessment procedures) and 3.3.5 (help improve the quality standards, testing laboratories, skills and awareness for agricultural and processed products) having positive progress. The achievements were on strengthening the staff capacities to implement product standards and certification, quality grading, quality control measures, and reliable conformity assessment. A total of 128 MoALI staff (72 men and 56 women) were trained on Good Hygiene Practice (GHP), Good Manufacturing Practice (GMP), and Training

45 ADS Outcome 3.3 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

46 ditto

of Trainer (ToT) on Setting up Laboratory and registration that was facilitated by the Food and Drug Administration (FDA). Moreover, 18 units of laboratory equipment were procured, and an ELIB, a library with an automation system was installed (Annex Table 19).

During this reporting period, 3,806 food products, 934 consumer products, and 181 cosmetic products were passed the test according to the quality assurance standard in Myanmar.

The 5 outputs that were not implemented are outputs 3.3.2 (participation on the revision of the Law on Standardization), 3.3.3 (support to the establishment of the National Accreditation Bureau) and 3.3.4 (support to the National Standard Council to expedite the passage of the key national standards for the agriculture products). Likewise, 3.3.7 (support the development of public and private calibration capacities) has not progressed. Agri-food production requires a specific approach to achieve the expected quality level. Hence, delaying the implementation of these outputs is risking institutionalizing the food quality and safety assurance systems of the agricultural products in Myanmar.

Without those measures, the agricultural product competitiveness in both domestic and international markets will be insignificant. Therefore, to speed up the achievement of these outputs, MoALI has to work closely with Government-related bodies' in-charge of installing the quality assurance systems. Simultaneously, ADSISU has to facilitate reviewing the outputs for possible streamlining of similar outputs under outcomes 2.8 (on GAP) and 3.7 (on Food Quality and Safety). The outputs that can be dropped are outputs 3.3.6 (review and help the draft revision process to the Law on Meteorology) and 3.3.7 (support the development of public and private calibration capacities). Although these outputs are considered essential for the agri-food system's long-term growth, most like not feasible during the ADS limited implementation timeframe.

2.5.4 Progress of Outcome 3.4 on Participatory Planning for Rural Development

Rural development improves the quality of life and the wellbeing of the people living in rural areas. Considering that poverty implies the lives of two-thirds of the Mynamar population[47], investment in rural development is vital.

The ADS emphasises re-orienting MoALI's approach to rural development by maximizing participatory planning and implementation processes with strong community engagements in selecting priority interventions that address underdevelopment's underlying causes. Considerable attention is on strengthening community's capacity to prepare and draft action plans and improve rural entrepreneurial skills. The promotion of gender equality is considered necessary as an integral part of the rural development programmes that the ADS have to support.

During the reporting period, 4 of the 6 planned outputs have positively progressed. These outputs are considered central to the current rural development initiatives in Myanmar. Significantly, milestones achieved are on outputs 3.4.3 (village level community development initiatives (e.g., DRD Green Village Project), 3.4.5 (community capacity building in preparation and drafting of action plan projects), and 3.4.6. (training on rural entrepreneurship and enterprise development . The other achievement was on output 3.4.4 (Township level community development initiative. For details, please see Annex Table 20.

Principally, 2,746 villages were engaged in village development planning, and 279 townships received support in Enhancing Rural Livelihoods and Income (ERLIP), Community Driven Development (CDD), and Village Development Planning (VDP) Projects. About 2,685 community development activities such as building schools/education infrastructure, health care centers, libraries, and village halls were implemented. Additionally, 944 villages in 800 project units (Mya Sein Yaung) received revolving fund of 30 million MMK (about US$ 30,000) for each village. A township level multi-stakeholder review meeting was conducted to promote ownership and build synergy at the township and community level (Annex Table 20).

47 Sustainable rural development is vital for Myanmar (source: https://www.mdn.gov.mm)

On the other hand, 786 capacity building training, including natural resource management, was carried out for the 30,497 participants from farmer's associations, cooperatives, village committee members, Government, private sector, and other institutions. Likewise, 314,061 people were trained in rural development, technical engineering, and waste management and participated in drafting or preparing project action plans. Additionally, 46 gender training sessions, 148 ToT/ Training of Technical Facilitator (TTF)/ Training of Facilitator (TOF), and 275 capacity building specific training were organized at the Township level. Also, 2 ToT/TTF/TOF, 12 capacity building training, and 2 gender training sessions were conducted at the Union level (Annex Table 20).

Other knowledge sharing and learning activities organized to promote community capacity building on rural development were the 55 exchange visits, 76 multi-stakeholder workshops, 31 Village Development Plan (VDP) workshops, and 150 publicity, promotion, and information campaigns. Approximately 68,459 cooperative members, farmers, and community leaders' as well as DRD technical staff, were also received other learning opportunities (Annex Table 20).

Moreover, 46,071 participants were trained in 2,581 rural entrepreneurship and enterprise development skills and capacity-strengthening on agriculture and livestock breeding, livestock and veterinary practices, computer operation, diesel/wiring, carpentry/masonry, handicraft making, and sewing. Other market-driven skills, as well as vocational training, were also provided. Additionally, communities were trained on GAP, GAHP, GAqP applications, including setting up model farms to demonstrate the use of these sustainable and good farming practices (Annex Table 20).

Sustainable rural development is fundamental to promote an all-inclusive economic and social development in Myanmar. Therefore, the current positive progress of outputs under outcome 3.4 shall be maintained. For the other two outputs that were not implemented, such as 3.4.1 (establish new research and development Division in DRD) and 3.4.2 (establish new design Division for rural infrastructure), a review shall be facilitated to decide if these outputs will still be prioritized. Currently, the delay in implementing these outputs does not necessarily influence the outcome's overall positive achievement.

2.5.5 Progress of Outcome 3.5 on Rural Infrastructure

Improving rural infrastructure is crucial to uplift the country's social conditions and underpinning Gross Domestic Product (GDP). With improved rural infrastructure, it will accelerate the agriculture sector development and overall economic growth. It will help enhance product value, preserve the quality of marketed products, and reduce post-harvest losses, thus increasing the benefits of the producers in the value chain. Considering Myanmar's agriculture potential, improving rural infrastructure is essential, including the associated support systems such as energy and clean/safe drinking water.

The ADS outlines improving rural infrastructure, mostly farm road, rural energy, potable water, markets, and logistics following the Master Plan for Transportation and the Rural Road Strategy. It recommends policy review on road tolls, fees, and taxes to reduce transport costs and times, and other current restrictions that undermine the efficiency to market and sell Myanmar's agricultural products[48]. Additionally, the ADS emphasises increasing rural households' access to electricity and suggests promoting several renewable energy types using experiences from DRD's similar activities. Access to clean and potable water is foreseen essential, including establishing a mechanism to share knowledge.

Likewise, improving market and logistic infrastructures is critical to increasing farmer's competitiveness and access to sustainable domestic and international markets. Without an investment in market and logistic infrastructures, it will be challenging for Myanmar's smallholder product commercialization. The emphasis is to support the Government's initiative in establishing transport corridors in Myanmar's economic production areas. Besides, supporting the Industrial Policy implementation that prioritises the creation of four Special Agro-industrial Economic Zones (SAEZ) is considered necessary [49].

In 2018/19, out of the 16 outputs planned for implementation, 6 outputs were implemented. These are outputs 3.5.1 (improve rural road infrastructure consistently with a master plan for transportation of the Ministry of Transport and Communication, and the Rural Road Strategy), 3.5.3 (establishment of rural (off-grid) electricity connections), and 3.5.4 (facilitate connecting of rural communities and households to the national grid). Positive progress was also on outputs 3.5.7 (construction of rural water supply infrastructure) and 3.5.8 (knowledge sharing on access to clean drinking water technology). Please see details in Annex Table 21.

Principally, milestones achieved were the construction of 266.84 miles farm-to-market rural roads and 2,340.6 feet rural roads and bridges with culverts that benefited 241 villages and approximately 371,658 people. Also, the rural roads created access to 176,829 acres of agricultural land and livestock rearing area. Likewise, 2,174.38 miles of different rural roads such as concrete, earth, footpath, gravel, macadam, wheel track, kankar, and bitumen were completed, and 12,185 feet of bridges with culverts were built. These roads' construction benefited the 4,269 villages, 856,863 households, and approximately 3,217,180 people (Annex Table 21).

48 ADS Outcome 3.5 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

49 ditto

Simultaneously, 599 rural (off-grid) electrifications were installed, while 351 villages were connected to the national grid, and 124 communities have engine power generation. At the same time, 518 villages have generator power sources. In total, 59,712 households are connected to the national grid, 76,261 households connected to the generator, and 14,847 families are using engine power generation. On the other hand, 4,167 rural villages have houses using solar home systems, and 76 communities have mini-grid (solar, hydro, biomass, biogas) and 49 villages with installed solar street lighting. Besides, 39 villages are using small hydropower generation. Around 344,207 households are using these renewable energy systems. Additionally, 31,278 public facilities are using solar power generated, and 4,940 community buildings use mini-grid. Moreover, 12 National Electrification Project (NEP) related capacity-building training and 33 NEP/SHS-IVA/AVIP committee training were carried out that trained and involved 1,714 farmers/community, committee members and cooperatives, as well as DRD staff and other relevant institutions (Annex Table 21).

Furthermore, 3,882 units of different rural water supply infrastructures were constructed and rehabilitated, such as deep tube wells, shallow wells, spring/gravity flow, overhead, or ground tanks. These water systems provided clean and safe potable water to 2,496 villages, 443,386 households, and approximately 2,150,965 people are using these improved/safe rural water supplies. Besides, 2,275 Water Association Committees (WAC) were established to ensure the water systems' sustainable functioning. The WACs are responsible for effectively managing and maintaining the water systems, ensuring equitable water distribution and efficient operations. Two training on the rehabilitation of drilling rigs and 129 water supply training were conducted for 1,376 committee members, 1,236 farmers/community, 10 cooperative members, 341 DRD staff, and 241 participants from other institutions (Annex Table 21).

As mentioned above, 10 of the 16 outputs planned are lagging. The delay of the proposed new Department of Agribusiness and Marketing Information (DABMI) (output 3.5.9), affected the non-achievement of the other 6 outputs such as 3.5.10 (identify strategic locations for market development), 3.5.11 (improve market and logistics infrastructure in rural towns), 3.5.12 (implement

PPP financing support mechanisms), 3.5.13 (develop rules and regulations and SOP for improved market infrastructure management), 3.5.14 (capacity building programmes for market infrastructure management) and 3.5.15 (develop agro-industrial zones for production and processing of safe and environment-friendly agro-based products). The other delayed outputs are 3.5.2[50] (removal of all restrictions on the internal movement of the agricultural goods), 3.5.2 (monitor transport costs and time), and 3.5.6 (promote public-private partnerships (PPP) for development and distribution of power to rural farming communities) also crucial to achieving the outcome and the intended ADS impact. Therefore, these shall be addressed during annual planning and ADS mid-term review . The ADSISU has to seek guidance with the NADSIC on mechanisms to speed up the implementation of these lagging outputs, mainly to decide the establishment of DABMI. Additionally, the ADSISU and the other MoALI Investment Promotion Committee (IPC) task force members have to advocate for investments in the market and logistics infrastructure continuously under the MIPP initiative.

Finally, the momentum on implemented outputs shall be maintained. The new focus shall be on producing tangible results on the improvement of the rural community's wellbeing. The newly built or improved farm to market roads, bridges, and electricity should facilitate increasing rural community's access to better markets, increased productivity, and farmer's market competitiveness. Besides, the impact on the improvement of food diversification, food security, and nutrition shall be evident.

2.5.6 Progress of Outcome 3.6 on Agro-enterprises Development

The ADS underscores the importance of an initial focus on developing a limited number of agriculture value chains. The selection of these value chains shall strongly consider the financial and economic benefits, contribution to poverty reduction, growth potentials, and social inclusion (gender and environmental issues). On the other hand, these value chains shall address national and regional strategic priorities and global growth[51]. The ADS indicates to explore the value chains of rice, pulses, vegetables, oilseeds, coffee, rubber, sugarcane, cattle, and aquaculture[52]. The promotion of public-private partnerships for value chain development was also accentuated to facilitate and accelerate the envisaged results efficiently. Likewise, enabling environment, organizational, and capacity strengthening of MoALI, farmer organizations, and trade associations were highlighted as priorities during the value chain implementation.

Finally, the promotion of innovative small and medium (SME) agro-enterprises shall be considered through agribusiness incubators and the establishment of the value chain and agro-enterprise development funds. Specific agro-enterprises that engage youth, women, and disadvantaged groups shall be explored and supported.

50 A duplicate output number indicated in the ADS publication that requires fixing, including the succeeding output numbers.

51 ADS Outcome 3.6 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

52 ditto

From the 19 outputs planned for implementation in 2018/19, 5 outputs have had positively progressed during the reporting period. The advancement was primarily on output 3.6.12 (organize annual value chain fairs, exhibits, seminars, workshops, conferences, and training both in Myanmar and abroad aimed to have access to markets for agri-food products from Myanmar). A total of 574 value chain events were conducted, including the 2 Myanmar small-scale industry product exhibitions that were participated by 142 small-scale industry operators, 2 seminars, 567 training, and workshops held locally and internationally attended by 11,870 participants. On the other hand, 409 wood handicraft products, 25 cotton shawl, and silk string were sent to Japan for promotion in partnership with Asia Crafts Link (ACL) (Annex Table 22).

Other positive progress was on outputs 3.6.1 (establish 7 prioritized National Value Chain programmes (including crops, livestock, and aquaculture), and 3.6.2 (conduct value chain study and identify bottlenecks and opportunities for respective prioritized enterprises). Likewise, outputs 3.6.14 (Training on Trainers (ToT) on Climate-Friendly Agribusiness Value Chains), and 3.6.16 (promote the establishment of Agribusiness incubators) have gradually advanced.

One value chain project on agri-product processing technology was implemented. Simultaneously, value chain studies for tomato and pulses were conducted, and maize value chain development to increase farmer's income in Myanmar consultation was facilitated. Likewise, the Climate-Friendly Agribusiness Value Chains Sector (CFAVC) project was launched, and preparation to deploy the Climate-Friendly Agribusiness Value Chain specialists was organized to carry out the ToT. Finally,

the concept note to establish an agribusiness cell was formulated asan essential step for towards developing the agribusiness incubators (Annex Table 22).

Despite the progress mentioned above, generally, the momentum of achieving outcome 3.6 is trivial. Nine of the outputs are lagging, and key deliverables of the implemented 5 outputs were not achieved. Therefore, for the remaining years of the ADS implementation, these outputs and the undelivered targets shall be prioritized. On the other hand, some outputs shall be reviewed for streamlining. Similar outputs, such as 3.6.5, 3.6.6, and 3.6.7 about supporting the value chain actors, shall be integrated. Outputs 3.6.10, 3.6.11, and 3.6.18 all intended to establish funds for value chain innovations, development and competition shall be considered one output only. Besides, output 3.6.14 (Training of Trainers on Climate-Friendly Agribusiness Value Chains) is an activity statement that shall be broadened to output. The output 3.6.2 (conduct value chain study) can be integrated as an activity under 3.6.1, considering that it is essential. Conducting studies to select the value chains shall be carried out to establish the 7 target prioritized

value chains fully.

Furthermore, ADSISU has to develop the ADS planning guideline to facilitate the inclusion of the ADS outputs and deliverables during fiscal planning and budgeting. Failure to do so will result in the partial achievement of outcome 3.6.

2.5.7 Progress of Outcome 3.7 on Food Quality and Safety

Food quality and food safety are central issues in today's food systems. Food quality and food safety have an intricate relationship, so each component cannot be viewed independently. Realizing that Myanmar missed many previous opportunities from the globalized world, the current Government had shown interest in establishing and strengthening food quality and safety standards and systems [53]. The objective is to facilitate small food businesses and agro-enterprises to have an acceptable level of food quality and safety from field to plate.

The modernization of the current Food Law formulated in 1997 was highlighted in the ADS as a basis to develop effective regulations and enforcement of international standards. The sanitary and phytosanitary regulations (SPS), quality, and safety standards for the prioritized value chains shall be established. The ADS also underscores the accreditation of national food quality and food safety certifying bodies and national laboratories. Moreover, strengthening existing laboratories and the establishment of new laboratories at the regional level and district offices for food safety testing are considered fundamental[54]. Other actions deemed necessary for implementation are the capacity risk assessment, establishment of one health approach, increasing private sector engagement, and building capacity to implement all food quality and safety standards.

In 2018/19, the progress of achieving the outcome was limited to some success indicators reported under output 3.7.1 (help modernize the food law) and 3.7.13 (build capacities to trace production processes for agricultural and food products). Mainly, the advancements were on the accreditation of the fishery's Analytical Laboratory Unit under ISO / IEC 17025:2005 to issue lab test reports for frozen freshwater fish. The 27 laboratories were strengthened and upgraded, including procurement of 2 laboratory equipment to test antibiotics for food and the establishment of a national laboratories network. Also, awareness and information sharing workshop concerning general requirements for testing laboratories on ISO/IEC17025: 2017 was organized (Annex Table 23).

The 11 planned outputs were not implemented. Considering the limited capital budget of only 125.56 million kyats during fiscal year 2018/19, achieving all the outputs was challenging for MoALI . In fact, the implementation of the awareness-raising on the ISO/IEC 17025:2017 was from the recurrent budget.

53 MYANMAR: National Action Plan for Agriculture (NAPA) Working Paper 14: Food Safety and Quality Standard (source: http://www.fao.org)

54 ADS Outcome 3.7 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

In this regard, it is strongly suggested streamlining outputs under outcome 3.7 by combining similar outputs. Outputs 3.7.5 can be combined with 3.7.6 having a similar objective of strengthening existing laboratories and building new regional laboratories. Similarly, output 3.7.3 and 3.7.10, develop SPS and facilitate negotiation with key trading partners, can be integrated into one. On the other hand, output 3.7.11 is a cross-cutting activity that can be embedded under outputs 3.7.1, 3.7.3, and 3.7.4 Output 3.7.8 (conduct awareness) is an activity that can also be part of other outputs. It is essential to only prioritise critical outputs relevant to achieving the outcome and supporting Myanmar's vision of protecting the communities from foodborne illnesses. Besides, outputs under outcome 3.7 shall be distinctive with those under outcome 2.8 (on GAP) and 3.3 (on Food Quality). Currently, there are outputs under these three related outcomes that are similar.

Moreover, lagging outputs shall be considered for MoALI's programming, resource mobilization, and Government planning and budgeting. ADSISU shall facilitate a process to ensure that delays of these outputs accordingly.

2.5.8 Progress of Outcome 3.9 on Trade Facilitation and Export Growth

Myanmar trade volumes are increasing, so no matter how streamlined or developed a paper-based trade documentation system, it will ultimately not keep at pace with the growth in trade[55]. It is clear from the international experience of other developing countries that fulfilling export and import procedures take at least fifty percent more time than it does for developed countries [56].

The ADS outcome 3.9 intends to modernise the trade facilitation of Myanmar's agricultural products, making it efficient. This process is crucial for improving agricultural and food product competitiveness and Myanmar accessing the international market sustainably. The development and establishment of a single electronic window and paperless trade systems under the framework of e-Government initiatives linked to ASEAN single window are expected. The preparation and implementation of plans for handling surges of transit goods of the Western China markets' growing import activities are planned to be carried out. Improving the trading regime at land-borders of the neighboring countries is required to be established. In this context, a reduction in licensing requirements for imports and agricultural and food exports are considered to be rationalized, including the negotiation of export licenses of Myanmar's agricultural and food products [57].

Likewise, the ADS underlines improving the Government of Myanmar's capacity to facilitate the

55 The impact of ICT in Trade facilitation on business in Myanmar (source: https://www.researchgate.net)

56 ditto

57 ADS Outcome 3.9 description Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

implementation of the agriculture export promotion and negotiation with World Trade Organizations and ASEAN Economic Community. Nonetheless, implementing the national trade facilitation strategies to reduce cost and shipment time shall be prioritized to improve revenue collection and regulatory enforcement.

During the first year of the ADS implementation, fiscal year 2018/19, despite efforts to advance all 10 planned outputs, only output 3.9.2 (help develop more effective trade facilitation capacities to reduce the cost of clearing goods through customs and border control) had progressed partially. The third meeting of the National-level Trade Facilitation Committee on the World Trade Organisation's Trade Facilitation Agreement (WTO TFA) was organized. Six infrastructures to support cattle trade were built (Annex Table 24).

The other 9 outputs were entirely not implemented. Given the limited budget of 554.88 million kyats against 5,880 million kyats investment estimate, it was challenging to achieve all 10 outputs. Besides, MoALI has a limited mandate on trade facilitation. Therefore, coordination with the Ministry of Commerce has to be improved.

On the other hand, outputs under outcome 3.9 shall be reviewed and simplified, particularly on redundant outputs 3.9.3 and 3.9.6, all related to custom clearance services. Also, the outputs have to be rationalized, ensuring not undermining the achievement of outcome 3.2 (protection of intellectual property rights).

2.6 PILLAR'S PROGRESS AT A GLANCE

The below boxes summarises the main achievements per pillar, and outcome, based on results presented in 2.2-2.4. They present the key progress for each Pillar during the first year of the ADS implementation (2018/19), as well as a summary of planned but not implemented outcomes and outputs:

2.6.1 PILLAR 1: MILESTONES on GOVERNANCE

Outcome 1.1: Effective integrated planning based on participatory processes both at the union and at the state/region level.

- Assessment on the effectiveness of methodologies and the relevance of existing planning templates.
- Conducted 10,450 village development planning exercises using participatory methodologies.
- An on-going review of the existing Department's result framework to align with the ADS and MS-NPAN, improvement of baselines, targets, and making outputs and outcomes indicators verifiable and SMART.
- Submitted monthly loans/grants project and quarterly results-based reports to the Project Appraisal and Progress Reporting Department and the Treasury Department of the Ministry of Planning, Finance, and Industry (MOPFI), as well as to the Foreign Economic Relations Department (FERD).
- Establishment of the e-Government system and Knowledge Center (KC) at Union level and 18 KCs at States and Regions.

Outcome 1.2: Improved capacity for policy formulation and analysis.

- Agriculture Policy Units was established and operational with 11 policy officers.
- Prepared policy brief on the critical role of a strong national agricultural research and extension system.
- Conducted 9 policy discussions or free talks.
- Two field surveys conducted for ADS and MS-NAPN in the Ayeyarrwaddy Region and Shan State
- Revision of the existing Biosafety Framework and Law.
- Research on pulses value chain under the Project on Agricultural Transformation and Market Integration in the Association of Southeast Asian Nations (ASEAN) Region (ATMI-ASEAN).
- Organised 2 policy round tables on pulses value chain study.
- Supported policy research and studies on migration, irrigation, non-farm studies, and land tenure security and vegetable value chain.

Outcome 1.3: Timely and Effective Monitoring and Evaluation processes that inform a web-based Management Information System (MIS).

- Establishment of M & E units for all MoALI Departments with dedicated staff and Terms of Reference (TOR).
- An M&E results framework and a basic guiding template for each Department have been developed.
- M & E coordination meetings, including ADSISU conducted.
- 2 comprehensive workshops and training on M & E were carried out.
- Conducted Strength Weakness Opportunities and Threat (SWOT) analysis for all MoALI's Department's M & E units.
- Meetings with 18 ODA loan projects that agreed on a coordinated mechanism for project monitoring and evaluation.
- Revision of the ADS M&E framework to improve relevancy, feasibility, and technical applicability for a pragmatic ADS monitoring and evaluation that is harmonized with the Department's result framework, MS-NPAN, and MSDP.
- Established the Vessel Monitoring System (VMS) for effective monitoring of marine resources, particularly protecting native and threatened species from degradation

Outcome 1.4: Sound statistical systems for evidence based decisions

- On-going negotiations with FAO to provide financial and technical supports to carry out a comprehensive census with ICT.
- Workshops on building master frame with integration of GIS/Satellite imagery, the use of Electronic Document Management System (EDMS) Software and Government Personnel Management System (GPMS).
- Market Information Service (MIS) established Facebook page that published market information and data and circulated market information through the Agri-business Journal, the Farmer Journal, and Agriculture Market Information Agency (AMIA).
- Published the Livestock Baseline Survey report for informed decision making.

Outcome 1.5: Strong farmer and industry associations and federations.

- 98 training, 7 field days, and three forums for the effective management of farmer organizations conducted for farmers' cooperative societies.
- 26,565 members of the cooperative societies, board members, and farmers, as well as the 2,821 States and Regional technical officers of MoALI participated the above mentioned training, Field Days and Forum.
- Up-graded the training facilities and working environments for facilitators.
- Annual meeting was conducted on harmonizing the sugarcane production and sugar market attended by 39 farmers, two cooperative representatives, 54 committee members, 51 from the private sector, 121 MoALI Staff, and 34 from other institutions.
- 77 new cooperatives established and registered.

- 621.6 billion kyats disbursed to support cooperative societies to increase products volume, services and trading.
- 11.2 billion kyats worth of agricultural inputs have been distributed to Agriculture Supply Services Cooperative Society (ASSCS) members through a hire-purchasing system.

Outcome 1.6: Strengthened farmers' land rights and enhanced capacity of institutions involved in agricultural land

- Conducted land surveys and inventories, updated the cadastral information, produced digital 5,034 digital "kwin" maps for 83,591 land holdings, issued land tenure rights, and registered land titles.
- Central Land Records Development Training Center (CLRDTC) rolled-out training courses, workshops, and on-the-job training not only for the technical staff of the land management and administration services but also with the members of the District and Townships land management committees and the General Administration Department (GAD).
- The land management and administration services technical officers received trainings on using Android-Based Survey Solution (TABSS), Geographic Information System (GIS), Remote Sensing and Database, Unmanned Aerial Vehicle (UAV) Aerial Imagining for Surveying, Mapping, and Satellite Photogrammetry.

Outcome 1.7: Enhanced MOALI capacity for ADS coordination and implementation.

- ADSISU unit is operational to carry out its core functions related to ADS.
- The Technical Assistance (TA) was deployed to strengthen the capacity of ADSISU. Substantial efforts and technical support were provided to empower ADSISU and ensure uptake of knowledge, skills, and abilities (KSAs) following the capacity building plan.
- ADSISU conducted pragmatic contribution analysis as an initial step to prepare the first ADS progress report in close coordination with 13 MoALI Departments and Minister Office.
- MoALI performed so well in coordinating and negotiating investments for the agriculture sector. Signed three Memorandum of Agreements (MoUs) with ASEAN organizations and a protocol to amend the ASEAN plus Three Emergency Rice Reserve (APTERR).
- MoALI organized the 3rd Agriculture Rural Development Coordinating Group (ARDSCG) and hosted the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Agriculture Ministers meetings.
- Regular National Project Steering Committee (NPSC) meetings for international loans and grants were conducted, particularly for the FARM project.
- Negotiated with the EU a Budget Support of 112 million Euro to implement ADS nutrition-related outcomes as a contribution to the Multi-sectoral National Plan of Action for Nutrition (MS-NPAN) was finalized.
- The Climate-Friendly Agribusiness Value Chain (CFAVC) Sector Project was approved, for which the implementation started during the fourth quarter of fiscal year 2018/19.

- The 5th Japan-Myanmar Cooperation and the World Bank loan project in relation to building the National Food and Agriculture System still under negotiations.

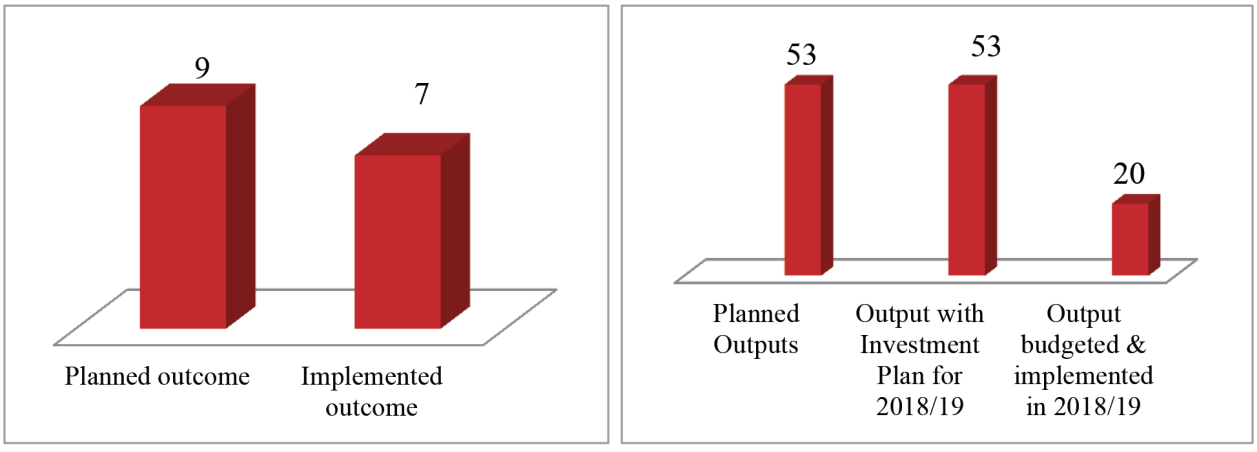
LAGGING OUTCOMES AND OUTPUTS:

As previously stated, out of 9 outcomes planned for implementation in 2018/19, only 7 outcomes (78%) have showed positive advancements (Figure 8). Currently, there are no advances in outcomes 1.8 (improved food and nutrition security) and 1.9 (MoALI restructured to integrate existing units better and become more responsive to farmer's enterprises and civil society).

The DRD is supposed to be responsible for achieving outcome 1.8; however, DRD's current mandate does not include specific food and nutrition security functions accordingly. Besides, the ADS missed elaborating measures to guide the achievements of outputs under outcome 1.8. In this regard, a review of this outcome shall be carried out to further elaborate the output indicators, as proposed in Section 3 and 4. On the other hand, achieving outcome 1.9 require facilitation from the Minister's Office. With MoALI's current limited budget, the planned broader restructuring process has been delayed. Although, M&E Division and APU under DOP and M&E units for each of the MoALI Departments were created. These achievements were reported under outcome 1.2 and outcome 1.3.

Moreover, from the planned 53 outputs[58], only 20 outputs[59] were budgeted and implemented[60] mostly using the capital budget (for more details, please see Section 3) with some portion from the recurrent budget, particularly on strengthening human resource capacities[61] (Figure 8). All 9 outputs under outcome 1.8 and 1.9 were not achieved, as well as the 3 outputs under outcomes 1.10 and 1.11[62]. The other 24 outputs with zero advancements are mainly under outcomes 1.6 (14 outputs) and 4 outputs under 1.5 and 1.7, respectively.

Figure 8.Planned vis-à-vis implemented outcome and outputs



58 Although the ADS IP has indicated investment estimates for 57 outputs in 2018/19

59 Output 1.1.8 and 1.7.3 are similar, so counted as one.

60 Overall achievement is partial without achievements of some output progress indicators

61 The current ADS IP only calculated output level capital investment, but not on recurrent. Thus, current analysis is limited to actual expenditures related to human resource capacity strengthening.

62 Outputs indicated in the ADS IP but not in the ADS publication.

2.6.2 PILLAR 2: MILESTONES on PRODUCTIVITY

Outcome 2.1. Improved research system for crop, livestock, and fisheries and improved research-extension coordination systems with participation of farmers and private sectors.

- The Fish Disease Laboratory and Freshwater Aquaculture Research and Extension Centers (FAREC) were established and operational.
- 15 fundamental and applied biological, chemical, and physical researches on fisheries, 41 on crops and other products, 3 soil sciences types of research and 20 research and development studies, were conducted.
- 15 agricultural economics, 3 researches on marketing, including gender roles in agriculture were carried out.
- 23 types of post-harvest technologies researches to improve maize, chickpea, hybrid rice, green gram, mango, rice, and tomato were carried out.
- 24 new research infrastructures were built, 32 farm facilities and 2 Histopathology laboratories, and a Molecular laboratory were improved. The existing research facilities were furnished with 139 new laboratory equipment and farm machineries.
- 12,973.97 acres of demonstration plots for various crops, high yielding native varieties were established, 13 workshops on maize and other cereal crops (i.e., rice, wheat) variety protection, post-harvest, and plant protection, as well as an annual meeting for the DAR DOA joint research findings presentations conducted.
- Farmer Channel continue broad casting 66 news , 10 talk shows, 12 documentaries short stories on research results and adoption of agricultural good practices/technology and as part of research dissemination systems.
- 91 farmer field days on research results attended by 5,278 people were organized.
- 3 structured meetings that promoted sericulture research and development and 13 workshops on maize and other cereal crops (i.e., rice, wheat) variety protection, post-harvest, plant protection were conducted.
- A Private-Public Post-harvest conference was facilitated to stimulate the Public-Private Partnership (PPP) further.
- Agricultural research services institution and human resources capacity strengthening. All agriculture field extension officers and 156 Doctor of Veterinary Medicine (DVM) were trained. 44 MoALI technical officers participated in the production and distribution of animal feeds and domestic market development research training. 300 MoLAI staff attended capacity strengthening, including 45 training sessions on maize and other cereal crops (i.e., wheat, rice), pulses, and horticulture, agricultural economics, plant variety protection, computer skills, post-harvest, and rice Bio Park.
- Established the Young Scientist Initiative (YSI) to increase the number of agricultural researchers.
- Launch the preparation of the agricultural research master plan and road map.
- Established partnerships for various research works with international research organizations such as Michigan State University (MSU), Japanese Universities, Society

for the Protection of Animals Abroad (SPANA), Australian Center For International Agricultural Research (ACIAR), Commonwealth Scientific and Industrial Research Organisation (CSIRO), and Australian Universities.

- Yezin Agricultural University (YAU) signed MoUs and commenced partnerships with Wagening University and Research, Jiangsu Academy of Agricultural Science, Graduate School of Chinese Academy of Agricultural Sciences (GSCAAS), Cologne University Applied Sciences, Chengdu Institute of Biology Chinese Academy of Science (CIB, CAS), Nakamura Gakeun University and Nakumara Gakeun Junior College and Sungkyunkwan University for joint research , workshops and staff exchange.
- YAU has on-going research partnerships with Kyushu University, MSU, Yunnan Agricultural University, Karlsruhe Institute of Technology (KIT), Kyoto University, and Seoul National University, as well as the Embassy of the Netherlands.
- YAU is undergoing several discussions for possible research collaboration with the French Agricultural Research Center for International Development (CIRAD), University of Helsinki, Bern University (HAFL), GRET professionals for fair development, Chonnam National University, Chiba University and Maejo University.

Outcome 2.2. Transformed public-private agricultural extension system delivering improved products (crop, livestock, fisheries) and technology for adoption and adaptation better linked to agriculture research.

- 250 villages of the 89 village tracts have village extension plans and implemented agri-extension.
- Staff training needs assessment was facilitated and developed a training plan for the Department of Agriculture (DOA) technical and extension officers.
- 340 types of extension training were conducted to approximately 23,092 DOA extension and technical officers.
- 82 different livestock extension and human resource development training, including the Continuous Professional Development (CPD) were provided to 2,946 veterinary technical officers, veterinarians, UVS staff, and students.
- 1,346 fisheries and aquaculture extension and technical officers trained on 55 various fisheries and aquaculture training.
- Provision of transportation facilities, equipment and machinery for the extensions services and a well-equipped mobile animal clinic is operational that is providing extension services to livestock communities.
- 63 centers are operational to share information and knowledge and 579,108 pamphlets, manuals, and handbooks of various subject matters were produced and distributed to farmers.
- 6 types of grants (revolving funds) provided by DOA to 9 villages as part of the livelihood capacity building.
- 3,221 extension activities on improved/GAP technologies and research-based knowledge on crops were organized.
- 15 field demonstrations and 18 rubber field training and lectures attended by 432 farmers were facilitated.

- 218 existing and new farmer organizations were provided capacity strengthening on food safety and hygiene, machine, and waste cleaning training.
- 198 seed grower associations were organized and registered under the Union of Myanmar Federation of Chambers of Commerce (UMFCCI), including the 60% of the regional seed growers' associations established in Nay Pyi Taw, Mandalay, Sagaing and Bago regions.

Outcome 2.3. Develop (or revive) effective education and training to build "human capital" in the agricultural and food sector responding to the evolving needs of farmers and the private sector in rural areas.

- Upgrading of the Bachelor of Animal Science curriculum in partnership with Massey University (New Zealand).
- 52 (36 male and 16 female) Bachelor of Science (B.S. A. Sc) students and 156 Master of Veterinary Medicine (MVM) students (70 female students and 86 male students) attended field exposures on livestock production and animal health.
- 100 undergraduate students from UVS attended lectures on animal clinics with experts from the Society for the Protection of Animals Abroad (SPANA), and post-graduate students joined the continuous professional development training also conducted by SPANA.
- 37 training courses on modern agricultural technologies facilitated by Yezin Agriculture University (YAU)for YAU students were organised in collaboration with the Department of Agriculture (DOA), JICA-TCP, Agricultural Mechanization Department, and Private Sector organizations.
- 2,362 students were enrolled in the Yezin Agricultural University (YAU) that is taking up various sectorial disciplines.
- 5 Cooperative Universities and Colleges learning facilities and environments were upgraded and 30 agriculture training centers in State and Regions were improved for an effective training service delivery.
- Capacity strengthening of universities and college faculty and teaching staff. 136 YAU and UVS faculty and teaching staff received training on laboratory enhancement operations, application of polymerase chain reaction (PCR), and research ethics. 545 Cooperative Department staff officers at Union, States, and Regions attended the different capacity building opportunities on the improvement of service delivery for rural cooperatives.
- **Strengthening of the UVS**[63]
    - o 1 upgraded infrastructure with electricity and backup generator and automatic transformation system for research work.
    - o 1 infrastructure was built for Teaching & Research (Post-mortem examination unit) to improve research capacity.
    - o 26 infrastructures were upgraded to create better teaching and learning environment for students & faculty members.

63 An outcome 2.11 only indicated in the ADS IP, but related to education, thus integrated in outcome 2.3

- Upgraded the Information and Computer Technology (ICT) with internet and LAN connection.
- Laboratories (Histopathology Lab & Molecular Lab) were upgraded.
- Laboratory equipment (Deionizer, Deep Freezer, FT-NIR) procured to increase research capacity.
- International Atomic Energy Agency (IAEA) supported laboratory equipment at the Department of Physiology and Biochemistry.

Outcome 2.4. More responsive and reliable irrigation and drainage services and more efficient and sustainable water management systems.

- 244,648 acres were irrigated from groundwater sources.
- 2,822,382 acres of the irrigated area increased in 15 States and Regions from the rehabilitated and newly constructed irrigation system operated and maintained for regular and efficient use of water.
- 2,813,056 acres were irrigated from the rehabilitated and newly constructed village embankments and 3,153,559 acres were supplied with water from existing reservoirs, weirs, lakes and ponds, sluice gate and pumping stations.
- 54 rehabilitation activities were conducted, such as improving the existing irrigation schemes, expanding the canal networks, constructing permanent headwork, and upgrading the main canals
- Participatory Irrigation Management (PIM) and PIM Task Force have been formed and functional.
- PIM guideline and technical manual formulated and used.
- 1,048 Water Users Group/Associations (WUG/A) were formed and trained on Participatory Irrigation Management (PIM) training.
- 5 Water Users Associations (WUA) have been selected by the construction team to manage some irrigation systems.
- 2,621 IWUMD technical officers, WUG/A, and farmers received capacity strengthening on O&M, and water tax, water management, irrigation asset management, and GIS, heavy machinery operation, and tube well drilling.
- Machinery and equipment were provided to four IWUMD mechanical branches for the smooth and timely implementation of works.
- Maintenance work has been carried out for the existing drainage that irrigated 897,241 acres.

Outcome 2.5. Increased use of improved farm production inputs and technologies by crop growers.

- 61 seed laboratories and 40 seed farms upgraded. 9 varieties of certified seed crops were produced, and approximately 702.95 acres were used for seed multiplication of 21 types of cereals, legumes, vegetables, oilseeds, tubers, perennial cash, and industrial crops.
- 51.75 acres were used for varietal selection/trials/research of 19 crops (i.e., rice, maize, legumes, vegetables, spices, perennial cash crops, etc.) and 40.92 acres for breeding 18 crops such as rice, maize, tubers, vegetables, legumes, spices, including crop varieties with promising yield in different agro-ecological zones.
- 21.84 acres farms of breeder and foundation seeds collection maintained.
- 25.38 acres were used for the hybridization of 11 food and industrial crops, including open-pollinated varieties of legumes. 34.15 acres for the production of F1 hybrid maize, sunflower, and rice seeds.
- 735.07 acres were used for productions of breeder, foundation, registered and certified seeds of cereals (rice and wheat), legumes, spices, vegetables, oilseeds and nuts (groundnut, sesame), as well as cotton.
- 10,392.47 acres were maximized to produce good quality food crops seeds, 75,000 packs of mushrooms planting materials, 187 boxes of silkworm eggs, and 62,640 viss cotton seeds.
- 189 kgs and 83,000 hills seedlings of high-quality seeds and planting materials of coffee, 309 boxes silkworm eggs, 33,294 visses cotton, 319, 087 tons sugarcane, and 334,360 hills seedlings rubber were distributed to farmers and crop producers.
- 21,838 diverse genetic resources of wild, landraces, and released varieties of crops such as the resistant varieties of rice, maize, and legumes, and 200 traditional diverse crop varieties of upland rice, NaMaThaLay local rice, pulses, and vegetables stored in the gene bank
- 198 seed growers associations and seed businesses were certified.
- The fertilizer technical committee (FTC) was formed that provides advice and performs enforcement of fertilizer quality assurance through regular market inspections of counterfeit and unregulated selling of fertilizers.
- 1,007.53 tons of 46 kinds of illegal fertilizer products, 1,179 liters of unregistered liquid pesticide and 4,986 kilograms of pesticide powder were confiscated and destroyed.
- 1,068 types of fertilizers were registered and licensed. 21,203 retail and wholesale shops of fertilizers, pesticides, and herbicides were provided a license to operate, and 3,801 pesticide distributors were registered.
- 7 demonstrations on proper fertilizer application were organized, and 50 packages of groundnut rhizobium fertilizer were produced and distributed to farmers.
- 130.54 acres were used for 108 types of researches/experiments/studies and testing on the effect of commercial inorganic and organic/bio-fertilizers applications on crop yield and quality and 245 soil samples have been analysed, and 64 plant samples in selected areas of Myanmar were examined on spatial variability and fertility.

- 7 plant pathology and 40 types of various research studies on IPM and bio-control of weeds were conducted, as well as entomology research/experiments/studies, including pesticide residue testing on food.
- Conducted entomology field research detecting brown planthoppers resistant varieties on 72 rice varieties, 37 irrigated rice varieties, 23 rainfed rice varieties, 12 drought-tolerant rice varieties, and collection of Trichoderma and Mycorrhiza fungi was carried out. A major insect-pest warning model using defining distribution map for insect pests and natural enemies on rice and pulses was established, while 2 plant protection liquid chromatography-mass spectrometry (LCMS) laboratory machines and high-performance liquid chromatography ultraviolet (HPCL UV) detector were purchased that strengthened the pesticides and herbicides laboratories.
- 7,985 MoALI technical staff and farmers were participated in the various types of capacity building of different subject matters such as seed and planting materials breeding, four seed quality inspection on green gram and sesame. Training on post-harvest technology to maintain seed vigor and quality control on chickpea, sunflower, groundnut, green gram, pigeon pea, and black gram was provided.
- 26 training on seed certification and multiplication on various cereals, legumes, vegetables, and fruits, as well as the submergence tolerant and black turmeric were organized.
- 3 training on the implementation of the fertilizer law and regulation, training on balanced-nutrient fertilizer application and 12 training on certified pesticide applicators were conducted that were attended by 1,815 participants from concerned public organizations and importers/dealers/retailers of fertilizers, pesticides, and herbicides.
- Printed pamphlets and bulletins on fall armyworm trapping and integrated pest management methods and extension materials were distributed to MoALI technical staff and farmers.
- 6 training on the operationalization of animal quarantine stations that were attended by 93 LBVD technical officers.

Outcome 2.6. Increased application of appropriate mechanisation in the agricultural value chain.

- 1,102,447 acres were serviced for land preparation, 2,562.5 acres for transplanting, and 68,664.5 acres combined for harvesting.
- 6,527.66 acres have been transformed into systemic mechanized farms, and 1,040 acres of terraces and 400 acres of upland farms of terraces were reclaimed
- 121 associations have been established in 13 States and Regions for private mechanization service provision.
- 7,072 units of farm machinery to farmers and 365 units were sold to farmers through private sector collaboration. 50 units of farm machinery are accessible by rentals at the AMD mechanization stations.
- 3,597 farmers received training on farm machinery operation & maintenance, 941 farmers attended farm machinery repair and maintenance.

- 13,931 farmers participated in 420 demonstrations of the different farm machinery, including rice planting and drying machines, land preparations, transplanting machines, and harvesting.
- 6 building in were constructed for capacity building and strengthening opportunities.
- 62 mechanical workshop facilities were upgraded, including the 2 base workshops and a mechanization testing center equipped with 15 units of machinery was established that were accessed by 1,133 farmers.
- 61 types of research were carried out on crops seeding and transplanting, crop digging and harvesting, tillage, weeding and weed control. A research on straw management was conducted and 112 joint researches with Agricultural Machinery System and Engineering Co. Ltd (AGM and S & E) on land preparation and harvesting were organized.

Outcome 2.7. Livestock and fish - Increased use of improved livestock and fish breeding, health and husbandry service and technologies by livestock and fish producers.

- 7 laboratories equipped with AI facilities and liquid nitrogen (LN2) are operational and serving 40,000 livestock farmers and 3,500 commercial farms to inseminate the 97,586 cattle, goats, and swine.
- The AI training was carried out in targeted States and Regions for which 140 LBVD staff, including veterinarians and 40 farmers were trained.
- 5 national animal health and disease surveillance plans on Foot Mouth Disease (FMD), African Swine Fever, Peste de Petits Ruminant (PPR), Avian Influenza, and Rabies were developed and implemented.
- The Peste de Petits Ruminants (PPR) field visits on goats was conducted. 30 field visits on native chicken production and surveillances on vaccination against Newcastle Disease (I2 vaccine) in 6 States and Regions were carried out. 30 vaccination and surveillance visits were conducted on foot and mouth disease (FMD), and 3 surveillances on swine diseases were organized.
- 1 animal hospital in Insein Township, Yangon hospital were upgraded to support effective and efficient animal health, and disease treatments and UVS arranged a meeting to establish the one health programme in Myanmar.
- 4 laboratory facilities were renovated, 1 reagent for Brucella and 9 domestic vaccines were produced such as the Bovine Haemorrhagic Septicaemia (HS), Bovine Anthrax (AA), Bovine Black Quarter (BQ), Bovine Foot and Mouth Disease (FMD) "O," Pig FMD, Hog Cholera, Avian Newcastle Disease (I2), Elephant AA and Rose Bangal Antigen.
- A laboratory room dedicated to produce the FMD vaccine was built, and 6 cold chains in Yangon,, Nay Pyi Taw and Mandalay are fully operational.
- 1,601,110 cattle & buffalo heads were vaccinated with Bovine HS, 9,347,090 were vaccinated with Bovine AA, and 1,121,776 were vaccinated with Bovine BQ. Similarly, 7,598,976 chicken heads were vaccinated with I2 for Newcastle Disease,

- 474 companies were registered and licensed to produce and import livestock inputs such as veterinary drugs, animal feeds, vaccines, and allied livestock inputs.
- 2 research facilities for testing honey were constructed and 1,020 beekeepers participated in the apiculture training, for which 999 farmers were eventually engaged in the industry.
- An infrastructure equipped with laboratory tools for feed testing was built, and 3 straw warehouses and machines for pasture and feeding practices were constructed.
- 15 modified animal genetic conservation farms were developed and maintained.
- 8 training was conducted on laboratory management, good clinical practice for veterinary practitioners on cross-border animal epidemic, beef cattle breeding technology, use of nuclear-derived techniques for early detection of Foot and Mouth Disease (FMD) and differentiation of priority and zoonotic, on surveillance and diagnosis development of FMD and detection of multiple pathogens for differential diagnosis and syndrome surveillance for trans boundary animal disease.
- A workshop to develop an animal feeding strategy was organized and 4,411 farmers and LBVD technical officers were trained on Good Animal Husbandry Practices (GAHP).
- 4 marine and freshwater treatment tanks with 20 tons holding capacity were constructed. A nursery of Tilapia brood fish was improved, and a building of RC Shrimp Hatchery was built, including 20 larval rearing tanks (LRT).
- Improvements of the Nat Yay Khan Fishery Station, Kyauk Phyu Shrimp Hatchery and Ayeyarwaddy Region Pantanaw Fishery Station were completed.
- 30,000 an inch of Rothee alfredian carplet fingerlings have distributed to farmers, 80,000 juveniles have been released to the water and 0.1 million fingerlings were produced and released in Ayeyarwaddy River.
- Aquaculture Research and Extension Center (FAREC) was established and operational. A data collection system was in-placed that records the frequency of marine fishing activities, number of licenses issued for fishing vessels, seed production, and export volumes.
- Research and inventories were conducted to investigate fish species such as Nga Myinn (Giant Butter Catfish) and Nga Tha Lauk (Hilsa illisha) that are adaptable and potential for aquaculture farming. The analysis of the fluctuation of fish species with local communities was carried out, including a comparison of Human Chorionic Gonadotropin (HCG) and Superfecthormons and rearing Thai sliver barb in ordinary water of Sei Daw Gyi Dam and poorly filtered water.
- Experiments were conducted on induced breeding of Nga Phae Oung (Rohtee belangerii), Nga Phan Ma (Rothee alfredian carplet), Nga Phae (Notopterus notopterus), Nga Myin (Silonia Silondia) and Viet Nam Climbing Perch (Nga Pyay Ma).
- 24,643 acres Locally Managed Marine Areas (LMMAs) were established, including an extension of the new conservation area.
- The Vessel Monitoring System (VMS) was installed that monitors inshore and offshore fishing activities in Myanmar waters.

- The new Marine Fishery and Aquaculture Laws are prepared and at Bill stage.
- The National Plan of Action on Illegal, Unregulated and Unreported (IUU) Fishing was prepared, and 86 unregulated and unlicensed fishing vessels, including three foreign fishing vessels, were confiscated and fined.

Outcome 2.8. Sustainable Practices - Sustainable Farming, Good Agricultural Practices (GAP), Good Animal Husbandry Practices (GAHP), Good Aquaculture Practices (GAqP), and Organic.

- GAP guidelines for each crop based on the safe use of fertilizers, pesticides, and post-harvest practices and the National Aquaculture Development Plan that underlined the adoption of GAqP were developed. Additionally, GAHP guidelines for commercial swine farming, backyard swine, layer, broiler, backyard poultry and bee have also formulated.
- A National Laboratory for GAP was established and Analytical Laboratory Unit accredited by ISO / IEC 17025:2005 to issue lab test reports for frozen freshwater fish, seawater fish, shrimp, crustaceans and dried fish and shrimp.
- 3,017.72 acres and 243 farms were GAP certified according to the ASEAN GAP guidelines.
- 9,254.74 acres and 8 companies GAqP certified according to the ASEAN GAP guidelines.
- 68 Hazards Analysis and Critical Control Points (HACCP), 6 Good Mnaufacturing Practices (GMP), and 6,069 Health Certificates were granted. Food safety quality certificates were issued for four different types of fish and fishery products, namely: the frozen, chilled, live, and dry forms that were for export to EU, Korea, and Saudi Arabia (under exploration).
- 211 GAP, 185 GAHP, and 2 GAqP training were conducted, as well as one ISO 9001:2015 certificates training for laboratory staff and GAP forum on coffee.
- 342 acres were used for different crops GAP demonstrations and 56 field days were carried out.
- 3,017.72 acres for the 132 farms were GAP certified according to the Myanmar GAP standards following ASEAN GAP guidelines.
- 342 acres were used for different GAP demonstrations, and 56 field days were carried out
- 20,600 handbooks and 215,394 pamphlets were distributed to farmers and commercial farm operators for broader awareness, understanding, and adoption of sustainable farming practices, GAP, and GAHP to increase the production of crops, backyard/commercial swine, layers, broiler, and native chickens.
- Enforcement of good practice protocols was controlled through regular monitoring, field survey, and visits. Surveillances were conducted for the GAHP backyard, and commercial swine, GAqP, GAP certified farms and products.

Outcome 2.9. Resilience - Resilience of Farmers to Climate Change and Disasters.

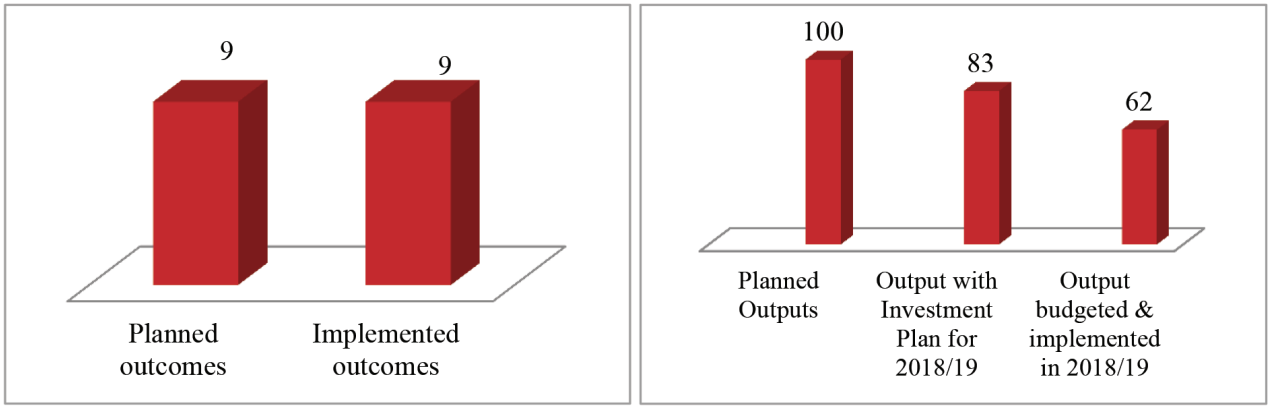
- 25 types of research/studies/trials/varietal selections were conducted on submergence, salt and drought-tolerant rice varieties, and drought-tolerant groundnut, cotton, and sugarcane. Experiments were conducted to select yellow mosaic resistant green gram and tomato varieties suitable for adverse climate conditions. Other studies carried out were on the analysis of BPH resistance on 37 irrigated rice varieties and 23 rainfed rice, as well as 12 Yeanaelo varieties.
- Varietal development of Sinthukha and Sinthwelatt rice with the integration of submergence tolerance, salt tolerance, and Bacterial Blight (BB) resistant genes were pursued.
- Research on the effect of climate change and cropping pattern on yield of rice-black gram, rice-soybean, rice-niger, rice-sunflower, rice-cow pea and studies on Green House Gass (GHG) emission on rice fields were organized with farmer's participation, including the selection of biotic and abiotic tolerant rice varieties.
- 10.21 acres of farms were used for these researches/studies/trials.
- 402 rice varietal lines resistant to flood were identified, and 130 lines from 12 parental submergence tolerant rice lines were selected, while 160 salt-tolerant rice lines selected from 7 parental lines.
- 3 varietal lines that are more resistant in the salt prone area and four drought-tolerant rice varieties with good eating quality lines were identified.
- 8 pods of mosaic virus resistant soybean varieties (Yezin 3 and Yezin 10) were selected, and the production of adaptable and resilient varieties of rice, maize, and mung bean was facilitated.
- A drought-tolerant rice variety was released, and 29 rice varieties of four heat-tolerant rice experiments and 94 varieties of five Yeanaelo rice experiments in the summer season were harvested.
- 26,658 farmers and extension officers attended the 82 CSA training on various crops. 50 education tours for farmers on CSA rice production were organized, and 3 FFS meetings on CSA were conducted.
- 195 acres and 26 demonstration plots and 23 field days were conducted for farmers to learn CSA practices and observe its results.
- 23,000 CSA manuals and pamphlets on cotton and allied fiber crops and 3,887 CSA pamphlets and handbooks on Mushroom production were distributed.
- 2,813,056 acres of embankment and 897,241 acres length of drainage canal was established and maintained, and 9,385 acres flood-prone areas were protected.

LAGGING OUTCOMES AND OUTPUTS:

As indicated in subsection 2.3, all 10 planned outcomes[64] for implementation in 2018/19 showed positive progress, although some key output progress indicators were not fully achieved (Figure 9). Of the 103[65] outputs, 61 outputs were budgeted and implemented (Figure 9). The 29 outputs under outcomes 2.1, 2.2, 2.5, and 2.9 were not implemented totally, as well as the 13 outputs under outcomes 2.3, 2.4, 2.6, 2.7, and 2.8.

The implementation of the 61 outputs was a combination of budget spent from the capital and recurrent. Although the recurrent budget contribution to the achievement of outcomes was for human resources capacity building and strengthening such as training, workshops, seminars, and exposures organized locally and internationally.

Figure 9.Planned vis-à-vis implemented outcome and outputs



2.6.3 PILLAR 3: MILESTONES on COMPETITIVENESS

Outcome 3.1 Improved business environment, information and investment along the agri-food.

- 3 training facilities and six rubber factories were built.
- The first meeting of the Investment Committee (IPC) was conducted and attended by 150 participants. The IPC and 5 Task Force Groups meetings were organized with support from Union MoALI. Five MoALI technical officers, including the ADSISU Director, are members of the five task forces.

64 Including outcome 2.11 indicated in the ADS IP

65 Including 3 outputs that are only shown in the ADS IP but not in the ADS publication.

Outcome 3.2: Protected intellectual property rights for the agricultural and food sector.

- The Myanmar Plant Variety Protection Law following the International Union for the Protection of New Varieties of Plants (UPOV) has been enacted on 24 September 2019 as the Pyidaungsu Hluttaw Law number 29.

Outcome 3.3. Reliable quality system developed that helps farmers and food processors get higher prices for higher quality goods, incentivizing quality upgrading develop.

- 128 MoALI staffs (72 men and 56 women) were trained on Good Hygiene Practice (GHP), Good Manufacturing Practice and Good Hygiene Practice (GMP) and Training of Trainer (ToT) on Setting up Laboratory and registration that was facilitated by the Food and Drug Administration (FDA).
- 18 units of laboratory equipment were procured, and an ELIB, a Library with an automation system was installed.
- 3,806 food products, 934 consumer products, and 181 cosmetic products were confirmed that passed the test according to the quality assurance standard in Myanmar.

Outcome 3.4. Enhanced framework for gender-equitable and participatory planning and implementation of rural development programmes institutionalized.

- 2,746 villages engaged in village development planning and 279 townships received support in Enhancing Rural Livelihoods and Income (ERLIP), Community Driven Development (CDD), and Village Development Planning (VDP) Projects.
- 2,685 community development projects, such as building and improvement of rural roads and bridges, establishing clean drinking water system, installation of rural electrification, building schools, health care centers, libraries, and village halls were implemented.
- 944 villages in 800 project units (Mya Sein Yaung) received revolving fund of 30 million MMK (about US$ 30,000) for each village.
- 786 capacity building training including natural resource management was carried out to prepare communities to implement prioritized development initiatives.
- 30,497 participants from, farmer's associations, cooperatives, village committee members, village constituents, the private sector, the Government and other institutions received capacity strengthening.
- 314,061 people were trained and participated in drafting or preparing project action plans, project management, and technical skills such as engineering and waste management.

- 46 Gender training sessions, 148 Training of Trainers (ToT)/ Training of Technical Facilitators (TTF)/Training of Facilitator (TOF), 275 capacity building specific training were organized at the Township level and 2 ToT/TTF/TOF, 12 capacity building training, and 2 Gender training sessions were conducted at the Union level.
- 55 exchange visits, 76 multi-stakeholder workshops, 31 Village Development Plan (VDP) workshops, and 150 publicity, promotion, and information campaigns were organized as a form of knowledge sharing and learning activities to promote community capacity building on rural development.
- 3,316 rural entrepreneurship and enterprise development skills and capacity-strengthening were carried out, such as agriculture and livestock breeding, livestock and veterinary practices, computer operation, diesel/wiring, carpentry/masonry, handicraft making, sewing, vocational training, GAP, GAHP, GAqP applications.
- 46,071 people trained in various rural entrepreneurship and enterprise development skills and vocational skills.

Outcome 3.5. Rural infrastructure improves smallholder agriculture efficiency and profitability.

- Construction of 266.84 miles farm-to-market rural roads, as well as 2,340.6 feet rural roads and bridges with culverts.
- 241 villages benefited the farm to market roads.
- 371,658 people are accessing farm to market roads.
- 2,174.38 miles of different types of rural roads such as concrete, earth, footpath, gravel, macadam, wheel track, kankar and bitumen were completed.
- 12, 185 feet of bridges with culverts were built.
- 4,269 villages, 856,863 households, and approximately 3,217,180 people benefited all types of roads and bridges.
- 599 rural (off-grid) electrifications were installed. 351 villages were connected to the national grid, 124 communities have engine power generation and 518 villages have generators.
- 59,712 households are connected to the national grid, 76,261 households connected to the generator, and 14,847 families are using the engine power generation.
- 4,167 rural villages have houses using solar home systems, 76 communities have mini-grid (solar, hydro, biomass, biogas), 49 villages with installed solar street lighting and 39 villages are using small hydropower generation.
- 31,278 public facilities are using solar system power, and 4,940 community buildings use mini-grid.
- 1,714 farmers/community and committee members and cooperative as well as DRD staff and other relevant institutions trained on National Electrification Project (NEP) capacity-building training.

- 3,882 units of different rural water supply infrastructures were constructed and rehabilitated, such as deep tube wells, shallow wells, spring/gravity flow, overhead, or ground tanks.
- 2,496 villages have access to clean potable water system, 443,386 households, and approximately 2,150,965 people are using the improved/safe rural water systems.
- 314,641 households and approximately 2,940,517 people are using these improved/safe rural water supplies.
- 2,275 Water Association Committees (WAC) were established to ensure the sustainable functioning of the water systems.
- 129 water supply training, including 2 training on the rehabilitation of drilling rigs were conducted.
- 1,376 committee members, 1,236 farmers/community, 10 cooperative members, 341 DRD staff, and 241 participants from other institutions trained on water supply and management related training.

Outcome 3.6. Increased competitiveness and stakeholder participation in agricultural value chains engaged with prioritized commodities.

- 574 value chain events were conducted, including exhibitions, seminars, training, and workshops held locally and internationally,
- 11,870 participants attended value chain related events.
- 409 wood handicraft products, 25 cotton shawl, and silk string were sent to Japan for promotion.
- 1 value chain project implemented (agriculture processing technology).
- 2 value chain studies on tomato and pulses were conducted and consultations organized for maize value chain.
- The Climate-Friendly Agribusiness Value Chains Sector (CFAVC) project was launched and concept note to establish the agribusiness cell was developed.

Outcome 3.9. Trade and Exports. Trade facilitated agri-food and agricultural products export growth.

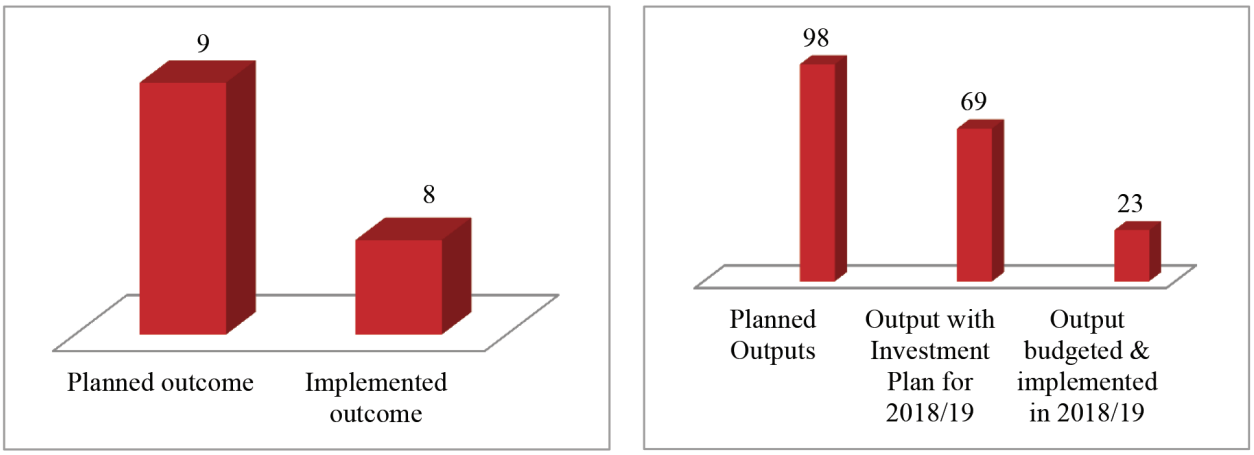
- The third meeting of the National-level Trade Facilitation Committee on the World Trade Organisation's Trade Facilitation Agreement (WTO TFA) was held.
- 6 infrastructures to support cattle trade were built.

LAGGING OUTCOMES AND OUTPUTS:

As previously indicated under 2.4, out of 9 outcomes planned for implementation in 2018/19, only 8 outcomes have positively progressed (Figure 10). Currently, there are no advances in outcome 3.8 (improved access to financial services). The formulation of policies, laws, and approval of regulations are expected to be facilitated during the second year of the ADS implementation. Besides, with the limited mandates of MoALI to carry out the needed transformation on improving access to the financial services, coordination with relevant institutions is required, particularly with the Myanmar Agriculture Development Bank (MADB) to achieve outputs concern MADB's operations. Additionally, the Cooperative Department and SSID's current financial services are yet to be embedded in the intended outputs of outcome 3.8.

Therefore, from the planned 98 outputs, only 23 outputs were budgeted and implemented[66] using the capital budget (for more details, please see Section 3) and some portion of the recurrent budgets, particularly on strengthening human resource capacities[67] (Figure 10). All 12 outputs under outcome 3.8 were not achieved, as well as the 53 outputs under outcomes 3.1 (8 outputs), 3.5, (10 outputs) 3.6 (14 outputs), 3.7 (12 outputs) and 3.9 (9 outputs). The other 10 outputs with zero advancement are mainly under outcomes 3.2 to 3.4.

Figure 10.Planned vis-à-vis implemented outcome and outputs



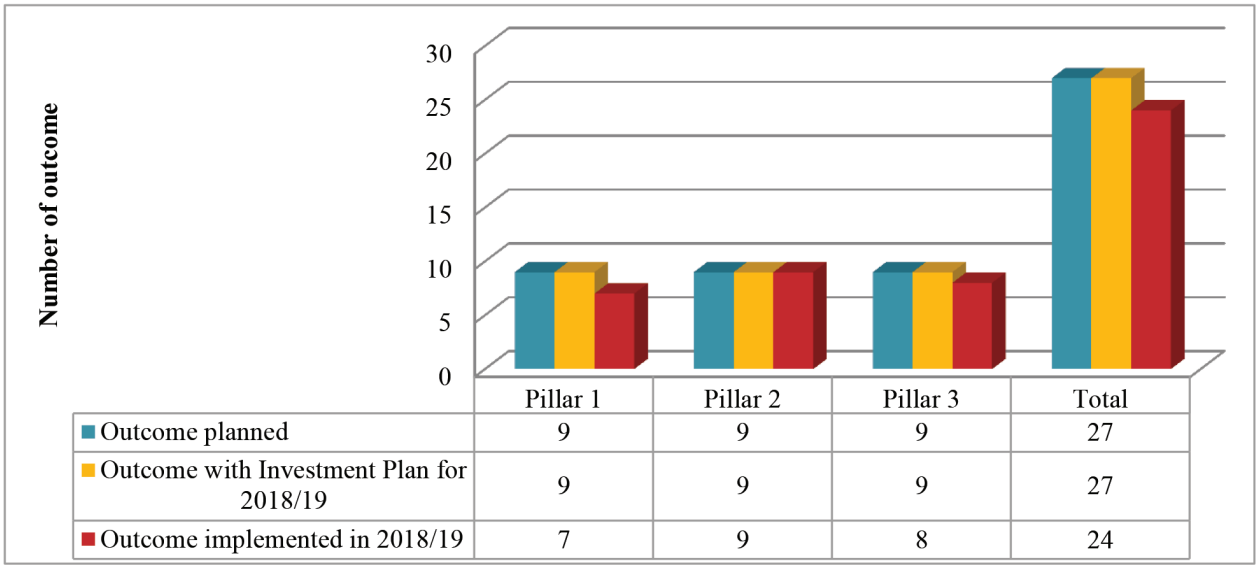
66 Overall achievement is partial without achievements of some output progress indicators

67 The current ADS IP only calculated output level capital investment, but not on recurrent. Thus, current analysis is limited to actual expenditures related to human resource capacity strengthening.

2.7 OVERALL PROGRESS

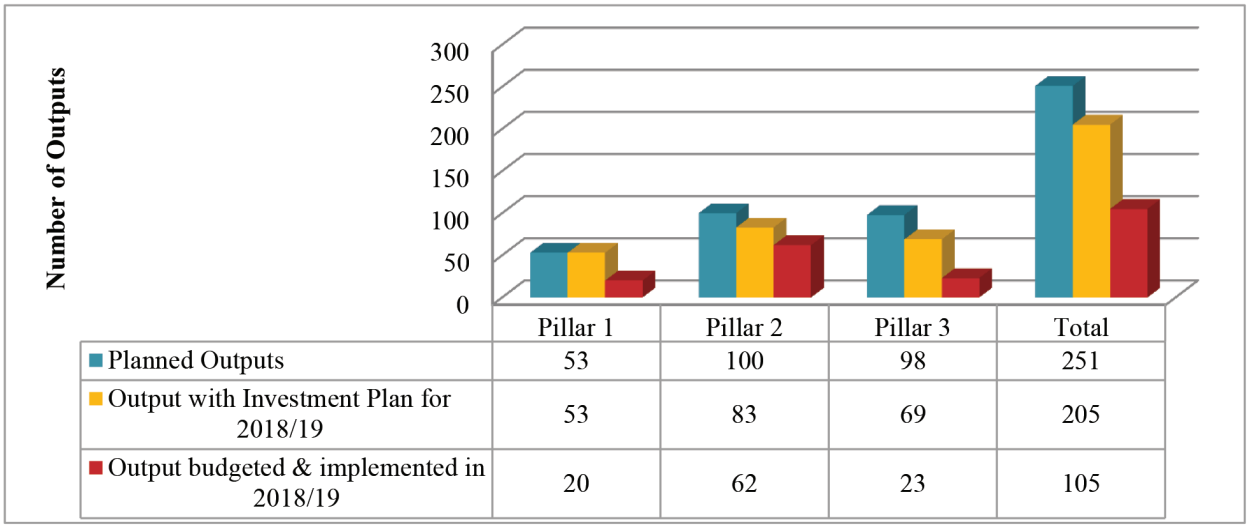
The ADS framework contains 27 outcomes and 251 outputs for implementation over five years, for which 9 outcomes and 53 under Pillar 1 – Governance (21%); 9 outcomes and 100 under Pillar 2 – Productivity (40%); and 9 outcomes and 98 under Pillar 3 – Competitiveness (39%). While the Investment Plan indicates an investment estimate for 2018/19 to implement 27[68] outcomes and 205 outputs, funding limitations allowed for the implementation of 24 outcomes (Figure 11) and 105 outputs only: 20 outputs under Pillar 1 (19%); 62 under Pillar 2 (59%); and 23 under Pillar 3 (22%) (Figure12). These outputs were implemented using Government and recurrent budgets and some external funding for which implementation is integrated into MoALI's Department.

Figure 11.Comparison of planned outcomes against implemented outcomes with IP



	Pillar 1	Pillar 2	Pillar 3	Total
Outcome planned	9	9	9	27
Outcome with Investment Plan for 2018/19	9	9	9	27
Outcome implemented in 2018/19	7	9	8	24

Figure 12.Comparison of planned against outputs implemented with IP



	Pillar 1	Pillar 2	Pillar 3	Total
Planned Outputs	53	100	98	251
Output with Investment Plan for 2018/19	53	83	69	205
Output budgeted & implemented in 2018/19	20	62	23	105

68 Although the ADS IP included an outcome 3.11 that belonging to 2.3

Table 2. Progress of ADS Outcomes under Pillar I by Responsible MoALI Departments

Objective 1 : Enhanced governance and capacity of institutions responsible for agricultural development				
Outcome	**No. of Planned Outputs**	**No. of Outputs with IP for 2018/19**	**No. of Outputs budgeted & implemented in 2018/19**	**Implementing Dept**
1.1 Planning	6	9	5	DOP, MO , DOA[69], LVBD [70]
1.2 Policy capacity	4	3	4	DOP, DOA, DALMS[71]
1.3 M & E	4	4	2	DOP, DOA, DOF
1.4 Statistics	3	4	2	DOA,DALMS
1.5 Associations	5	6	2	DOA, DOP, CD
1.6 Land Rights	16	13	2	DALMS
1.7 Coordination and Participation	6	3	3	MO, DOA, DOP
1.8 Food & Nutrition Security	3	4	0	DRD, DOA
1.9 MoALI Restructuring	6	4	0	MO
1.10 MoALI restructuring	0	2	0	MO
1.11 Enhanced reputation of MoALI capacity	0	1	0	UVS
Total	**53**	**53**	**20**	

69 MoALI Departments have implemented the outcome as primary responsible institutions indicated in the Investment Plan

70 MoALI Departments have implemented the outcome, despite not indicated as primary responsible institutions in the Investment Plan

71 MoALI Departments have not implemented the outcome as primary responsible institutions indicated in the Investment Plan

Table 3. Progress of ADS Outcomes under Pillar II by Responsible MoALI Departments

Objective 2: Increased productivity and farmers' income				
Outcome	**No. of Planned Outputs**	**No. of Outputs with IP for 2018/19**	**No. of Outputs budgeted & implemented in 2018/19**	**Implementing Dept.**
2.1 Agriculture Research	19	16	10	DAR, DOF, LVBD[72], UVS[73]
2.2 Agriculture Extension	16	1	7	DOA, DAR[74] , MO, DOF,
2.3 Education & Training	3	5	4	YAU, DOA, CD, UVS
2.4 Irrigation & Water Management	1	10	6	IWUMD
2.5 Crop Inputs	14	1	9	DOA, DAR, YAU
2.6 Mechanization	7	6	6	AMD
2.7 Livestock and Fishery	18	42	14	LBVD, DOF
2.8 Sustainable Practices (GAP/GAHP/ GFP/ OA)	3	1	2	DOA, LVBD
2.9 Resilience	10	1	4	DOA, LVBD, DAR
Total	**100**	**83**	**62**	

72 MoALI Departments have implemented the outcome as primary responsible institutions indicated in the Investment Plan

73 MoALI Departments have implemented the outcome, despite not indicated as primary responsible institutions in the Investment Plan

74 MoALI Departments have not implemented the outcome as primary responsible institutions indicated in the Investment Plan

Table 4. Progress of ADS Outcomes under Pillar III by Responsible MoALI Departments

Objective 3. Enhanced market linkages and competitiveness				
Outcome	**No. of Planned Outputs**	**No. of Outputs with IP for 2018/19**	**No. of Outputs budgeted & implemented in 2018/19**	**Implementing Dept.**
3.1 Business Environment	10	11	2	DOP[75], DOA[76]
3.2 Intellectual Property Rights	4	1	1	DOA , DAR
3.3 Quality Systems	7	8	2	DOA, DABMI[77], SSID, DAR[78]
3.4 Rural Development	6	6	4	DRD
3.5 Rural Planning & Infrastructure	16	11	6	DRD, MO , DOA, DABMI
3.6 Value Chains	19	19	5	SSID, DOA, DAR, DABMI
3.7 Food Quality & Safety	14	1	2	DOA, SSID
3.8 Finance Services	12	2	0	CD, DOP, LVBD
3.9 Trade and Exports	10	10	1	DOP, DOA, CD
Total	**98**	**69**	**23**	

75 MoALI Departments have not implemented the outcome as primary responsible institutions indicated in the Investment Plan

76 MoALI Departments have implemented the outcome as primary responsible institutions indicated in the Investment Plan

77 Proposed new MoALI Department has not implemented the outcome as primary responsible institutions indicated in the Investment Plan.

78 MoALI Departments have implemented the outcome, despite not indicated as primary responsible institutions in the Investment Plan

SECTION – III

ADS INVESTMENT PLAN BUDGET EXECUTION ANALYSIS

3.1 OVERVIEW

This chapter summarizes the key findings from an analysis conducted by the ADS Implementation Support Unit (ADSISU) on ADS financing within the budget allocation and expenditures for the fiscal year 2018/19, and provide an initial evidence-based approach to support reporting on ADS IP execution. The chapter also includes a discussion on critical implications and options to improve the effectiveness of the ADS implementation.

Despite the data limitations, pending systematic regular monitoring and more reliable tracking system for rigorous analysis on ADS financing, the information presented in this chapter serves the practical purpose of an initial discussion on the ADS activities and costing and can contribute to strengthening of ADS planning, budgeting, and monitoring processes.

The five years Investment Plan (IP) was prepared to guide the logical programming, financing, and resource mobilization to implement the ADS effectively. The vision was to cost the capital investments and budget allocations required for key sub-sectors critical for the improvement of productivity, farmers' innovations, and competitiveness, as well as promoting public and private partnerships for an inclusive and sustained agricultural service delivery. With budget estimates calculated for each output, the IP is supposed to provide a baseline to guide MoALI and development partners in their annual respective planning and budgeting processes. It should be noted however, that the delayed launching of the ADS in 2018 led to miss the opportunity to advocate for the ADS financing for the first year of implementation, as MoALI's 2018/19 plan and budget were prepared and approved a year earlier before the ADS IP was publicly available.

The ADS IP was formulated based on estimated calculations and projected trends in the agriculture budget, as well as MoALI's annual portfolio trajectories, programming priorities, the 2017 Public Expenditure Review (PER), the Medium-Term Expenditure Framework (MTEF) and the donors' pipeline[79]. The IP was designed to implement the ADS 3 Pillars, 27 outcomes, and 251 outputs with an estimated capital investment of 3,134,444 million kyats over 5 years from 2018 to 2023. The projected outlook for the five-year period was to commit to an investment level of 52.7% for Pillar 2 (Productivity), 36.8% for Pillar 3 (Competitiveness), and 10.6% for Pillar 1 (Governance).

3.2 RESPONSIBLE MOALI DEPARTMENTS IMPLEMENTING THE ADS IP

In 2018/19, all 13 MoALI Departments and the Minister's office contributed one way or another to the immediate implementation of the ADS. Table 5 below summarizes MoALI Departments' main contribution to the achievement of the ADS outcomes.

The analysis, although limited by the lack of reliable data, shows that issues relating to clarity of mandates and assigned ADS outcomes need to be solved with concerned Departments to guarantee future usefulness of ADS as a platform for strategic planning and budgeting. A review of the assignment of primary responsibilities and accountabilities of various stakeholders to implement the ADS is a must to fully operationalize the ADS.

79 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

Some elements have been identified that will have to be corrected in the upcoming revised ADS Results Framework, which is expected to provide a comprehensive alignment of the ADS and the Investment Plan and to fix the existing inconsistencies, unmatched outcomes, and outputs.

For instance, some outcomes were assigned to Departments but are not matching their current mandates. Particularly critical is the case of outcome 1.8: Food and Nutrition Security that is assigned without its consent to DRD. The DAR has also negated of having no responsibility to implement quick win and outputs:

1. 2.1.9: Establish an Action Research fund.
2. 2.1.14: Establish a new international agricultural research partnership .
3. 2.1.15: Conduct an in-depth study of agricultural and fisheries extension and research systems.

The DOP also has similar feedback with several outputs and outcomes assigned to DOP that is not under their mandate, in fact beyond their capacity.

Finally, the ADS outcomes that currently neither budgeted nor implemented require further analysis to reflect MoALI's commitment to contribute to the achievements of the MS-NPAN and MSDP in the future.

Besides, the involvement of the DPs, private sector and farmers is yet to be articulated in the future ADS implementation plan, to maximize their contribution and reflect their prominent role in the performance of the ADS. On this, it requires the immediate establishment and functioning of the National ADS Coordination Committee (NADSCC) and its sub-committees at the Union, States, and Regions.

Table 5. Responsible MoALI Departments to implement the ADS Outcomes

Objective 1: Enhanced governance and capacity of institutions responsible for agricultural development		**Objective 2: Increased productivity and farmers' income**		**Objective 3: Enhanced market linkages and competitiveness**	
Outcome	**Department**	**Outcome**	**Department**	**Outcome**	**Department**
1.1 Planning	DOP, MO	2.1 Agriculture Research	DAR, DOF, LVBD, UVS	3.1 Business Environment	DOP, DOA
1.2 Policy capacity	DOP, DOA, DALMS	2.2 Agriculture Extension	DOA, DAR, UVS	3.2 Intellectual Property Rights	DOA
1.3 M & E	DOP, DOA	2.3 Education & Training	YAU, DOA, UVS	3.3 Quality Systems	DOA, DAB-MI
1.4 Statistics	DOA, DALMS	2.4 Irrigation & Water Management	IWUMD	3.4 Rural Development Planning	DRD

1.5 Associations	DOA, DOP, CD	2.5 Crop Inputs	DOA	3.5 Rural Infrastructure	DRD, MO, DOA, DABMI
1.6 Land Rights	DALMS	2.6 Mechanization	AMD	3.6 Value Chains	SSID, DOA, DABMI
1.7 Coordination and Participation	MO, DOA, DOP	2.7 Livestock and Fishery	LBVD, DOF	3.7 Food Quality & Safety	DOA
1.8 Food & Nutrition Security	DRD, DOA	2.8 Sustainable Practices (GAP/GAHP/GFP/OA)	DOA	3.8 Finance Services	CD, DOP, LVBD
1.9 MoALI Restructuring	MO	2.9 Resilience	DOA	3.9 Trade and Exports	DOP, DOA, CD

3.3 ADS 2018/19 INVESTMENT PLAN EXECUTION

Based on MoALI's budget trends from previous years and the capital budget share of 46% in 2017-18 Budget Estimates (BE)[80], the ADS IP projected an estimated amount of MoALI's overall capital Budget Estimates (BE) of 490,515 million kyats for 2018/19 and an estimated ADS-linked capital investment amounting to 489,531 million kyats[81]. Instead, MoALI's capital Budget Revised Estimates (RE) in 2018/19 was 482,000 million kyats representing 98% of the ADS IP estimate.

From the allocated capital Budget Revised Estimates (RE), MoALI was able to execute 86%. The overall capital Budget Revised Estimates (RE) that actually spent was 413,729 million kyats with 77%, or 376,355 million kyats of RE, directly linked to ADS investment and outputs implementation, 23% less than the projected Government capital investment budget. A financing gap of 113,176 million kyats was reported[82]. Nonetheless, MoALI managed to execute 91% of the 2018/19 overall capital budget actual expenditures for ADS implementation (Table 6).

80 Data source: MoALI PFM

81 including the supposed capital investment of 27,845 million kyats for a new Department of Agribusiness and Market Information (DABMI).

82 excluded the 9% not related to ADS capital Actual Expenditures (AE)

Table 6. Comparison of the ADS Investment Plan with Actual Capital Investment in 2018/19

	Investment Plan		Actual Capital Investment		Plan vis-a vis Actual	
	Million Kyats	%	Million Kyats	%	Million Kyats	%
MoALI Capital Budget	490,515	100%	482,000	100%	(8,515)	98%
MoALI Overall Capital Budget Expenditures			413,729	86%		
Capital Budget Expenditures Linked to ADS	489,531	99.8%	376,355	91%	(113,176)	77%
Gap – not linked to ADS	984	0.2%	37,374	9%	36,390	

3.4 ADS 2018/19 FUNDING SOURCES AND USES

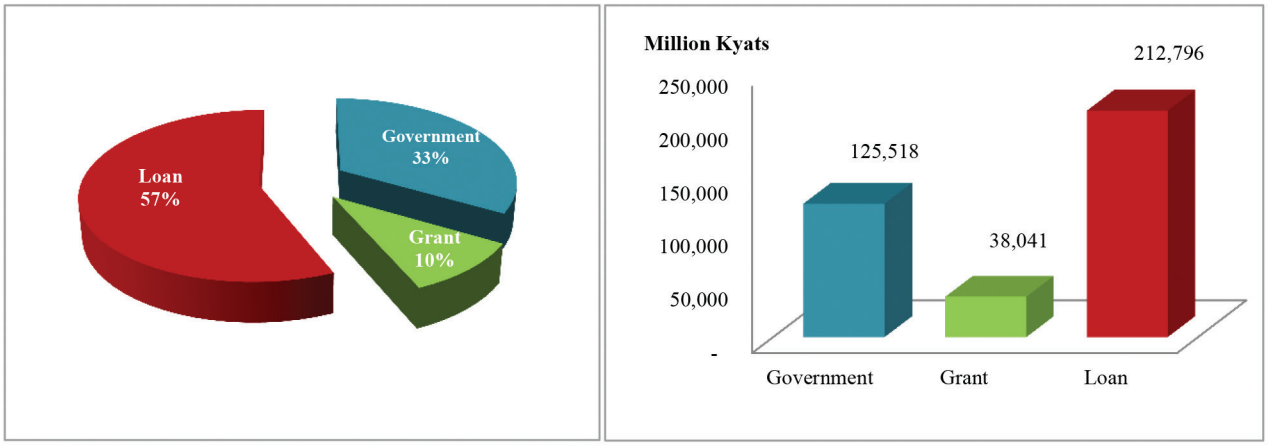
Despite Government of Union of Myanmar (GoM) effort to increase the investment level for the agriculture sector through the Union level budget, reliance on donor support through loans and grants remains critical. In 2018/19, a total of 212,796 million kyats or 57% of the ADS-linked actual capital investments derived from loans and 38,041 million kyats or 10% were grants. This externally financed investment corresponds to 67% of MoALI's ADS-linked capital budget (Figure 13).

Currently, the data and information available to ADSISU for a comprehensive analysis of the ADS financing are very limited. Not yet included in the present analysis is donors' funding for ADS implementation directly managed by donors and executed through implementing partners such as Non-Government Organizations, private sector, etc.). The establishment of a systematic and comprehensive expenditure tracking system for ADS would facilitate ADSISU analysis with a view tocapture all contributions and funding from different sources, donors, private sector, civil society at Union, State, and Region. It would also support the systematic analysis of the trends in Government and donor investments in agriculture, without having to carry out or rely on a PER. Monitoring and analyzing the budget contribution to ADS financing and investment is a vital exercise to review the IP and support informed policy debates for the remaining ADS timeframe.

In 2018/19, Government of Myanmar (GoM) spent 125,518 million kyats or 33% of the capital budget Actual Expenditures (AE) to implement the ADS. A significant share of the funds meant to improve rural infrastructure development, mainly focusing on increasing access to clean and safe drinking water, rural roads, and energy. Similarly to past years, DRD has the highest share of MoALI capital budget AE spending 210,708.776 million kyats[83], for which 69% covered from loans. While the IWUMD capital budget Actual Expenditure (AE) continued to decline, but still, the second-largest

83 including the 51.52 billion kyats for the improvement of rural roads

Figure 13.Funding contribution from sources to 2018/19 ADS implementation (in % and nominal terms) (Million Kyats)``



share of the overall MoALI capital budget AE, amounting to 116,937.26 million kyats, for which 61% was also from loans. The IWUMD capital budget AE was mainly for investing in improving the irrigation systems, considered highly relevant to sustained farmers use of irrigation to increase crop productivity and agricultural production, and sustain Myanmar's potential for rice exports (Table 7).

On the other hand, the third biggest capital budget AE was with the Department of Agriculture (DoA), for an amount of 32,575.09 million kyats, mostly for the acceleration of food and high-value industrial crop production, investments on better extension services and promotion of sustainable farming practices. Of the total capital budget AE, 54% were covered from grants, and 22% from loans.

Furthermore, the Agriculture Mechanization Department (AMD), was the fourth largest share of a capital budget AE of 21,136.99 million kyats, for which 47% were from loans and 9.78 million kyats from grants. This does not reflect the current restructuring process and transitioning on the privatization of the agriculture mechanization schemes (Table 7).

Finally, other MoALI Departments with significant capital budget AE from loans were from the (i) Minister's office[84], (ii) Department of Agricultural Research (DAR) and (iii) Department of Agriculture Land Management and Statistics (DALMS), while the Yezin Agricultural University (YAU), Department of Fisheries (DOF) and Livestock Breeding and Veterinary Department (LBVD) are managing investments mostly from grants.

84 FARM Project, loan from IFAD

Table 7. MoALI Departments Capital Budget Actual Expenditures by funding sources (2018/19) (Million Kyats)

No.	Departments	Actual Expenditure (AE)			
		Government	Loan	Grant	Total
1	MO	99.50	2,173.90	68.36	2,341.77
2	DOP	32.61		394.76	427.37
3	DOA	7,958.62	7,149.82	17,466.66	32,575.09
4	IWUMD	40,472.88	71,034.98	5,429.40	116,937.26
5	DALMS	2,413.05	306.53	23.2	2,742.78
6	AMD	11,216.15	9,911.06	9.78	21,136.99
7	YAU	1,205.68		2,916.98	4,122.66
8	DAR	2,426.91	482.59	1,729.21	4,638.71
9	LBVD	2,385.49		4,758.46	7,143.95
10	DOF	2,133.40		3,971.56	6,104.96
11	DRD	65,194.87	145,214.12	299.98	210,708.96
12	UVS	775.77		17.18	792.95
13	CD	1,856.41		1,209.96	3,066.37
14	SSID	677.21		312.07	989.28
15	DABMI				0.00
Total		**138,848.55**	**236,273.00**	**38,607.55**	**413,729.10**

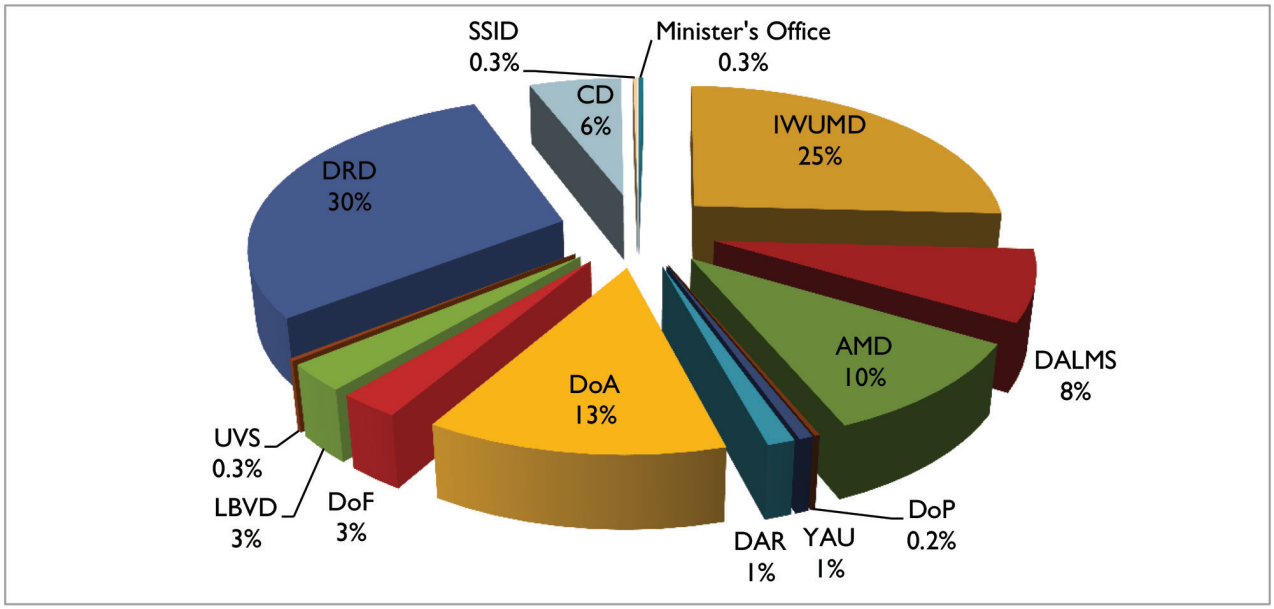
Unlike the capital budget projection of the ADS IP disaggregated by outcome and outputs, the recurrent budget estimate was not. Thus, the contribution analysis does not cover the detailed analysis of the 2018/19 recurrent budget actual expenditures of 465,786.79 million kyats, 17% higher from the initial ADS IP recurrent budget projection of 385,404 million kyats. Despite, 13% more than the capital budget actual expenditures, that complemented the overall investments for the agriculture sector during the reporting period (Table 8). Similarly, to the capital budget AE, the MoALI Departments that have absorbed the largest shares of the recurrent funds were DRD and IWUMD, with 30 % and 26% respectively. The DOA and AMD also received significant shares, of 13% and 10% respectively. The remaining 10 Departments have less than a 10% share, and a very low share of less than 0.5% for UVS, SSID and DOP (Figure 14).

Table 8. MoALI Departments Recurrent Budget AE in nominal terms (2018/19) (Million Kyats)

No	Department	Recurrent Budget Actual Expenditure (AE)
1	Minister's Office	1,336.64
2	Irrigation and Water Utilization Management Department (IWUMD)	119,022.28
3	Department of Agricultural Land Management and Statistics (DALMS)	35,729.59

No	Department	Recurrent Budget Actual Expenditure (AE)
4	Agricultural Mechanization Department (AMD)	47,685.10
5	Department of Planning (DOP)	1,046.02
6	Yezin Agricultural University (YAU)	2,781.76
7	Department of Agricultural Research (DAR)	5,541.80
8	Department of Agriculture (DOA)	59,531.81
9	Department of Fisheries (DOF)	12,372.81
10	Livestock Breeding and Veterinary Department (LBVD)	13,397.64
11	University of Veterinary Science (UVS)	1,240.30
12	Department of Rural Development (DRD)	138,710.92
13	Co-operative Department (CD)	26,153.32
14	Small Scale Industries Department (SSID)	1,236.49
	Total	**465,786.479**

Figure 14. MoALI Department's recurrent budget Actual Expenditures share



3.5 CAPITAL INVESTMENT EXECUTION BY PILLAR

As mentioned previously, one of the main contributions of the ADS IP is the strategic distribution of investments across the three ADS Pillars. The ADS Investment Plan (IP) advocates and provides a rationale for the allocation of investments on interventions of Pillar 2 (Productivity), absorbing most of the available resources and having a positive impact on lifting people engaged in agriculture out of poverty and in reducing malnutrition and food insecurity. The intention was to mobilize resources to carry out the much-needed investments to address issues on low productivity in the agricultural production, underfunded research and extension, insufficient human resources, alarmingly high number of unsettled land rights issues, and an unsustainable use of natural resources that increases climate change vulnerability[85].

The investment in Pillar 3 (Competitiveness) encompasses the vision to improve rural infrastructure for water and electricity supply, community-driven development, food safety, and promoting farmers' innovations and competitiveness. On the other hand, Pillar 1 (Governance), despite its less significant share of the investment, is considered nevertheless critical to the overall success of the ADS as it addresses the institutional reform and strengthening of overall management systems needed to support the policy decisions and effective prioritization of allocation of resources.

As a conclusion, the contribution analysis provides a rough and preliminary estimation that despite the lack of initial linkage of the ADS IP to MoALI planning and budget process for fiscal year 2018/19, MoALI allocated an overall 482,000 million kyats in capital Budget Revised Estimates (RE). From the overall capital Budget Actual Expenditure (AE) of 376,355 million kyats for ADS, 51% covered outputs under Pillar 2 (Productivity), 47% for actions under Pillar 3 (Competitiveness). Finally, 2% supported institutional strengthening and governance (Pillar 1) (Table 9).

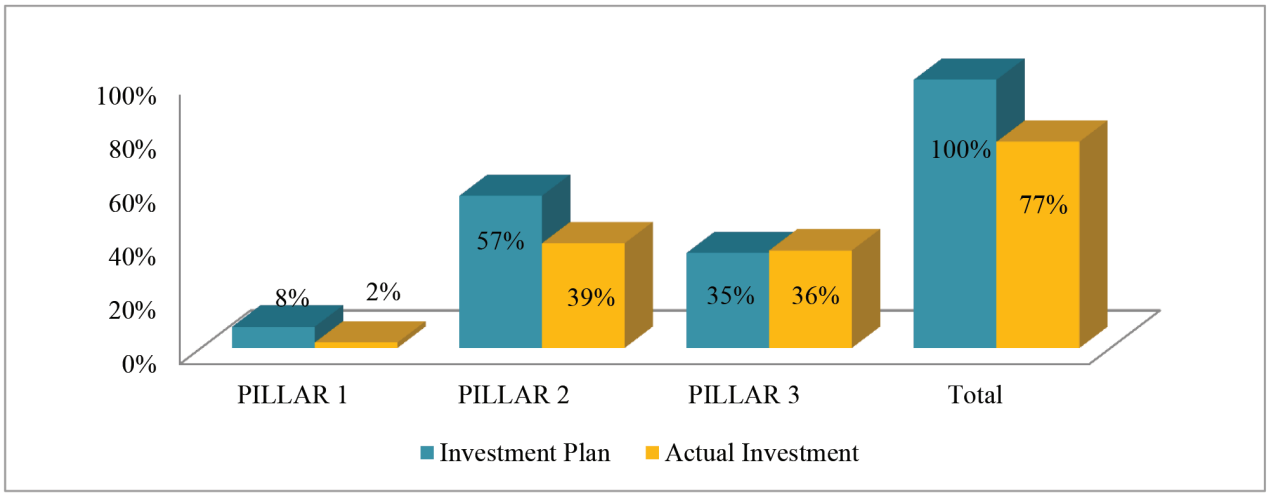
Table 9. 2018/19 ADS Capital Investment Execution by Pillar

Pillar	Investment Plan (Million Kyats)	% Share of Total Investment Plan (IP)	Actual Investment (Million Kyats)	% Share of the Actual Investment (AI)
PILLAR 1 – Governance	38,558	8 %	7,436	2%
PILLAR 2 – Productivity	277,527	57%	190,973	51%
PILLAR 3 – Competitiveness	173,446	35%	177,947	47%
Total	489,531	100%	376,355	100%

It is interesting to note that the capital Budget Actual Expenditure (AE) for Pillar 3 is almost equivalent to the ADS IP projections (even 1% higher) but 18% and 6% lower for Pillar 2 and Pillar 1, respectively (Figure 15).

85 Myanmar Agriculture Development Strategy and Investment Plan 2018/19-2022/23 (source: https://www.moali.gov.mm)

Figure 15. 2018/19 Comparison of Capital Investment Plan against Actual Investment



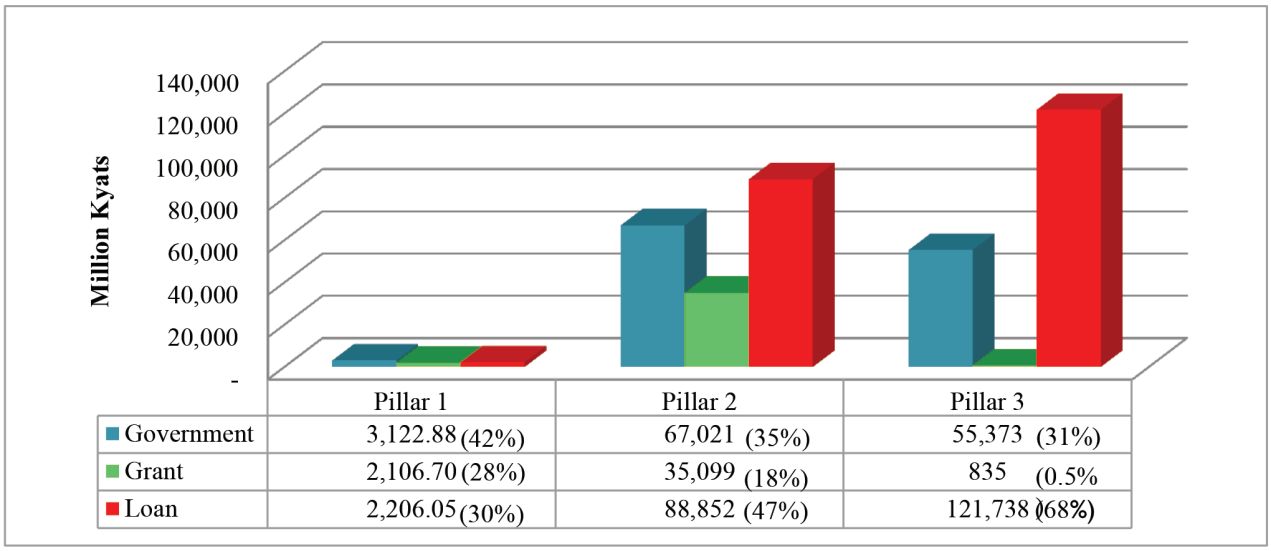
It is also worth noting that capital investments on Pillar 3 (Competitiveness) is higher than ADS IP without the 27,845 million kyats allocation for the establishment of Department for Agribusiness and Marketing Information (DABMI).The DABMI is supposed to be responsible for achieving the following:

1. Outcome 3.3: Reliable quality system developed that helps farmers and food processors get higher prices for higher quality goods, incentivizing quality upgrading developed.
2. Outcome 3.6: Increased competitiveness and stakeholder participation in agricultural value chains engaged with prioritized commodities.
3. Outcome 3.5: Improved smallholder agriculture efficiency and profitability.

3.6 FUNDING SOURCES FOR THE PILLARS

During 2018/19 a significant share of the capital investments was funded through loans and grants. The external financing recorded under MoALI budget actually exceeded the GoM allocation for all 3 pillars, amounting 122,573 million kyats (69%) for Pillar 3, by 123,952 million Kyats (1% more than Pillar 3) for Pillar 2 and by 4,312.75 million kyats (58%) for Pillar 1(Figure 16).

Figure 16.Funding Sources breakdown by Pillar in nominal terms (Million Kyats)



3.7 FINANCING GAPS FOR ALL PILLARS

Again, one of the objectives of the contribution analysis is to estimate and consequently advocate for the financing gap of the ADS. The analysis for 2018/19 concluded that the capital budget financing gap against the projected investment for 2018/19 represented 23% or 113,176 million kyats. A notable funding gap of 86, 553 million kyats relates to Pillar 2 and 31, 123 million kyats to Pillar 1. As a result, expected outputs and outcomes could not be achieved (Table 10).

The contribution analysis also revealed the misalignment in the allocation of the capital budget for Pillar 3. For instance, despite a satisfactory coverage of the expected level of investments on Pillar 3, as shown in Table 8 below, the intended progress remained unsatisfactory for key outcomes given the disparity of the budget allocation.

Table 10. Financing gap breakdown by Pillar in nominal terms (Million Kyats)

Pillar	Investment Plan (Million Kyats)	Actual Investment* (Million Kyats)	Variance
PILLAR 1 – Governance	38,559	7,436	(31,123)
PILLAR 2 – Productivity	277,526	190,973	(86,553)
PILLAR 3 – Competitiveness	173,447	177,947	4,500
Total	489,531	376, 355	(113,176)

***Actual Investment is same as Actual Expenditures**

The achievement of the ADS "quick wins" that were supposed to be a strategy to gain wide-ranging support to implement the ADS did not materialize as designed in the IP. Therefore, a follow-up to design ADS financing and resource mobilization strategy is now required to effectively pool resources from various available sources and as more funding could be incorporated through additional loan (e.g new World Bank loan) and capital gains could be envisaged from a better prioritization of resources.

Additionally, the establishment of an iterative, participatory and transparent process to reference the ADS IP for the annual planning, budgeting formulation across all Departments of MoALI at Union, State, and Region is still critically needed. Currently, the Departments' budget allocation is still not explicitly linked to ADS planned outputs, outcomes, or objectives.

Regardless of the current limited fiscal space for additional capital investment as projected in the ADS IP, MoALI indicated a positive commitment to ensure the implementation of the ADS and readiness to pursue all necessary efforts to achieve the desired targets.

Given the current capital investment gap, of only 77% of the IP is covered in 2018/19, a more comprehensive advocacy and lobbying strategy and campaign is needed at the parliament and with other stakeholders to promote the ADS and beyond that, mobilize investments in the agriculture, including with the private sector.

Maintaining the current funding gap and the lack of strategic allocation of the budget will most likely jeopardize the achievement of MoALI's strategic development. The ADSISU was established as a driver to incentivize and articulate the discussion at the level of MoALI's key decision-makers to promote the ADS, influence enabling decisions that will encourage a higher participation from private sector actors, Development Partners (DPs), farmers, households and markets to contribute to achieving ADS key results.

3.8 CAPITAL INVESTMENT EXECUTION PER OUTCOME

3.8.1 Outcomes under Pillar 1, Capital Investment:

The capital Budget Actual Expenditures (AE) reported under Pillar 1 in 2018/19 indicated positive progress on the implementation of 6 over 11 outcomes. The Pillar 1 incurred a capital budget Actual Expenditures of 7,436 million kyats, representing 19% of the ADS IP capital investment plan of 38,559 million kyats. The investment of 91% of the capital budget was to achieve outcome 1.1 (Planning), outcome 1.5 (strengthening associations and groups) and outcome 1.6 (Land rights), while the 9% was meant to achieve outcomes 1.3 (M & E), 1.4 (Statistics), and 1.7 (coordination) (Table 11).

Table 11. Capital Budget Actual Expenditures contribution to Pillar 1 against Investment Plan

Pillar I	Investment Plan (IP)			2018- 19 Actual Expen-ditures (AE) (Million Kyats	% of AI from IP	Plan vs. Actual	% Contribution to Pillar I		
	Outcomes	Out-puts	Estimated Investment			Variance	IP	AE	Difference
Governance	1.1 Planning	9	1,970	2,903	147%	933	5.1%	39.04%	33.94%
	1.2 Policy	4	1,700			(1,700)	4.4%		(4.40%)
	1.3 M&E	4	1,340	341	25%	(999)	3.5%	5%	1.09%
	1.4 Statistics	4	1,135	113	10%	(1,022)	2.9%	1.52%	(1.38%)
	1.5 Associations& groups	6	10,140	1,210	12%	(8,930)	26.3%	16.27%	(10.03%)
	1.6 Land rights	16	5,190	2,630	51%	(2,560)	13.5%	35.37%	21.87%
	1.7 Coordination	3	2,406	239	10%	(2,167)	6.2%	3.21%	(2.99%)
	1.8 Participation	4	1,295			(1,295)	3.4%		(3.40%)
	1.9- Food & Nutrition	4	10,880			(10,880)	28.2%		(28.20%)
	1.10- MoALI restructuring	2	2,500			(2,500)	6.5%		(6.50%)
	1.11 Enhanced reputa-tion of MoALI capacity	1	3			(3)	0.01%		(0.01%)
Total	**11**	**57**	**38,559**	**7,436**	**19%**	**(31,123)**	**100%**	**100%**	

Note: The ADS IP indicated 11 outcomes, while the ADS publication has 9 outcomes. In the IP investment for participation is outcome 1.8 and enhanced reputation of MoALI as a separate outcome 1.11.

However, it should be noted that there was neither capital budget allocation, nor expenditures reported to achieve the strategic outcomes on food and nutrition security[86], a critical requirement for the achievement of the strategic objective of the MS-NPAN.

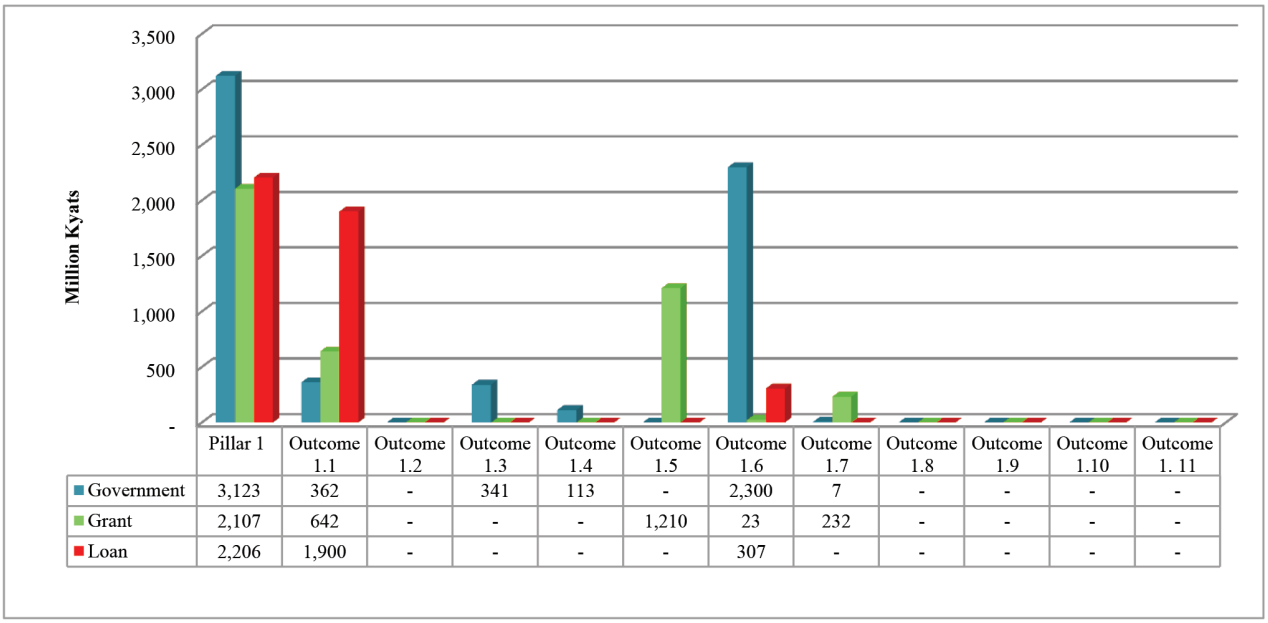
Also, the lack of budget to support MoALI coordination capacity in the agriculture sector, and to promote the decentralization on planning and budgeting process, as well the strengthening of policy-making capacity, present a serious risk for the future, as effective institutional coordination and robust management systems are necessary foundations to support the enabling environment for investment, private sector's and farmer's contribution in the agriculture sector.

Funding sources per Outcome:

In 2018/19, 58% or 4,313 million kyats of the capital budgets for Pillar 1 were from loans and grants, while 42% from the Government. The figure below illustrates the financing sources for each outcome of Pillar 1 (Governance).

86 outcome numbered 1.8 in the ADS but 1.9 in the IP

Figure 17. Pillar 1 Funding Sources breakdown by Outcome in nominal terms (Million Kyats)

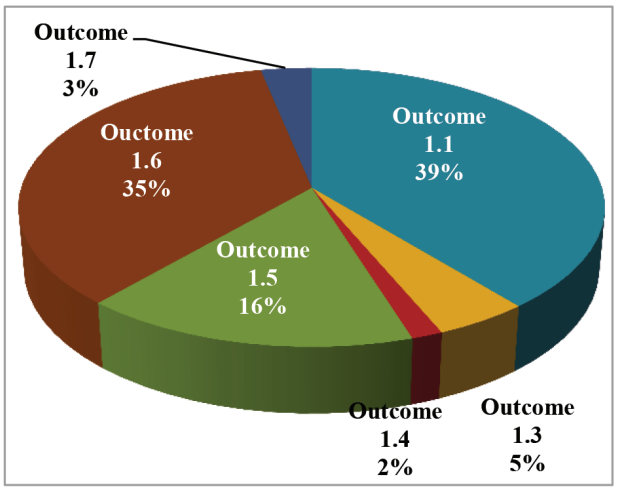


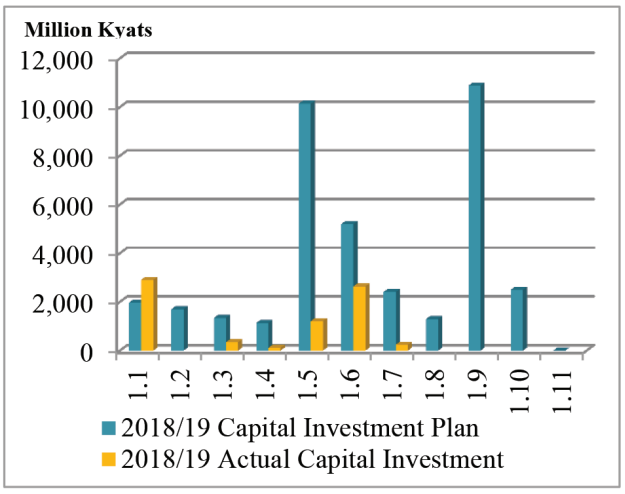
	Pillar 1	Outcome 1.1	Outcome 1.2	Outcome 1.3	Outcome 1.4	Outcome 1.5	Outcome 1.6	Outcome 1.7	Outcome 1.8	Outcome 1.9	Outcome 1.10	Outcome 1. 11
Government	3,123	362	-	341	113	-	2,300	7	-	-	-	-
Grant	2,107	642	-	-	-	1,210	23	232	-	-	-	-
Loan	2,206	1,900	-	-	-	-	307	-	-	-	-	-

Financing gap and capital budget actual expenditures share per Outcome:

An eighty-one percent or the equivalent of 31,123 million kyats was the reported financing gap on Pillar 1. Most outcomes were insignificantly apportioned, except outcomes 1.1 and 1.6 that have had an investment of 5,533 million kyats or 74% of the capital budget actual expenditures and 16% on outcome 1.5 (Figure 18).

Figure 18. 2018/19 Pillar 1 Outcome Capital Investment Share against Investment Plan





3.8.2 Outcomes under Pillar 2, Capital Investment:

Pillar 2 absorbed 51 %, or 190,973 million kyats of the overall ADS-linked capital budget AE in 2018/19 for food production, particularly the improvements of irrigation and water management (outcome 2.5) with an investment of 116,937 million kyats, or 61% of the Pillar 2 overall capital investment. The second-highest capital investment was on outcome 2.2, the transformation of the agricultural extension services with an actual investment of 23,739 million kyats. In comparison, the increased application of appropriate mechanization in the agricultural value chain (outcome 2.7) was the third-highest investment of 20,219 million kyats, a 10% share of the Pillar 2 capital investments (Table 12).

Table 12. Capital Budget Actual Expenditures contribution to Pillar 2 against Investment Plan

Pillar II	Investment Plan (IP)			2018- 19 Actual Expen-ditures (AE) (Million Kyats	% of AI from IP	Plan vs. Actual	% Contribution to Pillar II		
	Outcomes	Out-puts	Estimated Investment			Variance	IP	AE	Difference
Productivity	2.1 Research	10	12,925	6,128	47%	(6,797)	5%	3%	(2%)
	2.2 Extension	1	5,700	23,739	416%	18,039	2%	12%	10%
	2.3 Research-extension	6	2,509		0%	(2,509)	1%	0%	(1%)
	2.4 Education & Training	4	4,473	8,728	195%	4,255	2%	5%	3%
	2.5 Irrigation	10	148,550	116,937	79%	(31,613)	54%	61%	8%
	2.6 Crop inputs	10	20,759	7,832	38%	(12,927)	8%	4%	(4%)
	2.7 Mechanization	7	47,828	20,219	42%	(27,609)	17%	11%	(6%)
	2.8 Animal breeding	44	29,627	6,723	23%	(22,904)	11%	4%	(7%)
	2.9 Sustainable Practices	1	2,000	273	14%	(1,727)	1%	0.1%	(1%)
	2.10 Resilience	1	1,000	294	29%	(706)	0%	0.2%	(0%)
	2.11 Strengthening UVS	2	2,155	100	5%	(2,055)	1%	0.1%	(1%)
Total	**11**	**96**	**277,526**	**190,973**	**69%**	**(86,553)**	**100%**	**100%**	

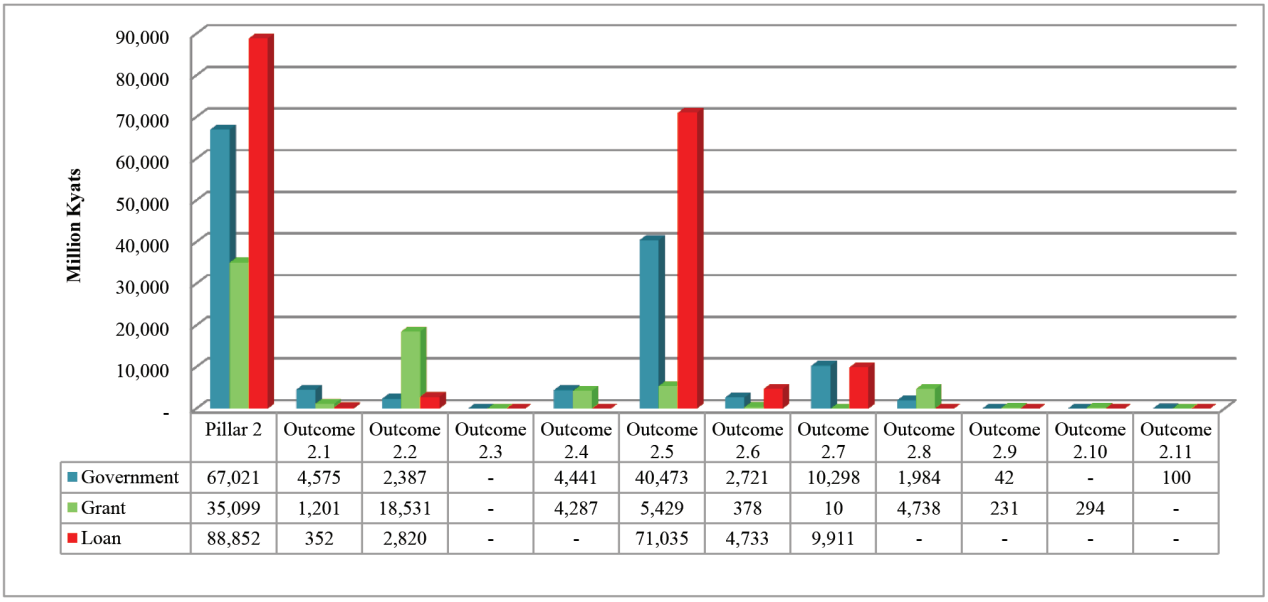
Note: In IP there are 11 outcomes, while the main ADS publication has only 9 outcomes. The IP indicated a separate investment for research and extension outcomes 2.1, 2.2 and 2.3, as well as outcome 2.11, strengthening of UVS.

Funding sources per Outcome:

The loans and grants contributed substantially to the capital investment of Pillar 2. Of the total actual capital budget AE, 65% or 123,952 million kyats were from loans and grants, while the Government contributed 67,021 million kyats or 35%. Investments to achieve outcomes 2.5 and 2.7 were also from loans and grants, with Government contribution of 50,771 million kyats (Figure 19).

The strengthening of the UVS (outcome 2.11 of the IP) was mainly under the GoM, spending, whereas grants invested to achieve outcomes 2.2, 2.4, and 2.8.

Figure 19.Pillar 2 Funding Sources breakdown by Outcome in nominal terms (Million Kyats)



	Pillar 2	Outcome 2.1	Outcome 2.2	Outcome 2.3	Outcome 2.4	Outcome 2.5	Outcome 2.6	Outcome 2.7	Outcome 2.8	Outcome 2.9	Outcome 2.10	Outcome 2.11
Government	67,021	4,575	2,387	-	4,441	40,473	2,721	10,298	1,984	42	-	100
Grant	35,099	1,201	18,531	-	4,287	5,429	378	10	4,738	231	294	-
Loan	88,852	352	2,820	-	-	71,035	4,733	9,911	-	-	-	-

Financing gap and capital budget actual expenditures share per Outcome:

The Pillar 2 has a deficit of 86,553 million kyats or 31% against investment plan. Despite outcome 2.5 received the significant budget; it still has financing gap of 31,613 million kyats, considerably the highest. Under similar circumstances are outcomes 2.7 and 2.8, with a noticeable financing gap of 27,609 and 22,904, respectively (Figure 20).

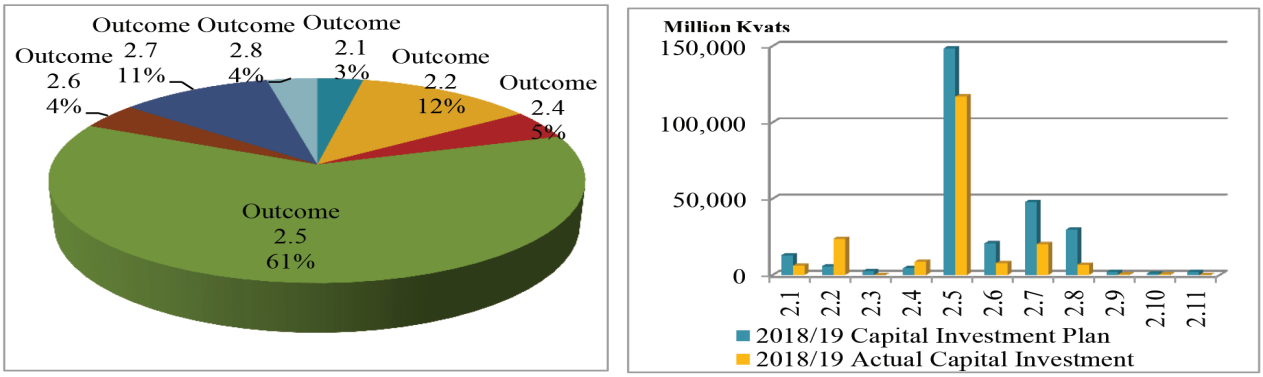
The following outcomes that have no sufficient apportionment nor budget are (i) 2.3: research extension; (ii) 2.10: improved farmers resilience to cope with the negative impact of climate change and disasters[87], (iii) 2.11: strengthening the University of Veterinary Science (UVS)[88] and (iv) 2.9: adoption of sustainable practices (i.e. GAP, GAHP, GAqP, and OA), as well as (v) 2.8: increased use of improved livestock and fish breeding, health and husbandry services.

Additionally, MoALI has to decide if the specific outcome for the strengthening of the University of Veterinary Science(UVS) is required. The current ADS outcome 2.3 does not explicitly articulate the inclusion of UVS concerning improving the human capital in the agriculture and food sector.

87 This outcome was not described as stand-alone deliverables in the ADS publication, but has had projected investment in the IP. For future implementation, discussion on the relevance of these outcomes shall be prioritized concerning improving the effectiveness and efficiency of the ADS implementation.

88 ditto

Figure 20.2018/19 Pillar 2 Outcome Capital Investment Share against Investment Plan



3.8.3 Outcomes under Pillar 3, Capital Investment:

The overall ADS IP to facilitate the process of transforming market linkages and sustained competitiveness for fiscal year 2018/19 was about 173,447 million kyats.

For Pillar 3, seven out of the ten planned outcomes were implemented for a capital budget AE of 177,947 million kyats, 3% more than the projected capital investment in the ADS IP. Ninety-eight percent or 175,169 million kyats were invested principally for outcome 3.5 (rural infrastructure), amounting to 149,393 million kyats, against the capital investment plan of 11,194 million kyats, and 25,775 million kyats on outcome 3.4, 24% of the investment plan's projection for improving rural development planning. The remaining investments, although insignificant, were on achieving the other results, except 3.2, 3.8 and 3.10 that were not budgeted, therefore completely not implemented (Table 13).

Table 13. Capital Budget Actual Expenditures contribution to Pillar 3 against Investment Plan

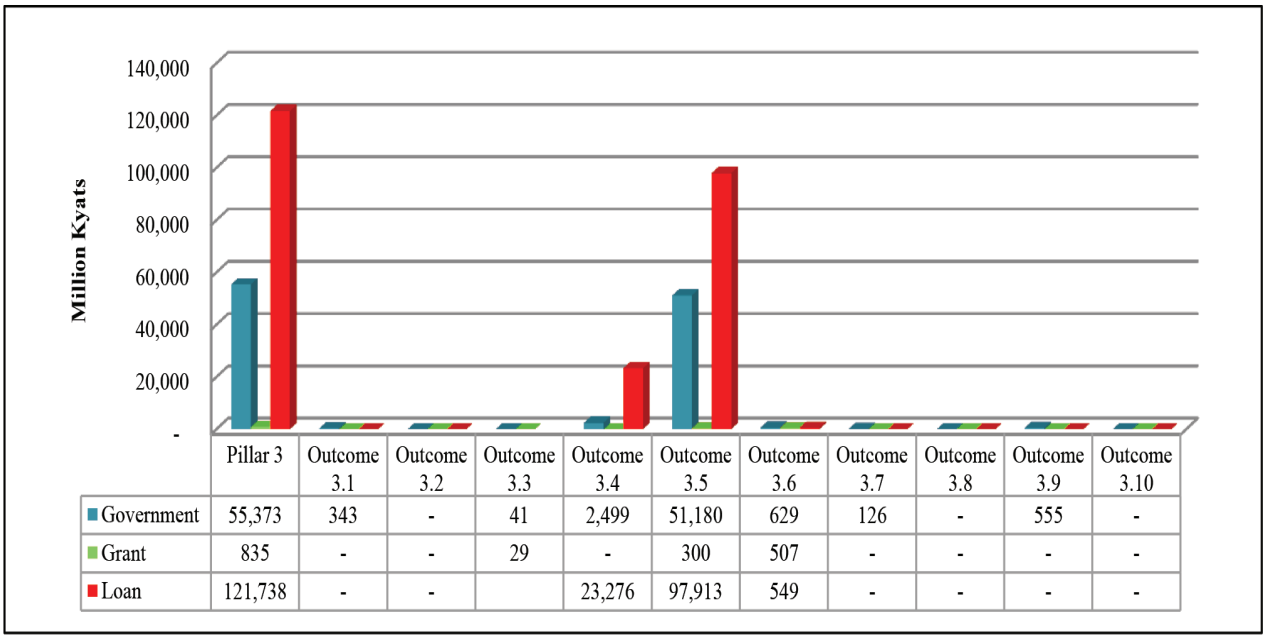
Pillar III	Investment Plan (IP)			2018- 19 Actual Expen-ditures (AE) (Million Kyats	% of AI from IP	Plan vs. Actual	% Contribution to Pillar III		
	Outcomes	Out-puts	Estimated Investment			Variance	IP	AE	Difference
Market Linkages & Competitiveness	3.1 Business environment	10	1,950	343	18%	(1,607)	1.12%	0.19%	(1%)
	3.2 Intellectual Proper-ty Rights	1	1,500		0%	(1,500)	0.86%		(1%)
	3.3 Quality	8	6,960	70	1%	(6,890)	4.01%	0.04%	(4%)
	3.4 Rural Development Planning	6	109,591	25,775	24%	(83,816)	63.18%	14.48%	(49%)
	3.5 Rural Infrastructure	11	11,194	149,393	1335%	138,199	6.45%	83.95%	78%
	3.6 Value Chains	21	30,272	1,685	6%	(28,587)	17.45%	0.95%	(17%)
	3.7 Food Safety	1	4,500	126	3%	(4,374)	2.59%	0.07%	(3%)
	3.8 Financial Services	3	1,000	-	0%	(1,000)	0.58%		(1%)
	3.9 Trade and Exports	11	5,880	555	9%	(5,325)	3.39%	0.31%	(3%)
	3.10 Financial Services	7	600	-	0%	(600)	0.35%		(0.35%)
Total	**10**	**79**	**173,447**	**177,947**	**103%**	**4,500**	**100%**	**100%**	

Note: IP outcome 3.10 and 3.8 are similar. In this report, both outcomes were not implemented in 2018/19.

Funding sources per Outcome:

The capital investment of Pillar 3 was principally coming from loans and GoM allocation. Sixty-eight percent of the capital investment was from the loan, 31% from GoM, and an inconsequential 1% from grants. Eighty percent of the capital budget from the loan was to invest for outcome 3.5, while 19% for outcome 3.4. On the other hand, 92% of the Government budget has matched the loan for outcome 3.5. The balance was used for minor investment in outcome 3.6, 3.9, 3.1, and 3.3.

Figure 21.Pillar 3 Funding Sources breakdown by Outcome in nominal terms (Million Kyats)



	Pillar 3	Outcome 3.1	Outcome 3.2	Outcome 3.3	Outcome 3.4	Outcome 3.5	Outcome 3.6	Outcome 3.7	Outcome 3.8	Outcome 3.9	Outcome 3.10
Government	55,373	343	-	41	2,499	51,180	629	126	-	555	-
Grant	835	-	-	29	-	300	507	-	-	-	-
Loan	121,738	-	-		23,276	97,913	549	-	-	-	-

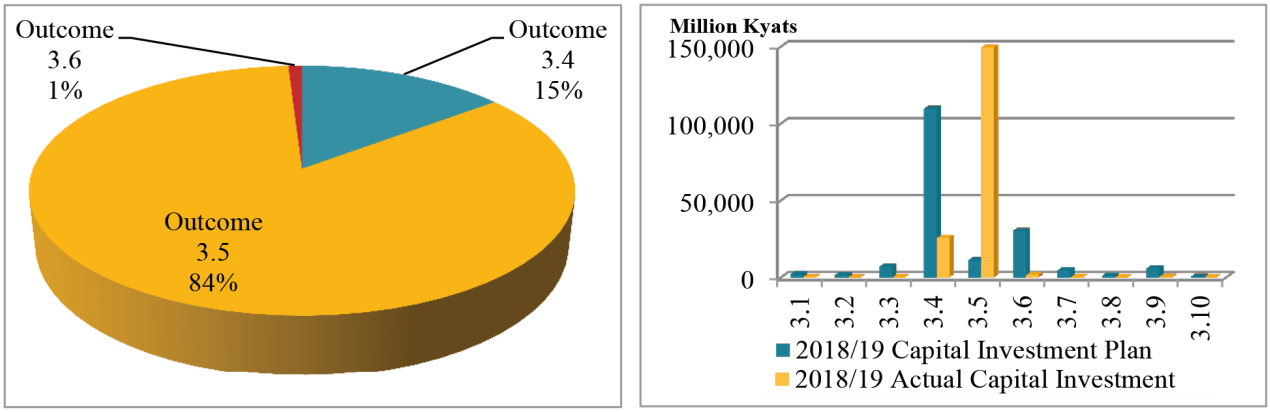
Financing gap and capital budget actual expenditures share per Outcome:

Overall, very little has been invested and completed in terms of developing and achieving inclusive market linkages and sustained competitiveness. Similarly, it needs to improve farmer access to financial services and encourage and support private sector investment.

The overall ADS IP to facilitate the process of transforming market linkages and sustained competitiveness for fiscal year 2018/19 was about 173,447 million kyats. Despite a reported excess of 3% on the overall capital budget AE for Pillar 3, there is still a significant financing gap of 113,176 million kyats for all three Pillars. Except for outcome 3.5 with a capital investment that exceeds the IP projection by 138,199 million kyats, the other three outcomes have not received a significant allocation while there is no allocation in outcomes 3.2, 3.8, and 3.10 (Figure 22).

Given the current substantial financing gap to implement actions to enhance market access and profitability through value addition, considerable investment and support services are needed. If small producers and agro-enterprises are to be empowered to play a constructive role in the development and transformation of the agricultural food supply chain, investments need scaling up urgently.

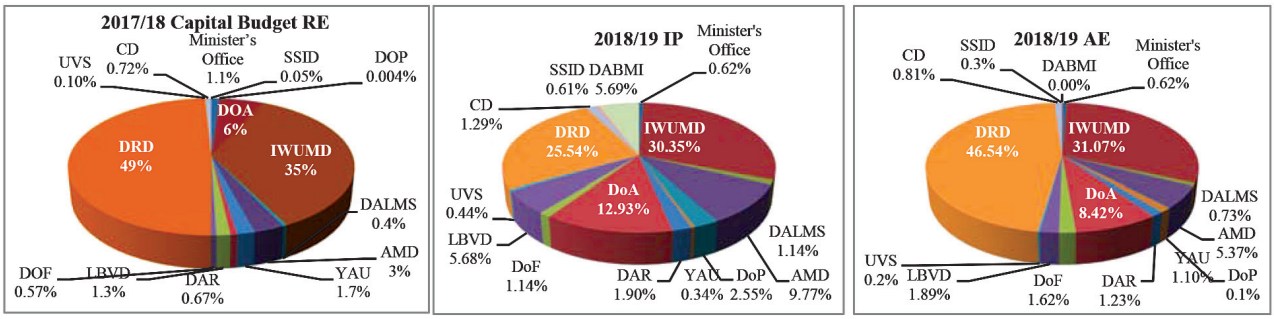
Figure 22. 2018/19 Pillar 3 Outcome Capital Investment Share against Investment Plan



3.9 NOTABLE TRENDS ON MOALI'S CAPITAL BUDGET ALLOCATION AND EXECUTION OF ADS INVESTMENT PLAN

It is interesting to note the visible contrast on the capital budget actual expenditures in 2018/19 against the ADS investment plan, as well as 2017/18 capital budget expenditures shares comparison[89] (Figure 23). Given the previous year's imbalance budget allocations, the ADS IP envisaged to have reduced investment for DRD and IWUMD, instead of aiming for higher investment on LBVD, DOA, AMD, DOP, and other Departments that are vital to achieving the intended ADS impact. In 2018/19, most of the capital and recurrent budget actual expenditures were still absorbed by DRD. The justification was for rural development remains significant for the improvement of rural roads, access to clean drinking water, and electricity. The capital budget actual expenditures on community and staff housing were excluded from the calculation as these are not ADS deliverables.

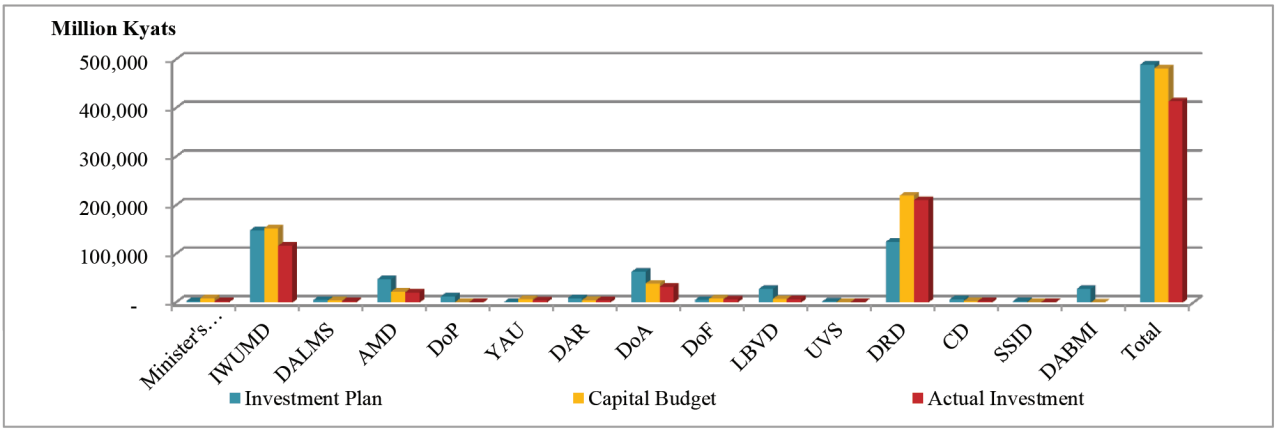
Figure 23. MoALI's Capital Budget Actual Expenditures against ADS Investment Plan



Apart from DOF and YAU that have reported a marginal increase in capital budget actual expenditures higher than investment plan, the investment plan for IWUMD, DOA, and other Departments was not accorded fully, although a reported slight increase in DOA and LBVD actual expenditures, against the 2017/18 capital budget RE share. Besides, the non-allocation of capital budget of 6% for the supposed new Department for Agribusiness and Market Information was critical, considering the expected principal role the Department is supposed to be playing in advancing achievement of Pillar 3 (Figure 24).

89 Data source: MoALI PFM

Figure 24. MoALI's Departments 2018/19 Capital Revised Budget Estimates and Actual Expenditures against ADS Investment Plan

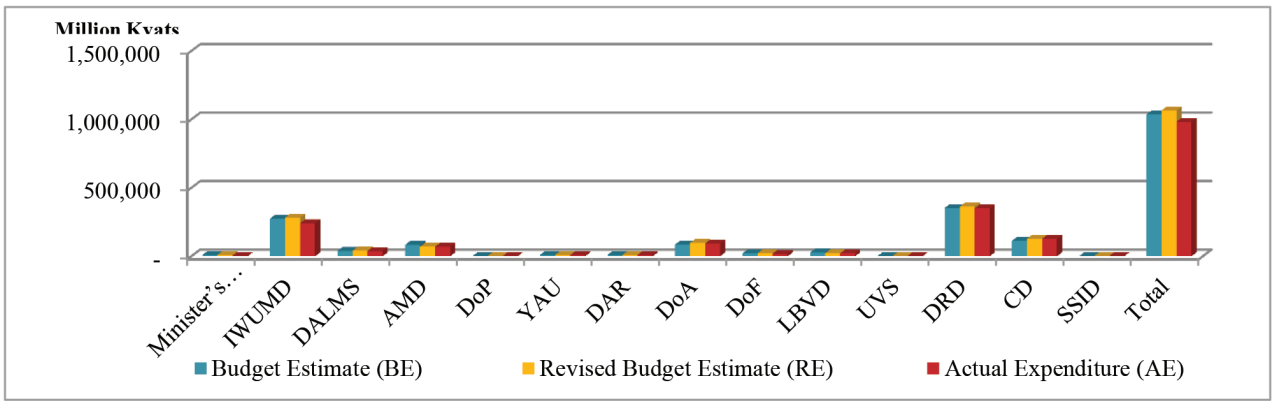


3.10 MOALI's BUDGET ABSORPTION CAPACITY

In 2018/19 Budget Estimates (BE), the MoALI budget has been increased by 0.12 percent compared to 2017/18 Budget Estimates (BE). Despite an increase of 3% Revised Estimates, still 0.4% lower than the 2017/18 Budget Revised Estimates (RE), with higher allocation on a capital budget (45.3%), in fact, 1.1 % higher compared to 2017/18 capital budget RE. On the other hand, the report shows a lower allocation of 44.7% on the recurrent budget, which is 2.5 % lower compared with 2017/18[90].

The MoALI reported overall spending of 92% of the aggregate Budget Revised Estimates (RE) of 1,065,153.41 million kyats, which is 11% higher compared to 2017/18 total expenditure of 865,819 million kyats. In 2018/19, MoALI's capital and recurrent budget execution increased by 20% and 12%, respectively, compared to 2017/18, with Departments spending performance average of 87% regardless of the integration of the ADS IP in MoALI's budget and current limitations to scale out its operation to States and Regions[91] (Figure 25).

Figure 25.MoALI's Department Budgets against Actual Expenditure



90 Data source: MoALI PFM

91 ditto

Apart from the Minister's office showing spending below 50%, the other 13 Departments showed high spending between 95% to 99%, such as CD, AMD, UVS, DRD, DAR, and DOA (Table 14).

Table 14. MoALI's Budget in 2018/19 in nominal terms (Million Kyats)

No	MoALI Department	Budget Estimate (BE)*	Budget Revised Estimate (RE)	Actual Expenditure (AE)**	Percentage
1	Minister's Office	10,621.18	10,615.78	3,678.41	35%
2	IWUMD	275,359.67	282,524.57	241,910.15	86%
3	DALMS	39,705.67	41,000.94	38,472.38	94%
4	AMD	83,253.18	71,038.74	68,822.09	97%
5	DOP	1,689.47	1,702.71	1,473.39	87%
6	YAU	10,463.01	10,465.65	6,904.42	66%
7	DAR	10,558.83	10,717.29	10,180.52	95%
8	DOA	85,738.84	97,197.56	92,204.33	95%
9	DOF	21,584.00	22,282.40	18,477.78	83%
10	LBVD	26,908.18	21,765.35	20,541.60	94%
11	UVS	2,076.63	2,094.10	2,033.24	97%
12	DRD	353,754.67	362,886.56	349,419.88	96%
13	CD	113,583.99	128,501.04	126,853.27	99%
14	SSID	2,040.01	2,360.71	2,225.77	94%
	Total	**1,037,337.33**	**1,065,153.41**	**983,197.21**	**92%**

* Budget Estimate at the beginning of the fiscal year
** Including Financial Expenditures on loan repayments, investments in monetary organizations and withdrawals on saving notes

Some Departments were unable to execute their capital budget allocations. The overall performance on the recurrent budget spending was substantial, with overall spending of 98%, while the Department average spending of 96%. The DOA spent 3% over the budget for the recurrent expenditures. (Table 15).

Table 15. 2018/19 MoALI's Recurrent Budget in nominal terms (Million Kyats)

No	MoALI Department	Budget Estimate (BE)	Budget Revised Estimate (RE)	Actual Expenditure (AE)	Percentage
1	Minister's Office	1,458.19	1,454.46	1,336.64	92%
2	IWUMD	120,664.18	120,958.38	119,022.28	98%
3	DALMS	35,994.05	36,901.82	35,729.59	97%
4	AMD	48,204.86	48,207.87	47,685.10	99%
5	DOP	1,085.47	1,111.11	1,046.02	94%
6	YAU	2,988.00	2,988.00	2,781.76	93%
7	DAR	5,569.70	5,728.15	5,541.80	97%

No	MoALI Department	Budget Estimate (BE)	Budget Revised Estimate (RE)	Actual Expenditure (AE)	Percentage
8	DOA	46,155.17	57,916.58	59,531.81	103%
9	DOF	14,143.86	14,376.90	12,372.81	86%
10	LBVD	14,220.19	14,226.71	13,397.64	94%
11	UVS	1,236.98	1,254.45	1,240.30	99%
12	DRD	136,033.80	142,557.09	138,710.92	97%
13	CD	24,071.99	26,761.57	26,153.32	98%
14	SSID	1,276.77	1,294.46	1,236.49	96%
	Total	**453,103.18**	**475,737.55**	**465,786.48**	**98%**

Table 14 below illustrates that all Departments experienced an under-execution of the capital budget. 14%of the available capital budget was not spent, leading to the non-achievement of specific outputs, identified as relating to: to need to activities envisaged to address the issues on land rights; restructuring of MoALI, and upgrade the infrastructure of one consolidated university and colleges for an adequate education to build Myanmar human capital.

The Minister's office has the lowest capital budget spending of only 26% while DALMS, YAU, and DOP have low execution rates (Table 16).

Table 16. MoALI's Capital Budget in 2018/19 in nominal terms (Million Kyats)

No	MoALI Department	Budget Estimate (BE)	Budget Revised Estimate (RE)	Actual Expenditure (AE)	Percentage
1	Minister's Office	9,162.99	9,161.32	2,341.77	26%
2	IWUMD	147,098.10	152,906.66	116,937.26	77%
3	DALMS	3,711.62	4,099.12	2,742.78	67%
4	AMD	35,048.32	22,830.86	21,136.99	93%
5	DOP	604.01	591.61	427.37	72%
6	YAU	7,475.01	7,477.65	4,122.66	64%
7	DAR	4,989.14	4,989.14	4,638.71	93%
8	DOA	39,498.80	39,183.41	32,575.10	95%
9	DOF	7,440.15	7,905.50	6,104.96	100%
10	LBVD	12,687.98	7,538.64	7,143.96	95%
11	UVS	839.65	839.65	792.95	94%
12	DRD	217,720.88	220,329.47	210,708.96	96%
13	CD	2,631.12	3,081.07	3,066.37	100%
14	SSID	763.23	1,066.26	989.28	93%
	Total	**489,671.00**	**482,000.35**	**413,729.11**	**86%**

SECTION – IV

MOALI's CONTRIBUTION TO MS-NPAN IMPLEMENTATION

4.1 OVERVIEW

The Myanmar Multi-sectoral National Plan of Action on Nutrition (MS-NPAN) was developed within the context of high-level political commitment to address malnutrition. In January 2017, the State Counselor, Daw Aung San Suu Kyi, convened multiple sectors and development partners for the first-ever Inter-Ministerial Coordination Meeting on Nutrition in Pakokku Township of Magway Region. This meeting led to the establishment of a Nutrition Promotion Steering Committee (NPSC) under the umbrella of the Development Assistance Coordination Unit (DACU), a clear recognition at the highest level of Government of the importance of nutrition as a priority area for development assistance.

In 2018, a five-year costed MS-NPAN was developed through intensive engagement with four sectors (Ministry of Health and Sports, Ministry of Agriculture, Livestock and Irrigation, Ministry of Education and Ministry of Social Welfare, Relief and Resettlement) and other key stakeholders, under the direction of the National Nutrition Centre (NNC) and a core group of international and national experts. The Myanmar MS-NPAN was formally endorsed at the first-ever meeting of the NPSC on 26 November 2018. The result of the meeting led to the implementation of a series of inception year activities, including designing the State/Regional specific costed action plans which are tailored to the conditions and characteristics of each region of the country.

The agriculture sector's contribution to nutrition is well-articulated and integrated into the overall narrative of the MS-NPAN, which emphasizes dietary diversification, and recognizes the important links between the diversification of agriculture production systems, income generation and livelihoods improvement, and the improvement of food security and nutrition. Three nutrition-sensitive agriculture outcome areas of the MS-NPAN are reflected in the ADS, although not explicitly articulated as such:

- increased availability of nutrient-rich food products at the market and household level;
- increased access to diversified diets through improved incomes;
- improved safety along with the food supply and value chain to enhance access to safe food.

MoALI prioritized 24 specific interventions for which it is responsible and identified a set of nutrition-sensitive indicators to measure progress against set targets.

4.2 ALIGNMENT OF THE MS-NPAN WITH THE ADS

Extensive work has been undertaken by MoALI to 'think multi-sectorally, but act sectorally". In practical terms, efforts have gone into anchoring the MS-NPAN in the ADS. It should be noted that ADS subscribe to the vision of contributing to achieving food and nutrition security, as expressed in Outcome 1.8. Although, the indicators selected for nutrition in the ADS are yet to be focused on measuring improvement of dietary diversity such as the Minimum Dietary Diversity Score (MDD-W) and production diversity. The recent MS-NPAN has enabled MoALI to fill this gap by articulating how ADS contributes to eradicating hunger and malnutrition and meeting the objective of improving food security and nutrition. Most outcomes areas in the ADS have the potential to contribute to food security and nutrition. The MS-NPAN is helping MoALI to remedy this gap by working through its theory of change. In this respect, the logical framework is still in the process of being aligned with the ADS framework.

The MS-NPAN identifies specific target groups that aim to reach to improve their nutritional status: pregnant and lactating women, women of reproductive age, adolescent girls, and, in particular children, under the age of five years. The first 1000-days approach is a guiding principle in this strategy (from conception to 2 years of a child age as the 'window of opportunity' to address chronic malnutrition/ stunting). Despite the ADS, investment plan and logical framework have not mentioned the specific MS-NPAN target groups; however, it generally discusses landless, poor, and marginalized farmers. MoALI's MS-NPAN output indicators are still being reviewed to indicate target population groups clearly. The integration of MS-NPAN indicators will be taken up during the revision of the ADS results framework.

4.3 MS-NPAN INCEPTION PHASE

In 2018/2019, the MSNPAN 'Inception Phase' was launched. The principal objective of the inception phase was to pilot the methodologies and processes for the subnational planning in Ayeyarwaddy Region before it will be rolled-out to other four States and Regions with the highest prevalence and burden of malnutrition: Shan State, Chin State, Kayin State, Kayah State, Kachin State, and Rakhine State. This first year of implementation consists of three main work streams: 1) prioritization of interventions, 2) capacity assessment, and 3) monitoring and evaluation.

The experiences from the lengthy pilot period in the Ayeyarwaddy Region were used in guiding the design of the formulation of the respective States and Regions multisectoral nutrition action plans. There was an impressive turnout by multi-sectoral representatives, particularly the General Administration Department (GAD) and the Department of Finance and Budget, that actively participated and contributed during discussions.

In the meantime, under the guidance of MoALI, DOP established a network of nutrition focal points with lead and alternates from DOA, DOF, LBVD, DRD, DALMS, SSID and DAR. Eight MS-NPAN intra-sectoral coordination sessions were held to review the MS-NPAN logical framework, the methodology for sub-national planning/intervention prioritization. With the support of EU-FAO FIRST, this network has taken the lead on sub-national MS-NPAN planning. Although ADS does not fully reflect nutrition-sensitive agriculture outcomes, the EU-FAO FIRST makes concerted efforts to link ADS and MS-NPAN by including nutrition-sensitive agricultural activities through planning and consultation workshops in Union, States, and Regions.

Based on outputs and outcomes of consultation workshops, nine indicators are used to prioritize interventions through a two-step process: long-listing of relevant interventions based on need, and secondly, shortlisting based on capacities and opportunities. A total of 9 indicators were used for township selection, including five key indicators on food gap, coping mechanism, food consumption, improved water source, and vulnerability. The additional 4 indicators are the percentage of women in the labor force, egg consumption, fish consumption, and landlessness) that are drivers of poor nutrition.

4.4 IMPLEMENTATION PROGRESS OF MS-NPAN NUTRITION SENSITIVE AGRICULTURE INTERVENTIONS

One of the underlying causes of malnutrition is low dietary diversity, or inadequate diet in terms of sufficient nutrients, minerals, and vitamins. In Asia, rice is a dominant food staple. In Myanmar, 67

percent of the total daily food consumption comes from rice[92]. In this regard, both the MS-NPAN and the ADS emphasized improving agricultural diversification from a dietary and production perspective. Dietary diversity is a cost-effective, affordable, and sustainable means of eradicating hunger and malnutrition. Likewise, production diversity helps to address malnutrition and climate change simultaneously.

The overall goal of the MS-NPAN is to reduce all forms of malnutrition in mothers, children and adolescent girls[93], while the ADS vision is for an inclusive, competitive, food and nutrition secure, climate change resilient, and sustainable agricultural system, contributing to the socio-economic wellbeing of farmers and rural people and the further development of the national economy. In this regard, the Ministry of Agriculture, Livestock and Irrigation (MoALI) is strongly supporting the implementation of the MS-NPAN as an integral part of the ADS.

As indicated in 4.1, MoALI is responsible for achieving the three outcomes related to food production diversification, rural income, and food safety. These interventions are foreseen contributing to accelerating the food and nutrition security in the country, particularly in reducing the 1.4 million (29%) children under-five years that are still classified as stunted, 7% of all under five children are still suffering from acute undernutrition or wasting, and 19% are underweight[94]. In this context, MoALI has been championing the process during the inception and implementation of MS-NPAN activities.

During the first year of the ADS implementation, progress showed the positive achievement of outcomes closely linked to the 16 MS-NPAN nutrition-sensitive agriculture interventions. Out of the 16 interventions that positively progressed, 6 interventions were under outcome 2.1, and 10 interventions were under outcome 1.1 and 3.1. Table 17 below presents the details of the progress for each intervention.

On the other hand, of the 8 lagging interventions, 5 were under outcome 1.1, while 3 and 1 intervention under 2.1 and 3.1, respectively. Therefore, for the remaining years of the ADS and MS-NPAN, these interventions shall be planned and budgeted. Importantly, MoALI has to establish a close relationship and partnership with the Ministry of Natural Resource and Environmental Conservation (MONREC) to implement intervention 2.7 (Agro-forestry).

92 Report Future Smart Food Events on the occasion of FAO and IFPRI's Global Event on Accelerating the End of Hunger and Malnutrition, November 28-30, Bangkok, Thailand (source: http://www.fao.org)

93 Multi-stakeholder National Action Plan for Nutrition (MS-NPAN) 2018/19 – 2033/23 (source: https://www.mohs.gov.mm)

94 Demographic Health Survey 2015/16 (source: https://mohs.gov.mm)

Table 17.Progress of Nutrition-sensitive Agriculture interventions linked to the ADS

MS-NPAN Outcome 1.1: Increased availability of nutrient-rich food products at the market and household level

1.1. Enhanced Homestead-based food production and other innovations.

Key Progress: *No progress*

1.2. Planning support for diversification

Key Progress:

- Assessment on the effectiveness of methodologies and the relevance of existing planning templates.
- Conducted 10,450 village development planning exercises using participatory methodologies.
- An on-going review of the existing Department's result framework to align with the ADS and MS-NPAN, improvement of baselines, targets, and making outputs and outcomes indicators verifiable and SMART.

1.3. Facilitate construction of **small-scale irrigation** and tube wells for households to enable diversification.

Key Progress:

- 244,648 acres were irrigated from groundwater sources.
- 2,822,382 acres of the irrigated area increased in 15 States and Regions from the rehabilitated and newly constructed irrigation system operated and maintained for regular and efficient use of water.
- 2,813,056 acres were irrigated from the rehabilitated and newly constructed village embankments and 3,153,559 acres were supplied with water from existing reservoirs, weirs, lakes and ponds, sluice gate and pumping stations.
- 54 rehabilitation activities were conducted, such as improving the existing irrigation schemes, expanding the canal networks, constructing permanent headwork, and upgrading the main canals
- Participatory Irrigation Management (PIM) and PIM Task Force have been formed.
- PIM guideline and technical manual formulated and used.
- 1,048 Water Users Group/Associations (WUG/A) were formed and trained on Participatory Irrigation Management (PIM) training.
- 5 Water Users Associations (WUA) have been selected by the construction team to manage some irrigation systems.
- 2,621 IWUMD technical officers, WUG/A, and farmers received capacity strengthening on O&M, and water tax, water management, irrigation asset management, and GIS, heavy machinery operation, and tube well drilling.

- Machinery and equipment were provided to four IWUMD mechanical branches for the smooth and timely implementation of works.
- Maintenance work has been carried out for the existing drainage that irrigated 897,241 acres.

1.4. Access to quality inputs (seeds, fertilizer)

Key Progress:

- 61 seed laboratories and 40 seed farms upgraded. 9 certified seed crops were produced, and approximately 702.95 acres were used for seed multiplication of 21 types of cereals, legumes, vegetables, oilseeds, tubers, perennial cash, and industrial crops.
- 51.75 acres were used for varietal selection/trials/research of 19 crops (i.e., rice, maize, legumes, vegetables, spices, perennial cash crops, etc.) and 40.92 acres for breeding 18 crops such as rice, maize, tubers, vegetables, legumes, spices, including crop varieties with promising yield in different agro-ecological zones.
- 21.84 acres farms of breeder and foundation seeds collection maintained.
- 25.38 acres were used for the hybridization of 11 food and industrial crops, including open-pollinated varieties of legumes. 34.15 acres for the production of F1 hybrid maize, sunflower, and rice seeds.
- 735.07 acres were used for seeds productions of the breeder, foundation, registered and certified seed of cereals (rice and wheat), legumes, spices, vegetables, oilseeds and nuts (groundnut, ssesame), as well as cotton.
- 10,392.47 acres were maximized to produce good quality food crops seeds, 75,000 packs of mushrooms planting materials.
- 21,838 diverse genetic resources of wild, landraces, and released varieties of crops such as the resistant varieties of rice, maize, and legumes, and 200 traditional diverse crop varieties of upland rice, NaMaThaLay local rice, pulses, and vegetables stored in the gene bank.
- 198 seed growers associations and seed businesses were certified.
- 7,985 MoALI technical staff and farmers were participated in the various types of capacity building of different subject matters such as seed and planting materials breeding, four seed quality inspection on green gram and sesame. Training on post-harvest technology to maintain seed vigor and quality control on chickpea, sunflower, groundnut, green gram, pigeon pea, and black gram was provided.
- 26 training on seed certification and multiplication on various cereals, legumes, vegetables, and fruits, as well as the submergence tolerant and black turmeric were organized.
- 198 seed grower associations were organized and registered under the Union of Myanmar Federation of Chambers of Commerce (UMFCCI), including the 60% of the regional seed growers' associations established in Nay Pyi Taw, Mandalay, Sagaing and Bago regions.

1.5. **Nutrition-sensitive land tenure:** Enable land regulatory framework to i) improve flexibility of land-use conversion; and ii) secure tenure over rotating and fixed agro-forestry systems, grazing lands, fishponds, other land use systems under customary tenure.

Key Progress: *No progress*

1.6. **Land (co-) titling schemes for both women and men**

Key Progress: *No progress*

1.7. **Training on nutrition-sensitive agriculture for extension services**

Key Progress: *No progress*

1.8. **Training to extension services for knowledge and skills on techniques to add value and minimize post-production food losses * linked with 2.1.2**

Key Progress:

- 250 villages of the 89 village tracts have village extension plans and implemented agri-extension .
- Staff training needs assessment was facilitated and developed a training plan for the Department of Agriculture (DOA) technical and extension officers.
- 340 extension training were conducted.
- 23,092 DOA extension and technical officers were trained.
- 82 different livestock extension and human resource development training, including the Continuous Professional Development (CPD).
- 1,346 fisheries and aquaculture extension and technical officers were trained on 55 various fisheries and aquaculture training.
- Provision of transportation facilities, equipment and machinery for the extensions services and well-equipped mobile animal clinic is operational that is providing extension services to livestock communities.
- 63 centers are operational to share information and knowledge and 579,108 pamphlets, manuals, and handbooks of various subject matters were produced and distributed to farmers.
- 3,221 extension activities on improved/GAP technologies and research-based knowledge on crops were organized.

1.9. Improve access to **mechanization** to address labor shortage (out migration)

Key Progress:

- 1,102,447acres were consolidated for land preparation, 2,562.5 acres for transplanting, and 68,664.5 acres combined for harvesting.

- 6,827.66 acres have been transformed into systemic mechanized farms, 1,040 acres of terraces and 400 acres of upland farms of terraces were reclaimed.
- 121 associations have been established in 13 States and Regions for private mechanization service provision.
- 7,072 units of farm machinery to farmers and 365 units were sold to farmers through private sector collaboration and handed over. 50 units of farm machinery are accessible by rentals at the AMD mechanization stations.
- 3,597 farmers received training on farm machinery operation & maintenance, 941 farmers attended farm machinery repair and maintenance.
- 13,931 farmers participated in 420 demonstrations using different farm machinery, including the rice planting and drying machines, land preparations, transplanting machines, and harvesting.
- 6 training centers were constructed for capacity building and strengthening opportunities.
- 62 mechanical workshop facilities were upgraded, including the 2 base workshops and a mechanization testing center equipped with 15 units of machinery was established that were accessed by 1,276 farmers.
- 61 types of research were carried out on crops seeding and transplanting, crop digging and harvesting, tillage, weeding and weed control. A research on straw management was conducted and 112 joint researches with Agricultural Machinery System and Engineering Co. Ltd (AGM and S & E) on land preparation and harvesting were organized.

1.10. Strengthen **intra-sectoral coordination** and capacity development on nutrition to realize a key objective of the Agriculture Development Strategy on food security and nutrition

Key Progress: *No progress*

MS-NPAN Outcome 2.1: Increased access to diversified diets through improved incomes

2.1. Rural Development s leveraged for nutrition, particularly **revolving fund** for fish and livestock

Key Progress: *No progress*

2.2. **Vocational training** for skilled casual labor and support for alternate income-generating activities

Key Progress:

- 37 training courses of modern agricultural technologies for YAU students were facilitated by Yezin Agriculture University (YAU) in collaboration with the Department

of Agriculture (DOA), JICA-TCP, Agricultural Mechanization Department, and Private Sector organizations.

- 3,316 rural entrepreneurship and enterprise development skills and capacity-strengthening, such as agriculture and livestock breeding, livestock and veterinary practices, computer operation, diesel/wiring, carpentry/masonry, handicraft making, sewing, vocational training, GAP, GAHP, GAqP applications were organized.
- 46,071 people trained on rural entrepreneurship, and enterprise development skills and vocational skills.

2.3. Developed opportunities for increased participation of women in agriculture, livestock, and fisheries (including production, farming, and marketing), as well as **gender**-sensitive decision-making over the use of agricultural resources.

Key Progress:

- 46 Gender training sessions, 148 ToT/TTF/TOF, 275 capacity building specific training were organized at the Township level and 2 ToT/TTF/TOF, 12 capacity building training, and 2 Gender training sessions were conducted at the Union level.

2.4. Support to establishment of agriculture, livestock, and fish supply/**market information systems** to track food flows (imports/exports and commodities).

Key Progress:

- Market Information Service (MIS) established Facebook page that published market information and data.

2.5 **Land rights-based social protection** for landless and land poor by way of (re-) allocation of unused VFV and other available land.

Key Progress:

- Conducted land surveys and inventories, updated the cadastral information, produced digital 5,034 digital "kwin" maps for 83,591 land holdings, issued land tenure rights, and registered land titles.
- Central Land Records Development Training Center (CLRDTC) rolled-out training courses, workshops, and on-the-job training not only for the technical staff of the land management and administration services but also with the members of the District and

  Townships land management committees and the General Administration Department (GAD).
- The land management and administration services technical officers received trainings on using Android-Based Survey Solution (TABSS), Geographic Information System (GIS), Remote Sensing and Database, UAV Aerial Imagining for Surveying, Mapping, and Satellite Photogrammetry.

2.6. Livestock promotion particularly for women and the landless (pigs, goats, poultry).

Key Progress:

- 7 laboratories equipped with AI facilities and liquid nitrogen (LN2) are operational and serving 40,000 livestock farmers and 3,500 commercial farms to inseminate the 97,586 cattle, goats, and swine.
- The AI training was carried out in targeted States and Regions for which 140 LBVD staff, including veterinarians and 40 farmers were trained.
- 5 national animal health and disease surveillance plans on Foot Mouth Disease (FMD), African Swine Fever, Peste de Petits Ruminant (PPR), Avian Influenza, and Rabies were developed and implemented.
- The Peste de Petits Ruminants (PPR) field visits on goats was conducted. 30 field visits on native chicken production and surveillances on vaccination against Newcastle Disease (I2 vaccine) in 6 States and Regions carried out. 30 vaccination and surveillance visits were conducted on foot and mouth disease (FMD), and 3 surveillances on swine diseases were organized.
- 1 animal hospital in Insein Township, Yangon was upgraded to support effective and efficient animal health, and disease treatments and UVS arranged a meeting to establish the one health programme in Myanmar.
- 4 laboratory facilities were renovated, 1 reagent for Brucella and 9 domestic vaccines were produced such as the Bovine Haemorrhagic Septicaemia (HS), Bovine Anthrax (AA), Bovine Black Quarter (BQ), Bovine Foot and Mouth Disease (FMD) "O," Pig FMD, Hog Cholera, Avian Newcastle Disease (I2), Elephant AA and Rose Bangal Antigen.
- A laboratory room dedicated to produce the FMD vaccine was built, and 6 cold chains in Yangon,, Nay Pyi Taw and Mandalay are fully operational.
- 1,601,110 cattle & buffalo heads were vaccinated with Bovine HS, 9, 347, 90 were vaccinated with Bovine AA, and 1,121,776 were vaccinated with Bovine BQ. Similarly, 7,598,976 chicken heads were vaccinated with I2 for Newcastle Disease,
- 474 companies were registered and licensed to produce and import livestock inputs such as veterinary drugs, animal feeds, vaccines, and other allied livestock inputs.
- 2 research facilities for testing honey were constructed and 1,020 beekeepers participated in the apiculture training, for which 999 farmers were eventually engaged in the industry.
- An infrastructure equipped with laboratory tools for feed testing was built, and 3 straw warehouses and machines for pasture and feeding practices were constructed.
- 15 modified animal genetic conservation farms were developed and maintained.
- 8 training was conducted on laboratory management, good clinical practice for veterinary practitioners on cross-border animal epidemic, beef cattle breeding technology, use of nuclear-derived techniques for early detection of Foot and Mouth Disease (FMD) and differentiation of priority and zoonotic, on surveillance and diagnosis development of FMD and detection of multiple pathogens for differential diagnosis and syndrome surveillance for trans boundary animal disease.

- A workshop to develop an animal feeding strategy was organized and 4,411 farmers and LBVD technical officers were trained on Good Animal Husbandry Practices (GAHP).

2.7. **Agro-forestry** promotion on non-permanent forest estate lands (in context of preserving biodiversity including neglected and underutilized crops, securing access to firewood for cooking, supporting shifting cultivation, and low-input livelihood activities such as cultivation of herbs and spices).

Key Progress: *No progress*

2.8. Develop and demonstrate feasibility of small-scale **aquaculture** and integrated rice-fish models for local consumption and income generation.

Key Progress:

- 4 marine and freshwater treatment tanks with 20 tons holding capacity were constructed. A nursery of Tilapia brood fish was improved, and a building of RC Shrimp Hatchery was built, including 20 larval rearing tanks (LRT).
- Improvements of the Nat Yay Khan Fishery Station, Kyauk Phyu Shrimp Hatchery and Ayeyarwaddy Region Pantanaw Fishery Station were completed.
- 30,000 an inch of Rothee alfredian carplet fingerlings have distributed to farmers, 80,000 juveniles have been released to the water and 0.1 million fingerlings were produced and released in Ayeyarwaddy River.
- Aquaculture Research and Extension Center (FAREC) was established and operational. A data collection system was in-placed that records the frequency of marine fishing activities, number of licenses issued for fishing vessels, seed production, and export volumes.
- Research and inventories were conducted to investigate fish species such as Nga Myinn (Giant Butter Catfish) and Nga Tha Lauk (Hilsa illisha) that are adaptable and potential for aquaculture farming. The analysis of the fluctuation of fish species with local communities was carried out, including a comparison of Human Chorionic Gonadotropin (HCG) and Superfecthormons and rearing Thai sliver barb in ordinary water of Sei Daw Gyi Dam and poorly filtered water.
- Experiments were conducted on induced breeding of Nga Phae Oung (Rohtee belangerii), Nga Phan Ma (Rothee alfredian carplet), Nga Phae (Notopterus notopterus), Nga Myin (Silonia Silondia) and Viet Nam Climbing Perch (Nga Pyay Ma).

MNS-PAN Outcome 3.1: Improved safety along with the food supply and value chain to enhance access to safe food.

3.1. **Food safety standards** expanded over wider range of food products.

Key Progress:

- 3,806 food products, 934 consumer products, and 181 cosmetic products were confirmed that passed the test according to the quality assurance standard in Myanmar.

3.2. Awareness raising for farmers in use of agrochemicals.

Key Progress:

- 7 demonstrations on proper fertilizer application were organized, and 50 packages of groundnut rhizobium fertilizer were produced and distributed to farmers.
- 130.54 acres were used for 108 types of researches/experiments/studies and testing on the effect of commercial inorganic and organic/bio-fertilizers applications on crop yield and quality and 245 soil samples have been analysed, and 64 plant samples in selected areas of Myanmar were examined on spatial variability and fertility.

3.3. Support **good practices** of agriculture, livestock, agro-forestry and fishery, particularly for smallholders.

Key Progress:

- GAP guidelines for each crop based on the safe use of fertilizers, pesticides, and post-harvest practices and the National Aquaculture Development Plan that underlined the adoption of GAqP were developed. Additionally, GAHP guidelines for commercial swine farming, backyard swine, layer, broiler, backyard poultry and bee have also formulated.
- A National Laboratory for GAP was established and Analytical Laboratory Unit accredited by ISO / IEC 17025:2005 to issue lab test reports for frozen freshwater fish, seawater fish, shrimp, crustaceans and dried fish and shrimp.
- 3,017.72 acres and 243 farms were GAP certified according to the ASEAN GAP guidelines.
- 9,254.74 acres and 8 companies GAqP certified according to the ASEAN GAP guidelines.
- 68 Hazards Analysis and Critical Control Points (HACCP), 6 Good Mnaufacturing Practices (GMP), and 6,069 Health Certificates were granted. Food safety quality certificates were issued for four different types of fish and fishery products, namely: the frozen, chilled, live, and dry forms that were for export to EU, Korea, and Saudi Arabia (under exploration).
- 211 GAP, 185 GAHP, and 2 GAqP training were conducted, as well as one ISO 9001:2015 certificates training for laboratory staff and GAP forum on coffee.
- 342 acres were used for different crops GAP demonstrations and 56 field days were carried out.
- 3,017.72 acres for the 132 farms were GAP certified according to the Myanmar GAP standards following ASEAN GAP guidelines.
- 342 acres were used for different GAP demonstrations, and 56 field days were carried out
- 20,600 handbooks and 215,394 pamphlets were distributed to farmers and commercial farm operators for broader awareness, understanding, and adoption of sustainable farming practices, GAP, and GAHP to increase the production of crops, backyard/ commercial swine, layers, broiler, and native chickens.
- Enforcement of good practice protocols was controlled through regular monitoring, field survey, and visits. Surveillances were conducted for the GAHP backyard, and commercial swine, GAqP, GAP certified farms and products.

3.4. Strengthening protocols and institutional capacity to implement routine **food safety testing** (including quarantine).

Key Progress:

- 218 existing and new farmer organizations were provided capacity strengthening on food safety and hygiene, machine, and waste cleaning training.
- The fertilizer technical committee (FTC) was formed that provides advices and performs enforcement of fertilizer quality assurance through regular market inspections of counterfeit and unregulated selling of fertilizers.
- 1,007.53 tons of 46 kinds of illegal fertilizer products, 1,179 liters of unregistered liquid pesticide and 4,986 kilograms of pesticide powder were confiscated and destroyed.
- 1,068 types of fertilizers were registered and licensed. 21,203 retail and wholesale shops of fertilizers, pesticides, and herbicides were provided a license to operate, and 3,801 pesticide distributors were registered.
- 7 demonstrations on proper fertilizer application were organized, and 50 packages of groundnut rhizobium fertilizer were produced and distributed to farmers.
- 130.54 acres were used for 108 types of researches/experiments/studies and testing on the effect of commercial inorganic and organic/bio-fertilizers applications on crop yield and quality and 245 soil samples have been analysed, and 64 plant samples in selected areas of Myanmar were examined on spatial variability and fertility.
- 128 MoALI staffs (72 men and 56 women) were trained on Good Hygiene Practice (GHP), Good Manufacturing Practice and Good Hygiene Practice (GMP) and Training of Trainer (ToT) on Setting up Laboratory and registration that was facilitated by the Food and Drug Administration (FDA).
- 18 units of laboratory equipment were procured, and an ELIB, a library with an automation system was installed.

3.5. Improve water supply management, water supply design, planning, and infrastructure; water quality standards, water safety plans, operation, and maintenance.

Key Progress:

- 3,882 units of different rural water supply infrastructures were constructed and rehabilitated, such as deep tube wells, shallow wells, spring/gravity flow, overhead, or ground tanks.
- 2,496 villages have access to clean potable water system, 443,386 households, and approximately 2,150,965 people are using the improved/safe rural water systems.
- 314,641 households and approximately 2,940,517 people are using improved/safe rural water supplies systems.
- 2,275 Water Association Committees (WAC) were established to ensure the sustainable functioning of the water systems.
- 129 water supply training, including 2 training on the rehabilitation of drilling rigs were conducted.

- 1,376 committee members, 1,236 farmers/community, 10 cooperative members, 341 DRD staff, and 241 participants from other institutions trained on water supply and management related training.

SECTION – V

CHALLENGES AND WAY FORWARD

5.1 OVERVIEW

The ADS and the Investment Plan were launched as blueprints in achieving MoALI's mission and visions of MSDP and MS-NPAN. However, it is essential to keep in mind that this is the first attempt of MoALI to have a consolidated and harmonized strategy and plan. The underlying intention is that if MoALI has the ADS and IP, then MoALI will be in a stronger position to mobilize resources to implement the agriculture sector development that envisages transformation of the sector with the targeted annual investment growth of 10%[95]. At the same time, donor funding would also be harmonized and embedded in MoALI's regular programming.

Despite the attempt to implement the ADS as planned, MoALI faced some challenges as detailed below, that if resolved, they could be drivers to increase the effectiveness of the ADS implementation.

5.2 ADS IMPLEMENTATION, COORDINATION MECHANISMS AND INSTITUTIONAL STRENGTHENING

Improving the ADS operation requires wide-ranging involvement of various organizations from Union, States, and Regions, as well as the private sector, civil society, and development partners. Therefore, the immediate operationalization of the ADS institutional mechanisms for implementation and coordination (i.e., NADSIC and NADSCC) is necessary. These committees at the moment are not functional.

The objective of establishing the NADSIC and NADCC or similar coordination bodies is to guide the overall implementation of the ADS and find solutions to resolve the current concern of low budget allocation and weak performance of outputs. Notably, NADSIC and NADSCC or similar coordination bodies can support in cementing intra- and inter-coordination of various stakeholders in the agriculture sector at the Union, States, and Regions. The evolving initiative of MoALI to promote inclusive coordination through the establishment of the Agriculture and Livestock Management Committee with broader membership similar to NADSCC can be explored. These bodies are potential to mobilize resources to increase ADS financing. Besides, the DPs, private sector and farmers' role shall be maximized as strong pillars of the ADS operation, as initially considered during the design of the ADS coordination and implementation framework.

Generally, strengthening MoALI's capacity at the Union, States, and Regions is required. However, improving ADSISU's capacity shall be prioritized, considering ADSISU being the main driver to implement the ADS fully. The fact that ADSISU was established six months after the launching of the ADS, and could not effectively carry out its functions due to the ambiguity of its institutional accountability and limited resources affected the momentum and delayed the process of the ADS implementation. Therefore, it is crucial to increase the effectiveness of ADSISU's operation to sufficiently carry out its mandate and core functions.

The ADSISU requires funding and strong technical and organizational capacities with an appropriate level of staff competencies and skills to coordinate and support ADS implementation successfully. The ADSISU entails structural and operational aptitudes to improve coherence, effectiveness, and sustainability of ADS implementation while carrying out ADSISU's core functions defined in the

95 As described in the ADS, less than the increase in the overall MoALI expected budget growth of 15%.

ADSISU Terms of Reference (ToR). As ADSISU will play an essential role in establishing effective intra- and inter-coordination at Union, States, and Regions, particularly to operationalize the NADSIC and NADSCC or similar coordination bodies, it needs to develop guidelines. A plan of action to mainstream the ADS at Union, States, and Regions shall also be formulated.

The issues relating to overlapping mandates assigned to ADSISU, such as coordination, planning, ADS financing, policy analysis, monitoring, and evaluation, shall be resolved. A task force shall be formed to facilitate the process of streamlining the Terms of Reference of ADSISU against the other concerned MoALI Divisions and Units. These include the Divisions of International Relations, Planning, Budget, Agriculture Policy Unit, and Monitoring and Evaluation. This way, the functions and deliverables of these Divisions and Units are harmonized.

Moreover, with the postponement of MoALI's restructuring, formation of the planned Department of Agribusiness and Marketing Information (DABMI) has been delayed. For that reason, establishing a business cell can be considered as an alternative. In this regard, the functions and the operation of the business cell shall be maximized, ensuring the achievement of outputs supposedly under the responsibility of DABMI.

Finally, the limited awareness and understanding of the ADS and Investment Plan's objective present some risk of not reaching the foresee policy change in the agriculture sector. The pending broader ADS awareness-raising at the Union, States, and Regions and targeting various stakeholders, including parliamentarians, shall be prioritized.

5.3 ADS SUPPORT SYSTEMS DEVELOPMENT AND INSTITUTIONALIZATION

The ADS support systems development (i.e., M&E, MIS, and contribution tracking system) shall be part of the prioritized actions during the second year of the ADS implementation. The delay of establishing rigorous ADS support systems will jeopardize the intention of MoALI to promote evidenced-based planning, increased fiscal allocation, targeted service delivery, and improved enabling environment. These support systems shall be institutionalized for sustained operations and functioning of the ADS.

5.3.1 ADS Planning, Budgeting and Contribution Tracking System

The ADS and IP's delayed launch led to missing the opportunity to advocate for the ADS financing and inclusion to MoALI's 2018/19 plan and budget that were prepared and approved a year earlier before the ADS and its IP were available. Besides, there is currently limited space for the ADS to be embedded in Government centralized planning and budgeting process. Therefore, establishing an iterative, participatory, and transparent planning and budgeting are critically needed to refer to MoALI's annual plan and budget formulation across all Departments Union, States, and Regions to the IP. The Departments' annual budget allocation has to link to ADS planned outputs, outcomes, or objectives and informed based on progress reported from regular monitoring and evaluation.

On the other hand, States and Regions ADS or similar policy documents (e.g Bago Regional ADS and IP, Shan agriculture master plan, Ayeyarwaddy Regional Economic Development Plan) shall be aligned to the Union ADS. Likewise, the Union ADS shall reorient the States and Regions' annual planning and budgeting processes and reference for the States and Regions ADS. The ADSISU shall proactively create a mechanism to facilitate the process at States and Regions. Such action is beneficial to increase

ADS implementation coverage and prioritize interventions according to States and Regions contexts in addressing the underlying causes of the agriculture sector's underdevelopment, food security, food safety, malnutrition, and climate change.

Currently, the capital investment of the ADS is only 77% of the Investment Plan. About 67% of the capital investment came from the financing institutions and Development Partners. For this reason, an annualized ADS financing plan shall be formulated to guide MoALI's ADS budgeting and resource mobilization efforts. The result from the contribution analysis and an investment estimate in the ADS IP shall inform the formulation of the financial plan. The process shall be designed to facilitate re-defining the Government, Development Partners, and private sectors' investment accountabilities through targeted development, particularly for the lagging outputs. The annual ADS investment plan must also be revised to respond to the changing context, needs, and priorities to keep the annual plan dynamic and relevant.

On the other hand, a full round of annual prioritization to decide short-term investment shall be considered, with priorities identified by the Departments in consultation with the key partners and stakeholders. The Government shall consider increasing fiscal allocation to implement the ADS by increasing MoALI's capital budget, bearing in mind the high deficit of 113,176 million kyats in 2018/19 and MoALI supposed 66 % budget share for the ADS financing.

Furthermore, the current limited data and information available to ADSISU hinder for a comprehensive analysis of the ADS financing. ADSISU has analyzed the progress of 105 outputs against the 205 planned outputs for implementation in 2018/19. In this regard, establishing a systematic expenditure tracking system for ADS would facilitate ADSISU to analyze and capture all contributions and funding from different sources, donors, private sector, civil society at Union, States, and Regions. It would also support the systematic analysis of the trends in Government and donor investments in agriculture.

5.3.2 ADS M&E, MIS and Reporting

Aiming to measure and evaluate ADS performance, an M&E Division was established under the Department of Planning (DOP). However, the unit requires considerable capacity building and strengthening to operationalize the M&E system, focusing first at Union and later on covering States, and Regions. Improving M&E institutional capacity is vital to efficiently carry out data collection, field monitoring, analysis, and reporting. Also, there is an urgent need to conduct a Ministry-wide training needs assessment for M&E to establish training requirements, formulate, and implement a technical capacity building .

The contribution analysis revealed that some elements of the current ADS M&E framework should be strengthened, focusing on improving baselines and targets and having SMART indicators for impact analysis or reporting at the outcome and output levels. Besides, many of the outputs have similarities that can be combined to streamline the ADS implementation monitoring and reporting. The revised ADS Results Framework is expected to provide a comprehensive alignment of the ADS and the Investment Plan and fix the existing inconsistencies, unmatched outcomes, and outputs. Also, establishing harmonized data collection tools, reporting templates, work plans, is fundamental. Improving the process of collecting quality data and information of the subsequent ADS annual reports is essential components of M&E. Therefore, substantial financial support and human resources are required to accomplish the ADS M&E.

At present, the monitoring and evaluation activities are carried out with limited use of ICT. An investment to establish an integrated Management and Information System (MIS) is essential for

MoALI to operate an effective, efficient, and reliable M&E during the remaining years of the ADS implementation. On a side note, the MIS will facilitate MoALI's reporting for MS-NPAN and MSDP. At the same time, the MIS will cater to the needs of MoALI's decision-makers to use monitoring information for management, planning, and decision making. Hence, a significant platform provides stakeholders to access information on ADS progress and allows feedback to improve accountability.

Furthermore, an integral part of the M&E process is for MoALI to introduce an annual ADS reflection and analysis across all Departments. During the process, each Department will present its achieved ADS outcomes and outputs, and new issues identified, lessons learned, and projects and activities planned for the following year. At the same time, periodic review of major ADS s and impact assessment studies shall be required, to assess performance, document and disseminate best practices and lessons learned. This process will facilitate an effective planning, increase accountability, and inter-departmental communication and collaboration.

5.4 ADS AND MS-NPAN CONVERGENCE

Although MoALI understands the symbiosis of ADS and MS-NPAN, the national ADS M&E Framework is not yet nutrition-sensitive in its present form. An outcome on the improvement of food and nutrition security is described, but indicators to measure progress are not articulated. Nutrition sensitivity in agriculture is a new concept in Myanmar; therefore, understanding and mainstreaming within MoALI are still limited. An assessment of the knowledge and capacities within MoALI will be needed to effectively integrate nutrition sensitivity in policies, plans, budgets, and M&E to support the effective implementation of the integrated MS-NPAN interventions in the ADS.

The nutrition-sensitive ADS- and MS-NPAN-aligned M&E Framework shall guide MoALI Departments during planning, budgeting, and M&E functions. Reporting against nutrition-sensitive ADS M&E Framework will provide evidence towards improving Myanmar's nutrition status as part of MoALI's contribution to the MS-NPAN. MoALI championing the bottom-up and consultative planning process in States and Regions is imperative to ensure the alignment and convergence of MS-NPAN and ADS interventions at various levels.

However, the integrated ADS and MS-NPAN implementation have to be established pragmatically, considering the learning process during the inception phase and planning exercises conducted in States and Regions. MoALI shall maintain collective efforts at Union and sub-national level with sub-national Government institutions, particularly during the planned implementation of the costed action plans in the first group of States and Regions (Ayeyarwaddy, Kayin, Chin, Kayah and Shan) and the MS-NPAN development workshops for the remaining States and Regions .

Finally, both ADS and MS-NPAN implementation and coordination mechanisms are yet to be established. To not overburden MoALI at Union, States, and Regions and sub-national Government institutions, a joint multi-sector body, could be promoted for nutrition focused outcomes.

CONCLUSION

Translating the ADS and its IP into action entails strong political will to embrace the intended policy change and institutional transformation. It requires MoALI to operate in a broader perspective to adopt the ADS fully. It involves restructuring investments, modifying operational systems, and determination to push for the envisaged change to happen. However, it is a known fact that a natural change is evolutionary. It will take time to achieve and requires long-term commitments from all stakeholders.

The first year of the ADS implementation was a learning period. The Department of Planning (DOP), as a driver and champion of the ADS, tried to maintain the momentum and leverage the ADS in dialogues with MoALI key decision-makers, technical Departments, financing institutions, Development Partners (DPs), and the various stakeholders in the agriculture sector at the Union, States, and Regions. There were continuous efforts to promote the adoption of ADS and its IP.

The ADSISU and other relevant units and Divisions (e.g., M&E and APU) were established and operational to commence the ADS implementation in 2018/19 as planned. The first contribution analysis across MoALI's Department not only provided the evidence on the progress of the ADS but brought back stakeholder's interest in the ADS. Despite the limitations and challenges, 105 of the ADS outputs have had positive advancements. Besides, MoALI demonstrated an increasing spending capacity for both capital and recurrent budgets, therefore mobilizing additional resources to ensure sufficient funding for the ADS is highly recommended.

The current agriculture policy shift offers opportunities to establish a sound basis in reorienting MoALI's service delivery mechanisms. The ADS as a blueprint is yet to be maximized to guide MoALI's decision making, annual planning, and budgeting, and programme development. Therefore, establishing a functional NADSIC and NADSCC or similar bodies is essential to drive the ADS's overall operationalization. Creating these platforms will help MoALI ensure efficient and effective coordination of technical and financial support from financing institutions, Development Partners, and the private sector. Moreover, bringing together different stakeholders within an appropriate framework allows the public and private sectors, and civil society organizations, to work together. Additionally, these stakeholders share roles and responsibilities and harmonize concepts, strategies, approaches, and modalities to implement various development interventions at Union, States, and Regions.

Nevertheless, the first year of the ADS implementation was progressive, even though MoALI had to climb a very steep learning curve to achieve positive results. A natural process of learning that is strengthening MoALI's capacity to implement a vital agriculture policy. MoALI staff can now recognize the logical linkages of the ADS, MS-NPAN, and MSDP, as well as logical linkages between the ADS outputs and outcomes to MoALI's plan and budget. Moreover, an effort to revise the ADS M&E framework to promote a strong connection of outputs to outcomes and focus on priority setting to assist future planning and budgeting is about to begin. Revising the ADS M&E will facilitate rationalizing priority outputs, particularly ensuring implementing the lagging outputs and achievements of outcomes.

ANNEX: ACHIEVEMENT OF OUTPUT INDICATORS

Table 1: Achievement of output indicators under outcome 1.1

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.1 Effective integrated planning based on participatory processes both at the union and at the state/region level.	1.1 Effective integrated planning based on participatory processes both at the union and at the state/region level.	**Indicator 1: Shared templates and methodologies for integrating MoALI Departments' plans.** - Integration of project work plan and budget to Department's annual work plan (AWP) and budget (e.g ADSP and SSID Projects). **Indicator 2: MoALI Departments' plans aligned with medium and long-term plans, including the ADS.** *No progress* **Indicator 3: Consolidated MoALI AWPB prepared and prioritized according to implementation of ADS.** *No progress*
	1.1.2 Introduce participatory planning methodologies during preparation of plans.	**Indicator: Participatory planning methodologies prepared and adopted by MoALI Departments.** - Conducted 10,450 village development planning exercises using participatory methodologies under the Village Development Planning Project.
	1.1.4. Monitor plan implementation regularly	**Indicator 1: MoALI Departments prepare quarterly M&E reports.** - Results framework developed and agreed for each Department, and quarterly results-based reports submitted; - Department of Fisheries 2 Electronic Document Management System (EDMS) Facilities with Office Equipment's; - On-going review of the existing Department's result framework to align to the ADS, MS-NPAN and other long-term plans as well as improving baselines, targets and indicators. **Indicator 2: DOP M&E Division prepare consolidated quarterly M&E reports.** - DOP consolidated all results-based quarterly reports and submitted to the Minister's Office for approval. - Monthly reports were submitted to Project Appraisal and Progress Reporting Department of the Ministry of Planning, Finance and Industry (MOPFI). - Monthly reports of International Loan Projects were submitted to Treasury Department, MOPFI. - Quarterly Progress Reports on loans and grants were submitted to Foreign Economic Relations Department (FERD. - Final report of "Fostering Agriculture Revitalization in Myanmar (FARM) Project Evaluation" was officially submitted to MoALI.
	1.1.6. Implement e-Governance system and make ministry and region/states plans available on the internet	**Indicator: Updated MoALI website includes ministry and states' / regions' AWPBs and medium and long-term plans.** - The DOP M&E unit with the EU TA support worked with the E-Government team and focal points under each Department, to update the web page through regular uploading of updated Departments' profiles, result frameworks (RF) and quarterly results-based reports (RBR) which is in process.

		- In preparation for MoALI to be capable of managing a web-site with relevant information, e-Government team was set up and operationalize. - Furthermore, the Minister's Office (MO) established a Knowledge Center at the head Office and 18 Knowledge Centers that are equipped with 1 Agricultural Instrument and 33 Audio Visual Equipment for KC (Sound Box & Amplifier, Micro Phone, TV, VD Player).
	1.1.8. Cooperation, coordination negotiation with international loan/grant/ grant assistance projects of MoALI tasks[96]	Capital investments were incurred on this output but progress reports were integrated under 1.7.3

Table 2: Achievement of output indicators under outcome 1.2

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.2 Improved capacity for policy formulation and analysis.	1.2.1: Establish Policy Division to review existing policies and prepare new policies	**Indicator 1: Policy Division has terms of reference (TOR), organizational structure and is staffed with qualified policy specialists.** - The Agriculture Policy Unit (APU) at the Department of Planning (DOP) was established and staffed with 11 policy officers (2 Senior officers and 9 junior officers). - The Terms of Reference (ToR) for the APU was developed. - 36 (8 male and 28 female) MoALI staff including 11 APU staff attended 2 policy courses. **Indicator 2: No. of existing policies reviewed.** - Please see progress under 1.2.3 **Indicator 3: No. of new policies formulated.** - A policy brief on the Critical Role of a Strong National Agricultural Research and Extension System was prepared and translated.
	1.2.2: Commission policy studies.	**Indicator: No. of policy studies commissioned / completed per year.** - DOP cooperated with regional projects for policy research and studies such on agriculture transformation (including pulses value chain and road map) and market integration in the ASEAN Region responding to food security and inclusiveness. - DOP also partnered with Agricultural Science and Technology Indicators (ASTI) in assessing Myanmar's current state of research agencies capacities, document and publish various agricultural researches and studies. - Conducted roundtable discussion on research progress of the pulses value chain and discuss road map to implement project activities. - Conducted policy round table on challenges and opportunities of Agri-food trade: The Case of Myanmar.

96 Output 1.1.8 is not reflected as separate output in the ADS publication, instead part of output 1.7.3, therefore output achievements were reported under output 1.7.3.

97 Same output with 1.1.8

		- Policy research and studies on migration, irrigation, non-farm studies, and land tenure security and vegetable value chain were carried out with support from Michigan State University (MSU).
	1.2.3: Conduct regular independent policy reviews	**Indicator: No of independent policy reviews conducted / completed per year.** - Established mechanism for policy free talks and conducted 9 policy free talks for 10 agricultural policies. - 346 technical officers from MoALI's Departments participated the policy free talks. - Revised the existing Biosafety Framework and Law of Myanmar. - Workshops on Biotechnology for Myanmar Regulators were conducted among Government agencies and farmer associations.
	1.2.4 Assure the consistency with previous policies, laws, and regulations.	**Indicator: Policy reviews incorporate analysis of previous policies, laws and regulations.** - Two field surveys were conducted for the analysis of the ADS and Multi-Sectoral National Action Plan for Nutrition (MS-NAPN) in Ayeyarwaddy Region and Shan State. - An initial gap analysis on loan projects was prepared.

Table 3: Achievement of output indicators under outcome 1.3

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.3 Timely and Effective Monitoring and Evaluation processes that inform a web-based Management Information System (MIS).E	1.3.1. Strengthen the capacity of Monitoring and Evaluation units at the union and at state/region level	**Indicator 1: TOR, organizational structure, staffing, and manual developed for DOP M&E Division.** - ToR was developed for the M&E team and focal points under each of the Department Planning Division; - An annotated guideline for preparing results based report (RBR) that briefly explained report contents chapter by chapter was prepared and all staff of MoALI M & E were briefed. **Indicator 2: M&E units established within the Planning Divisions of all MoALI Departments and within their state / region structure.** - Each MoALI's Department established M & E unit with dedicated staff in accordance with the Minister Order issued in 12 June 2018 and Terms of Reference (TOR). - Two-day monthly coordination meetings were conducted from June to September 2018, to promote coordination for all M&E units and share feedback on the quarterly result based reports (RBR) for further improvements. **Indicator 3: M&E capacity development training and capacity development database.** - Conducted strengths, weaknesses, opportunities, threats (SWOT) analysis in relation to M&E for all MoALI's Departments. - A workshop was conducted with approximately 100 MoALI staff attended.

		- A workshop with the support of the EU was conducted to strengthen the M&E capacity of the newly established units and the Agriculture Development Strategy Implementation Support Unit (ADSISU). - DOF established partnership with one VISMA Company and established the Vessel Monitoring System (VMS) to monitor the sustainability of marine resources, maintain native species and protect threatened species, as well as to comply with fishery regulation and to take actions on Illegal, Unreported and Unregulated (IUU) fishing vessels including carrier vessels. - Hardware: 55 Video Wall TV, Computer, Monitor, Copier, Printer etc).
	1.3.2. Establish an appropriate methodology and system to carry out systematic ADS monitoring and evaluation	**Indicator 1: ADS M&E results framework developed, including contribution analysis of MoALI Departments to specific ADS results.** - An M&E results framework was developed with strong participation of MoALI's Departments. - A first ADS contribution analysis of MoALI Departments was initially organized. **Indicator 2: ADS M&E plans formulated and resourced for all MoALI Departments.** - Basic guiding template for M&E annual plans has been developed for all Departments at Union level; - Conducted meetings with 18 Project Management Unit (PMU) and provided Monitoring Information survey form to organize essential project information for evaluation of Overseas Development Assistance (ODA) loan projects. - ADS M&E framework is currently being reviewed for adjustment to increase relevancy, feasibility, and technical applicability.

Table 4: Achievement of output indicators under outcome 1.4

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.4 Sound statistical systems for evidence based decisions.	1.4.1. Conduct Agricultural, Livestock, and Fisheries Census	**Indicator 1: Agricultural census conducted / completed.** - Conducted one workshop on building master frame with an integration of GIS/Satellite imagery attended by 78 MoALI technical staff; - The last census was conducted in 2013. DALMS is preparing the 2020 Myanmar Agricultural Census and is in negotiation with FAO for technical and financial assistance; **Indicator 2: Livestock census conducted / completed** - Livestock Baseline Survey was conducted in 1.5 million households from 530 quarters/villages, 4% from the total of 12,203 villages from 289 townships during January and February, 2018 with assistances from FAO-LIFT Fund Project. - Intercampus was conducted in 35 townships from 15 States/Regions in December 2019.

		Indicator 3: Fisheries census conducted / completed. *No progress* **Additional output achievements:** - Collected data from Departments on inputs, distribution and utilization of irrigated water, land utilization, vocational training, distribution and use of agricultural machinery. - DOP published the Agriculture at a Glance (2019), the Agriculture in Brief (2019), and the annual CSO Statistical Handbook (2019). - Report received of 15 crops and 12,715,190 acres of crop areas were surveyed as additional statistics for insertion to at the Statistics Year Book publication by the Central Statistical Office (CSO). - The market information service (MIS) section of the Cooperative Division had sent 13 reports on market information and data to the Agri-business Journal, the Farmer Journal, AMIA and MIS Facebook page during the reporting period.
	1.4.2 Improve current system of collection of agricultural statistics with the use of ICT and remote sensing.	**Indicator 1: ICT and remote sensing applied in collection of agricultural statistics.** - Application of ICT still under preparation. **Indicator 2: No. of ICT and remote sensing activities conducted.** - 65 MoALI staff participated a workshop on annual reporting using Electronic Document Management System (EDMS) Software. - 25 MoALI staff attended training on Government Personal Management System (GPMS). **Indicator 3: Types of ICT and remote sensing applied.** - Public access to MIS data in MIS Facebook page, AMIA (Agriculture Market Information Agency), the Farmers Journal and Agri Business Journal. - Annual MIS coordination meeting was held on June 15-June16.

Table 5: Achievement of output indicators under outcome 1.5

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.5 Strong farmer and industry associations and federations.	1.5.2. Provide capacity building for effective management of cooperative societies (including farmers)	**Indicator 1: No and type of capacity building activities for effective management of farmer organizations (incl. no of participants, disaggregated by gender).** - Implemented administration and management, bookkeeping, computer science, cooperative management trainings; - 70 trainings on vocational, business, women empowerment carried out; - 6 trainings such as OPENCBS, Financial literacy, Training of Trainers (ToT), Office management , gender equality and participation were carried out ; - Training facilities and facilitators working environment was upgraded such as housing for teachers/trainers, Government staff, 3-story building with office equipment; - Conducted 5 forums. - 18 value addition training conducted; - Conducted 4 Field Days **Indicator 2: No. of farmer organisations trained.** - 198 Seed Grower Associations (SGAs) in 13 States and Regions have been established under the Union of Myanmar Federation of Chambers of Commerce (UMFCCI) **Indicator 3: No. of participants trained, disaggregated by gender.** - 22,402 staff of cooperative societies and of Board of Directors (BOD)received follow up training on cooperative management through on the job-training; - 2,700 cooperative members in Kayah, Kayin, Rakhine, Bago, Thaninthary (Mekong Lancang Cooperation, MLC); - 672 participants for which 482 are farmers and 190 MoALI staff1 participated the value addition training ; - 329 farmers and 88 MoALI staff participated the Filed Days - Capacity building for 2,543 staff at S/R level (on administration and management, bookkeeping, computer science, cooperative management); - 463 cooperative members attended the Women's Forum, Leader's forum and Stakeholder Forum - 189 cooperative members in Myingyan, Nathogy (Canadian Cooperative Alliance, CCA) attended the trainings on OPENCBS, Financial literacy, ToT, Office management, gender equality and participation.
	1.5.3 Conduct annual meetings of MoALI with farmers organizations at the state/region and union level	**Indicator 1: Annual meetings of MoALI with farmer organisations, disaggregated by MoALI Department and union, state / region level meetings.** - 1 forum on the harmonization of Sugarcane Production and sugar market was conducted and participated by 208 participants for which3 39 farmers, 2 cooperative representatives, 54 committee members, 51 from the private sector, 121 MoALI Staff, and 34 from other institutions.

Table 6: Achievement of output indicators under outcome 1.6

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.6 Strengthened farmers' land rights and enhanced capacity of institutions involved in agricultural land	1.6.6. Update existing cadastral information of landholdings that were already certified	**Indicator 1: No of cadastral information records of certified landholdings updated per year** - 5,034 of digital kwin maps were produced from land survey using Real Time Kinematic (RTK-GPS) of 83,591 land holdings for 58,329 farmers
	1.6.9. Strengthen the capacity of land administration services	**Indicator 1: Institutional set-up of land administration services assessed and reforms proposed by MoALI** - Preparatory to this indicator, conducted institutional and staff capacity strengthening through 19 training courses, workshop and on the job exposures for 2,033 participants (12 females), on farm land survey, advanced survey and land records training; and township officer level, ; **Indicator 2: No of "model" township land administration units operational.** *No progress* **Indicator 3: Improved awareness and user satisfaction of land administration services conducted** - Preparatory to this indicator, conducted 10 upgrading courses on duty and function of 47 DALMS township officers have been conducted; - In addition, 10 training and workshops for 303 participants have been conducted, including: i. 3 trainings on Android-Based Survey Solution (TABSS), for 50 staff, 16 cooperative members and 3 private individuals; ii. 2 trainings on Basic Geographic Information System (GIS) remote Sensing and Database (TBGRSD), for 35 staff, 16 cooperative members and 3 private individuals; iii. 2 workshops on UAV Aerial Imagining for Surveying, Mapping and Satellite Photogrammetry, for 15 staff, 27 cooperative members and 3 private individuals; iv. One workshop on GIS / satellite imagery, for 78 staff.; v. One training on mobile and web-solutions for national agri-food information system for 70 staff vi. One workshop for annual reporting for 65 staff

Table 7: Achievement of output indicators under outcome 1.7

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
1.7 Enhanced MoALI capacity for ADS coordination and implementation.	1.7.1. Establish coordination unit for implementation of the ADS under the Department of Planning	**Indicator: ADS coordination unit established and functional.** - The coordination unit was established with 5 deployed staff from various MoALI's Departments, including investment of 6 units of furnitures and office equipment, and staff. - ADSISU Terms of Reference (ToR) was developed and used for the operationalization of ADSISU. - Conducted diagnosis of the current state of ADSISU using participatory approach and ADSISU staff competency assessment of the level of knowledge, skill and ability (KSA). - Conducted ADS awareness at MoALI Deapratments at Union level. - Launched and conducted ADS first contribution analysis in preparation for the ADS Progress report. - Establish presence/visibility and involved in programme development/loan/grant negotiations to support implementation of ADS.
	1.7.2 Provide TA to the Coordination unit	**Indicator: TA to the ADS coordination unit contracted and in place.** - The EU deployed the Technical Assistance (TA) (one international and one national consultant) to ADSISU in early June 2019 to strengthen ADSISU's capacity to ensure implementation of the ADS.
	1.7.3. Make provisions for cooperation with international partners including[97]: • Minister level meetings with ASEAN countries and development partners; • Cooperation, coordination, negotiation with international loan/grant/ grant assistance projects of MoALI; • Outfit and travel for international training and meeting	**Indicator 1: Number and type of ASEAN Minister meetings.** - Participated 11 ASEAN conferences/seminars/workshops - The climate friendly agri-business value-chain sector project CFABCS was approved - MoALI hosted the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Agriculture Ministers Meeting conducted in Nay Pyi Taw. - Signed 3 Association of Southeast Asian Nations (ASEAN) level MoUs and one agreement on the Protocol to amend the ASEAN Plus Three Emergency Rice Reserve (APTERR). **Indicator 2: No. of international loan, grant, grant assistance projects MOUs signed per year.** - Conducted meeting with 18 ODA projects funded by external donors; - International loan and grant steering committee meeting was organized to be able to monitor progress, management and work plans. - Conducted National Project Steering Committee for each and every loan projects (e.g FARM Project)

98 An output indicated in the ADS IP but not indicated a separate Output in the ADS publication.

99 An outcome that is only indicated in the ADS IP

100 Activities related to rural roads, water supply and electricity are reported under outcome 3.5

		- Negotiation with EU for budget support amounting 112 million euro to support MoALI to implement ADS nutrition related outcomes as contribution to the Multi-sectoral National Plan of Action for Nutrition (MS-NPAN) implementation. - The Climate Friendly Agribusiness Value Chain (CFAVC) Sector Project was approved with signed MoU, organized the PMU and implementation started during Q4 of fiscal year 2018/19. - Conducted the 3rd Agriculture and Rural Development Sector Coordination Group (ARDSCG) meeting discussing ADS priorities in relation to Myanmar Sustainable Development Plan (MSDP). - Conducted the 5th Japan-Myanmar Cooperation dialogue - 1st consultation meeting headed by the three permanents and relevant Departments for commemoration of the World Food Day and develop the TOR for seven committees responsible for FAO Day event - Investment on 7 Transportation machine from Mekong Lancang Project **Indicator 3: Amount of financial support provided by international partners for international training and meetings.** *No progress*

Table 8: Achievement of output indicators under outcome 2.1

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.1. Improved research system for crop, livestock, and fisheries and improved research-extension coordination systems with participation of farmers and private sectors	2.1.5. Undertake basic and applied biological, chemical and physical research - with emphasis on new and/or improved varieties of crops, animals, fisheries and other products suitable to various geo-ecological areas of Myanmar	**Indicator: Number and type of applied research studies conducted, disaggregated by crop, livestock and fish products.** - In preparation for DOF to conduct applied research studies, the following equipment were acquired: (i) GPS, LED HD and Motorized Screen; (ii) PH Meter, Laboratory Benches Quotation Standing Height Wall Assembly, Biological Microscope, Anatomical Microscope, Pipette Pump with Display, Wooden Box, UV Trans illuminator, Digital Heating Cooling Dry Bath, Nano Drop Spectrophotometer, Deep Freezer, Canon Projector, Copier for the Fish Disease (PCR-LAB). - The Fish Disease Laboratory at Thar Kay Ta started testing fish and shrimp diseases for fish farmers. - Freshwater Aquaculture Research and Extension Center (FAREC) was established at Thayetkone Fishery Station, AungMyayTharzan Township in Mandalay. - Established four research sites for sharks and rays for annual landing data collection. - Conducted 15 basic and applied biological, chemical and physical researches on fisheries, as follows: i. Research on potential fish species for the sustainable development of inland fish farming.

		ii. Research on Improving Fishery Management in Support of Better Governance of Myanmar's Inland and Delta Fisheries through a survey in Akaung Village, Pyapon Township. iii. Promoting sustainable growth of aquaculture in Myanmar to improve food security and income for communities in the Ayeyarwaddy Delta and Central Dry Zone. iv. Research on Passive Integrated Transponder (PIT) tagging of Silonia silondia (Giant butter catfish) species. v. Research on rotifer and experiment of chlorella farming/cultivation using four types of media on fresh water. vi. Research on brood stock management, hatchery and nursery management, health and disease management, pond aquaculture management of inland aquaculture technology. vii. Conducted feeding trials on supplemental artificial feed and live feed (Moina) for improving the survival rate of Rohu (Nga Myint Chin). viii. Conducted induced breeding of Viet Nam Climbing Perch (Nga Pyay Ma). ix. Conducted comparison of HCG (Human Chorionic Gonadotropin) and Superfecthormons, x. Trial on rearing Thai silver barb in ordinary water in Sei Daw Gyi Dam against poorly filtered water. xi. Research to mass culture the Moina macrocopa. xii. Experiments on induced breeding of Anabus testudineus (Thai). xiii. Studies of bone assembly, brood stock rearing of commercially freshwater cultured species such as Ngawe Yaing Nga Gyin (Hypophthalmicthys molitrix, Silver crap), Yecho Nge Mote (Piriactus branchpomum, Pacu), Tilapia (Oreochromis niloticus,Nile Tilapia), Nga Myint Chin(Lzbeo rohita, Rohu), Nga Gyin Phyu (Cirrhinus mirgala, Mrigal), Nga Yong (Neolissochillus Stracheyii, Masheer), Myat Sar Nga Gyin (Ctenopharyngodon idellus, Grass carp), Nga Pyay Ma (Annabas tstudineus, climbing perch), Nga Phae(Notopterus notopterus, Grey feather back). xiv. Larvae collection of Korea Nga thae Le Htoe (Missgurnus anguillicaudatu, Missgurnus Mizolepis (Loach) and Shwe Wah Nga Gyin (Cyprinus carpio, Common carp). xv. Developed new species of Nga Plae Oung (Rothee belangerii), Nga Phan Ma (Rothee alfredian carplet) and Nga Phae (Notopterus notopterus).

		- Conducted 41 basic and applied biological, chemical and physical researches on crops and other products, as follows: i. local rice varieties by using in vitro-nuclear technique; ii. high yield and good biomass produced cow pea varieties; iii. different genetic diversities of different sugarcane varieties by using molecular marker; iv. 10 plots (5.35 acres) of 185 varieties irrigated lowland rice to select promising irrigated rice varieties. v. 13 plots (4.18 acres) of 163 varieties of rain-fed lowland rice, to select promising varieties. vi. 40 varieties of high quality rice on four plots (1.64 acres) as part of the 2019 summer season research plan. vii. 11 yield trials (5.00 ac) of the promising rainfed lowland rice during 2019 wet season. viii. 11 plots (5.70 acres) of 295 varieties of high quality rice, to select promising varieties from. ix. Yield trial experiments of 6 green gram legumes varieties on 3.5 acres and black gram legumes on 2.5 acres under the 2018 post monsoon season research plan and 0.7 acre under the 2019 monsoon season. x. Yield characteristics experiments for 189 lines of pigeon pea and 61 varietal lines of chickpea lines from ICRISAT for initial observation of well–performed varieties. xi. Two researches related to cropping system of Pigeon Pea: (1) performance of seven different varieties of pigeonpea on rice-based cropping pattern and (2) finding out suitable short duration pigeonpea varieties for the zero tillage practice after post monsoon season rice. xii. Yield experiments of cowpea, lab lab bean and butter bean. xiii. Obtained improved Soybean varieties that suit the ecological conditions in Myanmar. xiv. Selection of cotton short duration and high yielding varieties in 0.5 acre. xv. Performance evaluation of 0.50 acre Gladiolus and 0.50 acre Cobora's Saffron varieties under diverse climatic conditions.

		xvi. Experiment on the sowing time and cultivation practices experiment of the new rice variety Pyitawyin, Paw San Bay Kyar and Paw Hsan Hmwe on 0.5 acre, respectively. xvii. Trial on the seedling age of Paw Hsan Baekya and Paw Hsan rice varieties on 0.5 acres. xviii. 2.2 acres trials on using System of Rice Intensification (SRI) in different rice varieties. xix. Comparison of rice planting techniques using Best Cultivation Practices and System of Rice Intensification in 1.2 acres. xx. Trial of planting different cane portions in 0.45 acres to know different growth and yield. xxi. Yield comparison of sugarcane by regions on 6.05 acres, and the rationing ability of sugarcane on 2.15 acres were conducted and demonstration plot (4.25 acres) of promising varieties. xxii. Research on different rocking of cane setts on yield of sugarcane on one acre. xxiii. Research on yield of sugarcane Raton crop under different thinning methods. xxiv. Research activities of sugarcane in the various study fields (95 acres total area covered). xxv. Experiments of tomato cultivation techniques on 0.2 acres and year round cultivation of vegetables on 0.5 acres. xxvi. Effect of ratooning on different cultivation practices for Thee Htat Yin rice variety on 1.2 acres. xxvii. 18.8 acres comparison of plating rice tillers and normal transplanting method. xxviii. 9.4 acres experiments using rice transplanter. xxix. 0.7 acre research trials of cassava crop vegetative propagation system, 1.25 acres row planting spacing and 1.15 acrse using different harvesting time on effects on yields. xxx. Different Tapioca portions were grown on 0.6 acre to know the effect of different Tapioca portions on growth and yield. xxxi. 48 acre varietal research such as transfer of boolworm tolerance gene to Giza variety by backcrossing method; improve sustainable cotton production through enhance resilience to climate change; regional varietal yield test of selected cotton varieties; genetic variability and heritability for yield and yield component characters in upland cotton and regional varietal yield test of kenaf varieties.

		xxxii. 10.75 acre agronomic research such as finding profitable cropping pattern (intercropping with cotton and green gram); study on the effect of NAA on cotton crop and study on fiber yield and quality relating to various harvest time. xxxiii. 26 kinds of research under Vegetables and Fruit Research and Development Centre (VFRDC) xxxiv. Research activities conducted on 249.5 acres for various crops by Coffee-Seasonal Crops Division. xxxv. Research (1 acre) on mushroom production. xxxvi. Research (126.5 acres) on rubber production xxxvii. Research (124.73 acres) on palm oil production xxxviii. Conducted research on summer rice, pulses and wheat xxxix. 44.6 acres of cotton and sericulture research was conducted. xl. varietal improvement, cultivation practices, nutrient management and plant protection techniques for cotton, jute and kenaf research were carried out in various study fields. xli. Conducted researches on rubber, oil-palm and cashew-nut productions. - Conducted 3 soil science researches such as (i) sustainable rice yields and soil property changes in rice-fallow-rice and rice-pulses-rice cropping pattern on 0.58 acres; (ii) sustainable rice yields and soil property changes after annual double rice cropping patterns on 0.65 acres; (iii) measuring effectiveness of rice yields and rice straw decomposition using two rice harvesting techniques; - Research conducted through the UVS: i. 22 groups, each comprised of ten students in their final year of the Bachelor of Doctor of Veterinary Medicine (DVM) students, started their research projects in November 2018. ii. 17 Masters of Veterinary Science' students developed research for completion of their theses; iii. 3 PhD student developed research for completion of his thesis.
		- 20 Research and development studies conducted by DAR on: i. Tissue culture research ii. Molecular Research iii. Disease resistance varieties iv. Disease prevention testing v. Value-added of the whole part of rice

	2.1.6. Undertake socio-economic research, cost of production and marketing studies. by geographical areas, crops, production techniques, and farming systems	**Indicator 1: Number and type of socio-economic research studies conducted on production costs Research papers on:" Gender Roles in Agriculture;** vi. "Profitability of Rice & Pulses Grown in Nay Pyi Taw, Myanmar"; vii. "Export Market Potential and Suitable Rice Varieties in Myanmar" (secondary data); viii. "Economic Analysis of Machine Transplanted Rice in Yezin, Nay Pyi Taw"; ix. "Economic analysis of existing dry season crops, in Ayeyeyarwddy and Bago regions"; - Conducted training for survey on production and distribution of animal feeds to change cropping pattern and to develop domestic market attended by 44 MoALI staff. - Conducted 15 agricultural economics research such as: i. Adoption of the rice varieties released by DAR and constraints in rice cultivation" in selected areas of Pyinmana, Zeyarthiri, Takkon townships in Nay Pyi Taw Council and Kangyidaunt, Myaungmya, Hinthada townships in Ayeyawaddy Region with 180 rice farmers (sample size). ii. Adoption of groundnut varieties released by DAR and constraints in groundnut cultivation" in selected areas of Patheingyi, Nattogyi, Myingyan and Nyaung U townships in Mandalay Region and Pakokku, Aunglann, Magway townships in Magway Regions with 180 groundnut farmers (sample size). iii. Economic analysis of currently practicing dry season crops in Ayeyawaddy and Bago Regions. iv. Study on gender role in agricultural research activities in DAR with 368 upper level staff and lower level staff from DAR. v. Research on profitability assessment on rice pulses grown in Nay Pyi Taw, Myanmar. vi. Research on economic analysis of machine transplanted rice in Yezin, Nay Pyi Taw. vii. Research on Farmer perception and constraints on rice and groundnut varieties developed by DAR in Naypyitaw, Ayeyarwaddy, Magway and Mandalay regions. viii. Research cost effectiveness of rice cultivation practices on 1.2 acres.

		ix. A study conducted on the impact of different Farm yard Manure (FYM) rates from transplanting rice cultivation practices. x. Research on the development of Rice-Fish System (RFS) in the Ayeyarwaddy Delta, through surveillance of Rice-Fish culture system in Hnan-taw village, Pyinmana Township. xi. Analysis of the rice harvest result in model Rice-Fish farm in Lapatan Township. xii. Survey on suitability of small scale aquaculture. xiii. Research on developing low cost and high profit rice cultivation practices (1.2 acres) xiv. Profitability of rice cultivation practice by Minoru R x 61 transplanter. xv. 3 economic research conducted by DOA. **Indicator 2: Number and type of socio-economic research studies conducted on marketing.** - Conducted 3 marketing research preparation and actual study on: i. Export, market potential and suitable rice varieties in Myanmar. ii. Promoting sustainable growth of aquaculture in Myanmar to improve food security and income for communities in the Ayeyarwaddy Delta and Central Dry Zone. iii. Market Information System Survey training for 6 MoALI staff and 38 people from other institutions.
	2.1.7. Undertake research on postharvest technology to improve productivity and competitiveness	**Indicator 1: Number of research studies conducted on post-harvest technologies** - Conducted 23 kinds of post-harvest researches related to maize, chickpea, hybrid rice, green gram, mango, rice and tomato; i. Confirmation of aflatoxin fungal incidence in maize due to high moisture content during storage period. ii. Testing of storage system for Shwe Bo Paw Hsan and Ayeyamin rice varieties. iii. Developing soybean-based snacks to replace snacks imported from China for school-age children. iv. Seeds treatment research. v. Seeds quality assurance and maintenance system for chickpea. vi. Developing packaging system and seeds quality maintenance system for chickpea. vii. Testing storage system of rice varieties stored in cool room and checking of seeds quality carried out on monthly basis. viii. Testing storage system of green gram. ix. Developed a packaging system (based on residue analysis on pepper, cauliflower, mango, tomato, sesame, chili, and green gram).

		x. Studies tomato value chain. xi. Analyzed post-harvest losses of tomato. xii. Developing of a training manual for post-harvest technologies to maintain seed vigor. xiii. Effect of the germination rate of Shwe Bo Paw Hsan rice variety using different seed treatments (Homai, Mancozeb, Atonic, Table salt). xiv. Development of storage practices that can maintain Shwe Bo Paw San and Ayeyarmin rice quality. xv. Study the postharvest prevention method of aflatoxin fungal incidence in chili that caused liver cancer. xvi. Testing the storage condition of Yeanaelo (7), Yat Koesal, Shwe Sal Yin, Thee Htat Yin, Sin Thukha, breeder seeds from rice research section and rice seeds from hybrid rice section by monthly and annually. xvii. Effect of 4 different rice cultivation practices and lodging during harvest time on postharvest quality. xviii. Analysis of maize storage system and quality comparison; xix. Study the postharvest prevention method of aflatoxin fungal incidence in chili that caused liver cancer. xx. Experiment of lodging system in summer rice production. xxi. Experiments of storage systems on greengram harvest from 1.00 acre demonstration. xxii. Research on postharvest practices for guava, mango and banana. xxiii. 16 kinds of postharvest researches were carried out; - Invested on engineering, processing and extension laboratories, especially in drying, of durian, dragon fruit, and onion. **Indicator 2: Number of new post-harvest technologies introduced.** - Purchase of 3 Machinery and Equipment for 1 Cup quality evaluation lab set options, 1 Coffee Roaster, and 1 Pulper to sizing machine (Mekong Lancang project). - Provision of 3 equipment (including a sugarcane planter) to improve sugarcane productivity. **Indicator 3: Number and type of training on new post-harvest technologies.** - A Private-Public Postharvest Conference of Onion was held in Naypyitaw on December 28, 2018. **Indicator 4: Number of participants trained on post-harvest technologies disaggregated by gender.** *No progress*

	2.1.8. Establish a system for collating, publishing and sharing and disseminating data and results of research activities including collaboration with private sector	**Indicator 1: Research dissemination system established** - Farmer Channel continues broad casting information and knowledge sharing. For which carried out 2 interview s, 12 documentaries, short stories, 66 news and 10 talk shows on research results, knowledge sharing of agricultural good practices promotion of improved agricultural technology/ good practices. - DAR research released varieties and technologies to farmers, through: i. 2 field days of promising local adaptability of Maize and Soybean Varieties based on field standing performance. ii. Quality Seed Offering Ceremony of Wheat held at Aungban Research Farm in Shan States. iii. Practical Training of Hybrid Sunflower Seed Production conducted in Sebin Research Farm in Yemathin Towinship. - 3 launching meetings to promote the sericulture research and development (R&D) under the Lanchang-Mekong Project. - 89 times farmer field days on research results on improved production practices and technologies on sugar cane, cotton, jute, kenaf and mulberry, mushrooms, coffee and seasonal crops conducted by DOA. **Indicator 2: Number of research studies published per year.** - Published and distributed research journal and book on various research findings. **Indicator 3: Number of joint research activities undertaken with private sector.** *No progress*
	2.1.10. Build institutional, human, infrastructure (including ICT) and financial capacity of agricultural research services, namely based on the Agriculture Research Plan	**Indicator 1: Percentage increase of additional budget provided for agricultural research services.** *No progress* **Indicator 2: Number and type of capacity building, training provided to extension officers per year.** - Extension services training and field demonstration for different kinds of crops related on GAP were conducted by DOA for all extension staff. The GAP trainings conducted by Extension Division and State Agriculture Institute (SAI) reached over the 70% of the AWP. - Training on basic course of Microsoft Office, laboratory techniques, and PCR application for Doctor of Veterinary Medicine (DVM) students. **Indicator 3: Number of field extension officers trained per year, disaggregated by gender.** - All extension staff working in target areas participated the extension training and 62.5% of the training plan was achieved. - Doctor of Veterinary Medicine (DVM) (F:70; M:86) students were trained and guided for conducting extension services in the field, as part of their curriculum and extra curriculum syllabus.

		Indicator 4: Sufficient budget to undertake field extension services. *No progress* **Indicator 5: Number of township extension offices and demonstration sites rehabilitated.** *No progress* **Indicator 6: Township extension offices are connected to the internet.** *No progress* **Other relevant progress:** - Construction of 14 office buildings. - DOF built Fisheries Sciences facilities in Twin Tay, and School of Fisheries sciences in Gyo Gone.One building was built for capacity building of researchers and the renovation of the building used for research on livestock. - Constructed 1 building for research staff residence. - Constructed 1 tissue culture laboratory. - 2 Staff flat to facilitate improving research work at cocoon production Farm and for Meikhtila cotton lint testing. - Construction of four office building for research and extension by DOA.
	2.1.11. Strengthen and update capacity of existing research facilities and expand their number to cover all regions/states and agro ecological areas for both crops, livestock and fisheries	**Indicator 1: Percentage increase of additional budget provided for existing research facilities.** - DAR allocated 0.09% additional budget for Zalot's Regional Research Center (RRC). **Indicator 2: Number and type of capacity development trainings provided for staff of existing research facilities.** - Conducted 6 Strengthening & capacity building training at Bago and Magway Regions with 300 participants under the ADSP Project. **Indicator 3: Number of participants trained, disaggregated by gender.** No progress **Indicator 4: Number and locations of new research facilities constructed** - Pilot survey has been conducted in Zalot research farm to upgrade the regional research center (RRC). - Assessment was conducted to upgrade the RRC in Aungban research farm, Southern Shan.. - Bought 112 biotechnology Laboratory Equipment's. - Improved 32 Farm Facilities with Link, Ground Tank, Tube Well, Cold Storage, and Packing House; - Bought 24 units of tractor, trailer, dish plough, spray for rubber project; - 3 unit Motorcycle (Grant from Mekong Lancang) for research staff mobility; - Upgraded 2 Histopathology laboratories, and a Molecular laboratory, equipped 3 deionizer, deep freezer, Fourier Transform-Near Infrared (FT-NIR) to increase research capacity.

	2.1.12. Provide sufficient resources to increase the number of researchers and technical staff through short, medium, and long-term training both in Myanmar and abroad: • Agriculture/Crops Research Service; • Livestock Research Service (new); • Fisheries and Aquaculture Research Service (new)	**Indicator 1: Number of new researchers and technical staff recruited per year to the Agriculture / Crops Research Service, the Livestock Research Service, and the Fisheries and Aquaculture Research Service, disaggregated by gender.** - A Young Scientist Initiative (YSI) organization was established under DOA. **Indicator 2: Number and type of training activities provided for number of researchers and technical staff.** - One research and technology training course (group fellowship training) on the use of nuclear derived techniques for early detection of Foot and Mouth Disease (FMD). - One research and technology training course on improving the capacity of laboratory technicians in Thailand as a result 36,845samples submitted for laboratory testing. . - Training on Improving the Livelihoods of Smallholder Livestock Farmers by Developing Animal Feeding Strategies for Enhanced Food Security attended in China **Indicator 3: Number of researchers trained, disaggregated by gender.** - One female researcher attended the research and technology training course was provided in Thailand. - 3 UVS staff attended the training on Improving the Livelihoods of Smallholder Livestock Farmers by Developing Animal Feeding Strategies for Enhanced Food Security attended by in China under the joint FAO/IAEA of Nuclear Techniques in Food and Agriculture transfers nuclear and related technologies.
	2.1.14: Establish a new international agricultural research partnership through CGIAR, with a special role for ISNAR (International Service for National Agricultural Research).	**Indicator 1: Memorandum of Understanding (MOU) for agricultural research partnership with CGIAR and ISNAR.** - Signed Memorandum of Understanding (MOU) between the UVS and Hokkaido University, Japan to increase collaboration on future research activities. - Signed MoU with Ryukyu University of Japan. - Discussions between UV and the Society for the Protection of Animals Abroad (SPANA) for the development of research projects in Myanmar. - Discussion with UVS and ACIAR (Australian Center for International Agricultural Research) to collaborate for research works. - Discussion with CSIRO, University of Melbourne and UVS on research projects. - The Yezin Agricultural University (YAU) signed MoUs and commenced partnerships for joint research , workshops and staff exchange with : i. Wagening University and Research. ii. Jiangsu Academy of Agricultural Science. iii. Graduate School of Chinese Academy of Agricultural Sciences (GSCAAS). iv. Cologne University Applied Sciences. v. Chengdu Institute of Biology Chinese Academy of Science (CIB, CAS)

		vi. Nakamura Gakeun University and Nakumara Gakeun Junior College vii. Sungkyunkwan University - YAU has on-going research partnerships with: i. Kyushu University ii. MSU iii. Yunnan Agricultural University iv. Karlsruhe Institute of Technology (KIT) v. Kyoto University and Seoul National University vi. Embassy of the Netherlands. - YAU is undergoing several discussions for possible research collaboration with the French Agricultural Research Center for International Development (CIRAD), University of Helsinki, Bern University (HAFL), GRET professionals for fair development, Chonnam National University, Chiba University and Maejo University **Indicator 2: Number of joint research studies conducted with CGIAR and ISNAR.** - A post-graduate student from Hokkaido University, Japan stayed in UVS and conducted research activities on poultry farm management practices and biosecurity measures in Nay Pyi Taw area. - Conducted joint research surveillance on parasitic infestation on Elephants with Hokkaido University and UVS.
	2.1.16 Establish the National Agricultural Research and Extension System (NARES) to facilitate coordination between research and extension.	**Indicator 1: NARES established and functional.** - Conducted initial mission to prepare the agricultural research Master plan and road map with support from MSU. **Indicator 2: No. of research studies recommendations applied for extension activities.** *No progress*
	2.1.17. Implement Annual Research - Extension Liaison Meetings for sharing of experience and information and decisions on approaches to crop, livestock, & fisheries development	**Indicator 1: Annual Research - Extension Liaison Meetings held.** - Implement Annual Research - Extension Liaison Meetings for sharing of experience and information and decisions on approaches to crop, livestock, and fisheries development **Indicator 2: Number and type of recommendations and decisions made during Annual Research - Extension Liaison Meetings.** *No progress*

	2.1.19. Researchers and Extensionists jointly package, promote and disseminate knowledge on improved production technologies for adoption by farmers, including preparation of Commodity Manuals	**Indicator 1: Number and type of research studies used to prepare extension materials and training activities.** - Established an aggregate of 12,973.97 acres of demonstration plots by Extension Division for various crops. - Demonstrations on rice cultivation (sowing system experiment, cropping pattern experiment and SRI experiment) were carried out, over 69.72 % of the annual research plan was completed by the Rice Crop Division. - Cultivation of high yielding native and hybrid mulberry and silkworm germplasm was carried out by Cotton and Allied Fibre Crop Division, DOA. **Indicator 2: Number of meetings held between researchers and extension staff.** - An annual meeting was held to present DAR research findings, joint researches done by DAR and DOA, and the amount of Breeder and Foundation seeds that were distributed from DAR to DOA, with the participation of private sector, managers of township and district level across the States and Regions. - 13 workshops related to maize and other cereal crops, rice, plant variety protection, post-harvest and plant protection, and - 45 training sessions on maize and other cereal crops, wheat, rice, pulses and horticultural crop, agricultural economics, Plant Variety Protection, computer skills, post-harvest, rice bio park and plant protection, with DOA and farmers. **Indicator 3: Commodity manuals prepared.** *No progress*

Table 9: Achievement of output indicators under outcome 2.2

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.2. Transformed public-private agricultural extension system delivering improved products (crop, livestock, fisheries) and technology for adoption and adaptation better linked to agriculture research	2.2.1. Review extension system and formulate national extension policy and strategy, encompassing the functional mandate of MoALI (crops, livestock, fisheries, cooperatives, and rural and community development), and paying attention to the priorities of the Agricultural Policy and ADS Vision, including food security and nutrition, socio-economic well-being of farmers and development of the national economy	**Indicator 1: Extension system reviewed.** *No progress* **Indicator 2: National extension policy and strategy formulated.** *No progress* **Indicator 3: National extension policy and strategy enacted and operationalised** - Preparatory for these indicators, the following activities have been conducted: i. Purchase of 20 machinery and equipment (including a binocular microscope, an incubator, collection and extraction room instruments, a tissue culture lab, a tractor, etc.), and 9 office use machinery equipment (including a detection and amplification room instrument, desktops, printers, etc.); ii. Building of 23 facilities (including 3 houses for staff, 2 office buildings, 2 tractor storage buildings, 1 training room, 1 lab room, 3 crop storage buildings, etc.). iii. Purchase of 3 office use furniture (including 2 benches, and 1 rack)

	2.2.3. Identify priorities for extension work and make extension plans at each village or village/tract level (to be aggregated to township, district, state, and union level) while ensuring that farmers and farmers' organizations and other stakeholders are involved in the formulation of annual work plan for extension activities at all levels	**Indicator 1: State/region extension priority needs assessments** - Conducted extension priority needs assessment in State and Regions. - Following the results of a state/region extension priority needs assessment, equipment was purchased such as 10 units generators with cables, A/C, 4 units vehicles, 10 units laptops and spare parts,10 units printers and various office equipment, to assist the work of extension staff. **Indicator 2: Village tract and village extension plans established** - Agri-Extension established (training, demo, field day, field visit) in 89 village tracts and 250 villages. **Indicator 3: Participation of farmer organisations and farmers in formulating village extension plans** - 149 groups of farmers (farmer Common Interest Group – CIG) participated in formulating village extension plans.
	2.2.4. Provide training (long-term and in-service, with competency testing) and mobility and connectivity amenities to build and strengthen capacity of agricultural, livestock, and fisheries extension services institutions and staff	**Indicator 1: Capacity assessment and capacity development plan for extension staff** - Conducted staff training need assessment and develop a training plan for Seed Division staff. - A training need assessment and training activities were conducted in collaboration with the IRRI team. **Indicator 2: Number and type of training activities provided to extension staff.** - 340 training (local and abroad) attended by the agriculture extension officers such as: i. General Good Agricultural Practices (GAP). ii. GAP on sugarcane. iii. GAP for land use management. iv. Cotton production field inspection. v. Mulberry cultivation and silkworm breeding techniques vi. Advanced techniques for mulberry cultivation, silkworm breeding, cocoon and silk yarn production. vii. Training of Trainers (TOT) for postharvest management. viii. Basic food industry. ix. Vegetables seed production and marketing. x. Coffee crops cultivation and education. xi. Cotton, allied fibre and sericulture. xii. Rubber production and manufacturing. xiii. GAP training for teachers & staff (SAI). xiv. Fertilizer law and regulation. xv. Balanced nutrient fertilizer application.

		xvi. Early generation seed production xvii. 4 Rice Seed Production and Quality Control training under the Lanchang-Mekong Project. - 5 livestock training (local and abroad) attended by the veterinary staff and veterinarians such as: i. Artificial Insemination (AI). ii. Animal quarantine procedures to enhance disease control and improve animal health and welfare of exported animals. iii. Inspector training. iv. Cotton production field inspection. v. Mulberry cultivation and silkworm breeding techniques vi. Advanced techniques for mulberry cultivation, silkworm breeding, cocoon and silk yarn production. vii. Training of Trainers (TOT) for postharvest management. viii. Basic food industry. ix. Vegetables seed production and marketing. x. Coffee crops cultivation and education. xi. Cotton, allied fibre and sericulture. xii. Rubber production and manufacturing. xiii. GAP training for teachers & staff (SAI). xiv. Fertilizer law and regulation. xv. Balanced nutrient fertilizer application. xvi. Early generation seed production xvii. 4 Rice Seed Production and Quality Control training under the Lanchang-Mekong Project. - 5 livestock training (local and abroad) attended by the veterinary staff and veterinarians such as: i. Artificial Insemination (AI). ii. Animal quarantine procedures to enhance disease control and improve animal health and welfare of exported animals. iii. Inspector training. iv. Continuous Professional Development (CPD) training on poultry disease management for MoA-LI LBVD technical officers. - 77 livestock training (local and abroad) and internship attended by the University of Veterinary Services (UVS) students and staff. i. human resources development training for students taking Bachelor of Veterinary Science (BVSc), Bachelor of Animal Science (BASc), Master of Veterinay Science (MVSc)/ Master of Veterinary Medicine (MVM), Doctor of Veterinary Medicine (DVM), UVS staff.

		ii. capacity building activities including internship for Vetrinary Emergency Response Unit (VERU) and UVS Staff. iii. exhibitions/Fairs and annual conference on Manual Vacuum Aspiration (MVA) and agri-livestock show. - 55 Fisheries and aquaculture training attended by fisheries technical officers such as: i. Good Aquaculture Practices (GAqP). ii. Energy Saving and Safety at Sea for small fishing vessels. iii. Proper fish handling techniques application to local fishing vessels. iv. Fish species identification. v. Water quality and fish/shrimp disease control. vi. Seabass fish farming. vii. Giant Butter Catfish and Hilsa. viii. Fishing gear. ix. Quality control and research work. x. Hatchery and Growing Culture of freshwater prawn and marine shrimp and mud crab breeding and farming. xi. Eel fattening. xii. Basic fish farming and induce breeding. xiii. Basic ecosystem approach to fisheries management (EAFM). xiv. Food safety and food security. xv. Fisheries Co- Management. xvi. Technologies Transfer for Marine Shrimp Culture. xvii. Food Safety and Hygiene. xviii. Intensive Aquaculture of Tilapia Grow-out. xix. Fish Taxonomy. xx. Basic Taxonomy and Identification of Marine Fishes and Macro-Invertebrates. xxi. Gender equity analysis training. xxii. Research Practical Data Analysis. xxiii. Fish processing and quality control for fishery products. xxiv. Fish aquaculture and induce breeding. xxv. Shrimp grow out culture, water quality management and disease control management. xxvi. Mariculture Technologies and Aquafeed Production and Diseases Control and Prevention for Development Countries. xxvii. Small scale inland aquaculture. xxviii. Energy optimization use and improve safety at sea in fishing activities.

		xxix. Value Chain Development for Sustainable Use of Fisheries Resources. **Indicator 3: Number of participants in extension training, disaggregated by gender.** - 23,092 DOA extension and technical officers attended the 336 extension training. - 43 veterinary technical officers and veterinarians participated 5 training. - 1,575 attended the human resource development training - 1,238 VERU students and UVS staff. - 90 MoALI LBVD technical officers attended CPD training. - 25 UVS staff attended the exhibitions/fairs/ annual conference on MVA and agri-livestock show. - 1, 346 Department of Fisheries technical officers participated the 55 various fisheries and aquaculture training - 35 participants attended training on Advanced Inland Aquaculture Technology, conducted in cooperation with KOICA and DOF. **Indicator 4: Percentage of extension offices with access to the internet.** *No progress* **Indicator 5: Communication allowance for extension staff.** *No progress*
	2.2.5. Provide sufficient resources to carry out extension activities at the village level consistently with the identified priorities and available resources, giving special consideration to the production of diversified, nutritious and profitable range of food crop, livestock and fisheries products	**Indicator 1: Percentage of extension staff with access to vehicle / motorbike.** - DOF acquired 10 units of cars (wagon), motor boats, and motorcycles. **Indicator2: Resources provided to carry out extension services (e,g Fuel and transportation allowance for extension staff.** - DOA reported purchased and distributed to extension staff resources to support provision of extension services such as: i. 1,702 units of PH meter and moisture meter. ii. 108 units of desktop computers, iii. 46 units printers and 1 unit colored printer iv. 21 units of copiers v. 86 units of various office furniture, including office table, armed chairs, book case and computer table. vi. 46 units of generators. vii. 18 units of digital balance. viii. 14 units of laptop computers. ix. 2 units of projector and 11 units of projection screen. x. 20 units of Gasifier. xi. Paddy milling and drying facilities with spare parts and tools. xii. 2 units of air conditioners.

		xiii. Amonia Meters xiv. GPS xv. Camera - DOF reported purchased and distributed the following: i. Digital Camera ii. Camera. iii. ICE Making Machine(Flake) iv. Dryer v. Air Conditioner vi. Water cooler vii. LED television(55feet) viii. Project LED HD ix. Motorized Screen x. 4 voyers xi. 870 ice boxes xii. 2 containers - UVS reported purchased and equipped Mobile animal clinics. - LBVD purchased and distributed 6 multimedia facilities for conducting extensions services such as meetings, workshops and presentations. **Indicator 3: Number and type of extension trainings on diversified and nutritious crops, livestock and fisheries products per year.** xiii. 3 vocational training on animal farming and institutional livestock in 83 townships from the narcotic free-zone project; xiv. 3,221 extension activities for agriculture knowledge sharing on mulberry cultivation, silk-worm breeding techniques, mushroom cultivation, coffee seasonal crops and jute production in collaboration with YAU and DOA. xv. 18 rubber field training and lecture conducted in Mawlamyaing and Shan State participated by 190 MoALI staff and 432 farmers under the Mekong Lancang project. xvi. 15 field demonstrations on rubber and compost making in Mon and Yangon that were participated by 101 MoALI staff and 357 farmers under the Mekong Lancang project. **Indicator 3: Number of extension staff trained on diversified and nutritious crops, livestock and fisheries products, disaggregated by gender.** *No progress*

	2.2.8. Strengthen farmer organizations (groups, associations, cooperatives, federations) to become facilitators for change	**Indicator 1: Number of new farmer organizations established and registered per year.** - 198 seed grower associations from 13 States and Regions were organized and registered under the Union of Myanmar Federation of Chambers of Commerce (UMFCCI). - 60% of regional seed growers' associations have established in Nay Pyi Taw, Mandalay, Sagaing and Bago regions under the Integrated Seed Sector Development project. **Indicator 2: Number and type of capacity building activities provided to existing and new farmer organizations per year.** - DOA provided 6 grants to 9 villages for capacity building activities from KOICA's donation - 44% of intensive coaching and training of seed producers were finished under the Integrated Seed Sector Development (ISSD) Project, funded by the Directorate- General for International Cooperation (DGIS) of the Netherlands. - 41% of the planned work of the local seed business formation was achieved under the ISSD Project. - Food safety and hygiene both basic and Training of Trainers (TOT) for the purpose of communities livelihood improvement. - Machine Training - Waste clean Training. **Indicator 3: Number of members of farmer organisations trained per year, disaggregated by gender.** - 218 farmer organizations trained.
	2.2.10. Establish information and knowledge system to provide advisory services to farmers	**Indicator 1: Information and knowledge system operational.** - One Union and 18 knowledge centers were built, equipped with audio visual equipment (sound box & amplifier, microphone, TV, DVD player and operational. - One Mobile animal clinic is operational. - Constructed Freshwater Aquaculture Research and Extension Center Building equipped with water, electric and rest room. **Indicator 2: Number and types of information available in the system.** *No progress* **Indicator 3: Number of farmers accessing Information and knowledge system, disaggregated by gender.** *No progress*

	2.2.12. Prepare and disseminate simple farmer-friendly technical documents, including manuals on crop, livestock, apiculture, fisheries and agri-business enterprises and activities and other tools	**Indicator: Number and type of manuals and other tools prepared and distributed.** - 579,108 pamphlets, manuals and hand book produced and distributed by DOA on: i. Mushroom production. ii. Good Agricultural Practices (GAP) iii. Agricultural extension iv. Coffee and Seasonal Crops v. Cotton and fiber crops vi. Vegetable production vii. Seed post-harvest technologies viii. School gardening
	2.2.13. Promote and use ICT to interactively link subject matter specialists (SBS), extension workers and farmers with Knowledge System, demonstrations, updated crop/animal/fisheries husbandry manuals, and advisory services	**Indicator1: Knowledge system, including research centres, call centres and knowledge centres, established and accessible through ICT.** - 34 units of knowledge centers were built in Magway, Mandalay and Sagaing under the AIIP loan project. - 10 knowledge center upgraded in Sagaing, Mandalay and Magway using Government funds under the ADSP. - Installed Server for DOF knowledge management - Established internet connections for remote DOF offices **Indicator 2: Number and type of information available through the knowledge system.** *No progress* **Indicator 3: Number of users and frequency of accessing information from the knowledge system.** *No progress*

Table 10: Achievement of output indicators under outcome 2.3

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.3. Develop (or revive) effective education and training to build "human capital" in the agricultural and food sector responding to the evolving needs of farmers and the private sector in rural areas.	2.3.2. Sectorial disciplines in Yezin and other universities established/upgraded, including in agricultural economics, agricultural business and marketing, agriculture engineering, water management, food technology, and agricultural extension and communications	**Indicator 1: Number of discussions and consultations conducted to upgrade sectorial disciplines in YAU and other universities** - Professors from Massey University (New Zealand) visited UVS for preliminary discussion on upgrading the curriculum of the Bachelor Degree on Agricultural Sciences. **Indicator 2: Number of sectorial disciplines in YAU and other universities established /upgraded.** *No progress* **Indicator 3: Number of students trained, enrolled and graduated per sectorial discipline.** - Livestock Studies Association (LSA) livestock production four-day field exposure was organized with 52 (36 male and 16 female) Bachelor of Science (BASc) students. - Clinical Studies Association (CSA) field visit to the villages was facilitated with 5th DVM students (70 female students and 86 male students.

		- 100 undergraduate students from UVS attended lectures on animal clinics by an expert team from the Society for the Protection of Animals Abroad (SPANA). - Post-graduate students of UVS attended the continuous professional development training conducted by SPANA. - 2,362 students in YAU enrolled in the 2018/19 academic year on various sectorial disciplines (i.e., agricultural economics, agricultural business and marketing, agriculture engineering, water management, food technology, agricultural extension and communication). o Undergraduates: 2,267 (1,062 male and 1,205 female). o Post-graduates: 195 students (40 male and 155 female). **Indicator 4: Number and type facilities upgraded for effective and efficient delivery of sectorial discipline.** - 5 hostels were built for the effective and efficient delivery of UVS training and learning. - 5 Cooperative Universities and Colleges with upgraded learning facilities and environment such as: o Tanlyin Cooperative University: Built 6 inch concrete road and 260 sq. ft car parking for student hostel and teachers housing. o Sagaing Cooperative University: Built fence, 6000 gal water tank and 3floor building for student's housing. Purchased 10 units laptop computers, 120 sets of student chairs, sports and research instruments and references books. Also, purchased equipment such as 3 units projectors, 1 unit digital copy printer, 1 unit digital multi-function copier 2 units laser printer, 2 Copier, Laser Printer (A4) o Phaunggyi Cooperative College: Built double room in a 2 floor building with fence for school compound and purchased references books. o Mandalay Cooperative College: Built 3 floor building. o Thanlyin Cooperative University respectively: Purchased 10 units laptop computers.

	2.4.4[98] Training and Education	**Indicator: Number and type of effective training activities conducted in the agricultural and food sector responding to the evolving needs of farmers and the private sector in rural areas.** - 65 trainings and capacity building programmes received by YAU faculty members and staff. - 37 training programmes were conducted for the dissemination of modern agricultural technology to the students at YAU in collaboration with Department of Agriculture (DOA), JICA-TCP, Agricultural Mechanization Department and Organizations from Private Sector. - 31 UVS staff (16 M and 15F) trained on laboratory enhancement operations. - 15 teaching staff (3M and 12 F) attended the application of polymerase chain reaction (PCR) training. - 20 UVS staff (four male and 16 female staff) trained on basic Microsoft office operations - 5 UVS teaching staff and 10 Msc, candidates trained on research ethics by 4 research fellow from University of Melbourne. - Training on active learning for veterinary and animal science professionals attended by UVS undergraduate students, conducted jointly by Myanmar CP Livestock and UVSS. - 454 Cooperative Department staff officers at Union and States and Regional cooperative staff attended 8 capacity building trainings. - 613 students (224 male & 389 female) participating in internship s such as: - 3 outstanding students were interned to Kentucky University (USA); o 1 student went for internship in Japan; o 5 students went to Yunan Agricultural University in China. o 511 students were trained at Department of Agriculture, o 40 students finished their internship at YAU and other national and international organizations.

		- 30 agriculture training center upgraded such as: o 5 agriculture training centers located in Pyinmana, Shwebo, Tharyarwady, Zwekabin and Heho improvements with ICT room under the Netherlands Project. o 16 greenhouses with essential accessories in agriculture centers in Thahtone, Tharyarwady, Pwintphu, Deemawso established under Mekhong Lanchang Project. o 4 trainees living room, meeting room and class room were renovated in 4 Shweyatu building in Pyinmana under the Mekhong Lanchang Project. o 5 buildings were built for staff officers, student hostel and other staff using Government budget. - 7 machines and equipment for training and education were procured such as 2 disc plough, 2 Rotavator, 1 Tractor, 2 hand tractors.
2.11. Strengthening the UVS[99]	2.11.1 Upgrading the infrastructure (Laboratory building and animal yards)	**Indicator: Number of upgraded Laboratories operational.** - 1 upgraded infrastructure with electricity and back up generator and automatic transformation system for research work. - 1 infrastructure was built for Teaching & Research (Post-mortem examination unit) to improve research capacity. - 26 infrastructures were upgraded to create better teaching and learning environment for students &faculty members. - Upgraded the Information and Computer Technology (ICT) with internet and LAN connection.
	2.11.2 Upgrading Laboratory equipment and supplies	**Indicator: Number of equipment and supplies procured and used by students.** - 2 Laboratories (Histopathology Lab & Molecular Lab) were upgraded. - 3 Laboratory equipment (Deionizer, Deep Freezer, FT-NIR) procured to increase research capacity. - International Atomic Energy Agency (IAEA) supported laboratory equipment at the Department of Physiology and Biochemistry.

Table 11: Achievement of output indicators under outcome 2.4

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.4. More responsive and reliable irrigation and drainage services and more efficient and sustainable water management systems.	2.4.1. Develop Regulations for the Myanmar National Water Policy	**Indicator 1: Regulations and by-laws developed, enacted and enforced for the NWPs for rainfed agriculture, drainage, groundwater, WUA and ISF.** *No progress* **Indicator 2: Regulations and by-laws developed for research, studies demonstrations, training and extension.** - 1 training conducted
	2.4.2. Develop appropriate Measures for Water Management in Rainfed Agriculture	**Indicator 1: Number of research studies on water use management in rain-fed studies.** *No progress* **Indicator 2: Number of training sessions and no. of participants in trainings on water use management in rain-fed studies.** *No progress* **Indicator 3: Number of demonstration sites on water use management in rain-fed systems.** *No progress* **Indicator 4: Number of extension activities on water use management in rain-fed systems.** *No progress* **Indicator 5: Number of km of drainage work completed in delta area.** - Maintenance work of the existing drainage that irrigated 897,241 acres
	2.4.3. Establish on groundwater development • Conduct hydrological studies to establish resources for groundwater utilization; • Develop programme to promote use of sustainable groundwater use	**Indicator 1: established for groundwater development and sustainable use** - operation and maintenance of existing groundwater without negative impacts on natural resources. **Indicator 2: Hydrological studies conducted** - 2 trainings on tube well drilling attended by 42 IWUMD technical staff - Hydrological and test well drilling - 30 Groundwater monitoring stations **Indicator 3: Number of irrigable area increase** - Total of 244,648 acres of irrigated areas, including an increase of 2,105 acres.
	2.4.4: Rehabilitate system and modestly expand command area in village irrigated (VI) dam and village embankment systems (VE) of less than 200 acres command areas: • Village Irrigated system rehabilitation (XXX acres) and new construction (XXX acres);	**Indicator 1: Number of rehabilitated and new constructed village irrigated system.** - 2, 822, 382 acres of irrigated area increased in 15 States and Regions - implemented operation and maintenance of existing irrigation facilities and irrigation networks for equal and efficient use of irrigation water. - machinery and equipment were provided to four mechanical branches for smooth and timely implementation of works. **Indicator 2: Number of rehabilitated and new constructed village embankment** - Embankment area covered 2,813,056 acres.

	• Village Embankment rehabilitation (XXX acres) and new construction (XXX acres).	
	2.4.8. Rehabilitate reservoir dam irrigation systems (with command areas of >1000 acres; there are about 200 dams, of which only 40% are good): Complete physical rehabilitation and other works to increase effectiveness and intensity of existing schemes (to cover 80,000 acres at total cost of $320 million or $4,000 per acre): • Repair damaged surface systems and tube wells, may build new tube wells as part strengthening existing system. • To increase effective area of existing schemes, on a cost-sharing basis (e.g. farmers contribute labour), undertake following: i) lining or upgrading canals to reduce transmission losses; (ii) control structures to improve water management and distribution; (iii) land-levelling, better management, and constructing distribution networks (field channels); (iv) piped water conveyance in special need situation; and (v) building capacity of WUA in efficient irrigated agriculture management;	**Indicator 1: Number of repair of damaged surface systems and build new tube wells.** - Nine construction circles constructed in 15 States and Regions. - Conducted 54 rehabilitation activities of: i. reservoir dam irrigation systems to increase effective area of existing scheme. ii. canal network expansion to increase irrigable areas served by an existing irrigation system. iii. improved water allocation and crop planning. iv. constructed permanent headworks and improve main canals. **Indicator 3: Increase effective area of existing reservoir and irrigated systems.** - existing irrigation facilities and irrigation networks for irrigation command area fully supplied with water in 15 States and Regions - Total 1,899,027 acres irrigated areas of the existing Reservoirs, including an increase of 62,743 acres. - Total 395,292 acres irrigated areas from weirs - Total 109,766 acres irrigated areas from lakes and ponds - Total 486,567 acres irrigated areas from sluice gate. - Total 262,907 acres irrigated areas from river pumping stations **Indicator 4: Number and type of capacity strengthening conducted.** - Conducted 4 Training Courses for Heavy Machinery for which attended by 203 IWUMD staff.

	• Support canal network expansion to increase the irrigable area served by an existing irrigation system; • Improve water allocation and crop planning through provision of irrigated agriculture extension services to assist representative farmers from all sections of the canal to prepare cropping plans with involvement of to improve water distribution, crop productivity, equity and strengthening WUAs. • Construct permanent headworks and improve main canals on farmer-managed irrigation systems (FMIS); • Improve catchment area management and restoration catchment. • Construct inter-basin transfer schemes (IBT) to move water from permanent to seasonal rivers to augment supply in water-short irrigation systems if economically justified by generation of hydropower. Full environmental impacts must be assessed and mitigated for approval of any IBT.	

	2.4.9: Improve management of irrigation systems and on-farm water, including:	**Indicator 1: IWRM policy adopted and enacted.** - Participatory Irrigation Management (PIM) and the PIM Task Force Lead by the senior officials of IWUMD and JICA Irrigation Policy Adviser have formed. - The PIM guideline and technical manual were approved - Conducted PIM trainings for IWUMD officials have carried out. **Indicator 2: Number of WUA's responsible for irrigation management functions.** - 1,048 Water Users Group/Associations (WUG/A) were formed in 15 States and Regions. - 323 Water User Group (WUG) were formed in construction cycles. **Indicator 3: Capacity development assessment and plan for WUA.** - 53 Participatory Irrigation Management (PIM) trainings for irrigation extension staffs and farmers have been carried out such as: i. 3 regional trainings for WUAs (incl. PIM, O&M, and water tax) conducted for 476 participants. ii. 4 Water Management Training for 166 participants iii. 44 Capacity Building Training for 1,714 participants iv. Fish Barrier Mapping Training for 25 IWUMD staff. v. Irrigation Asset Management and GIS for 20 IWUMD staff. **Indicator 4: Irrigation management functions transferred from IWUM to WUAs** - 5 Water Users Associations (WUA) of construction cycle have been selected and planned to form WUA and transfer of Irrigation Management according to PIM Guide Line and Technical Manual developed.

Table 12: Achievement of output indicators under outcome 2.5

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.5. Increased use of improved farm production inputs and technologies by crop growers.	2.5.3. Strengthen certification of multiplied seed, including improved seed laboratories capacity	**Indicator 1: Number of seed laboratories capacity strengthened** - 39 seed laboratories upgraded. - 22 mini-seed laboratories upgraded. - 37 seed farms upgraded. - 3 seed production and cocoon production farms improved. - Quality seed production farm improved by renovating and installing 1 set of modernized machine and provision of 90 Hp tractor. **Indicator 2: Number and Type of training on seed certification and multiplication, including number of participants.** - 12 trainings preparatory seed multiplication and seed maintenance and workshops on Early Generation Seed (EGS) production, technology and quality control on chickpea, sunflower, groundnut, green gram, pigeon pea, and black gram; - Integrated Seed Sector Development Workshop, - 3rd Platform Secretariat Meeting and 5th NSP Meeting - Training on vegetable, fruit and flower production and vegetable seed production for 30 teachers and staffs of SAI. - Specific preparatory seed multiplication and seed maintenance activities include: - 4 trainings on rice seed production and quality control in Kayah state, Shan state, Magwe region and Naypytaw; - 4 Rice Seed Production and Quality Control Training in Kayah State, Shan State, Magwe region and Naypyitaw) attended by 155 DOA staff, 9 farmer associations, and 12 private sector - 4 hands-on Experience Training of Local Progressive Farmers on Initial Rice Quality Seed Production attended by 100 farmers **Indicator 3: Type of crops seeds certified and multiplied.** - Submergence tolerant Ayar Min rice variety - Coffee plants - Mutated rice plants and banana plants - Black turmeric plants seeds - Purified potato plants - Certified rice, oilseeds and legumes in the dry zone.

		Indicator 4: Areas used for seed multiplication - 702.95 acres used for 21 seed crops multiplication such as: i. 4.66 acres of two varieties of sugarcane (DAR-4 and K-95/84) used for seed multiplication. ii. 1 acre of 75 varieties of long staple cotton seed multiplication iii. 5 acres of long staple cotton for certified seeds production. iv. 598 acres cotton seed multiplication v. 15 acres jute and kenaf seed multiplication vi. 3.60 acres sunflower breeder seeds multiplication vii. 24.3 acres sunflower parental line multiplication trial viii. 0.1 acre purified green soybean seed multiplication ix. 0.25 acre purified pumpkin seed multiplication x. 0.25 acre purified bitter gourd seed multiplication xi. 0.1 acre purified turmeric seed multiplication xii. 0.20 acre purified Yam multiplication xiii. 0.5 acre Sweet Potato xiv. 3.03 acres purified sugar cane varieties xv. 2 acres oil seed parental line multiplication xvi. 8.1 acres sesame parental line multiplication xvii. 8.7 acres niger seed parental line multiplication xviii. 17.85 acres R lines parent seeds multiplication xix. 5 varieties from CMS lines multiplication xx. 5.3 acres of 19 hybrid rice varieties from of parental seed multiplication **Indicator 5: Number of seed grower associations, seed businesses certified.** - 198 seed growers certified
	2.5.4. Build-up capacity of seed research stations to produce breeder and foundation seeds: • Increase funding to enhance capacity of public research institutions and research stations, universities, and private sector industry; • Maintaining good quality land races and open pollinated varieties (OPVs) of different crops in the remote areas that are dominated by subsistence agriculture;	**Indicator 1: Percentage increase of funding for research institutions and research stations, universities, and private sector industry.** - Purchased of 25 lab equipment's for enhance sugarcane research breeding and for identifying sugarcane diseases. **Indicator 2: Research, varietal selection and breeding for breeder and certified seeds, including areas used** - At least 51.75 acres used for 19 crops varietal selection/ trials/research i. 2 selection of KSS14 variety ii. 1 research each for four mulberry varieties iii. 1.8 acres varietal selection trial of tapioca iv. 3 acres purify maize variety selection v. 0.4 acre wheat varietal selection trials vi. 9.5 acres monsoon groundnut crop research trials

	• Establish good linkages with international agencies; • **Promote private and cooperative sector and community based seed production. This will involve:** • Participate in partnerships with relevant private and cooperative organizations, farms and nurseries for production of quality seed and planting materials; • Facilitate private sector to produce breeder, foundation and hybrid seeds, especially by providing breeder and foundation seed to private and cooperative seed growers; • Promoting seed enterprise as an industry catering to the national needs and for export; • Promoting community based seed production and agro-biodiversity in inaccessible remote areas and for crops that are not attractive for private sector to produce seed; • Enforce quality assurance systems, involving: Improved capacity of concerned Government certification bodies and laboratories to undertake planting materials certification processes;	vii. 16.2 acres pre- monsoon sesame crop research trails viii. 3.6 acres pre-monsoon sunflower crop research trials ix. 8 acres selection of Niger purified lines x. 278 pigeon peas varieties parental lines selection xi. 61 chickpea lines from ICRISAT xii. 5.5 acres green gram varietal selection and yield trial xiii. 0.7 acre of 6 black gram varieties xiv. 2.05 acres tomato, egg-plant and chili peppers varietal selection experiments xv. 0.20 acres tomato varietal selection experiments xvi. 0.30 acres chili peppers varietal selection experiments. xvii. watermelon varietal trial xviii. 0.5 acre sorghum research trial xix. 126 lines from 8 crossings of promising rainfed lowland rice variety selection - At least 40.92 acres used for breeding 18 crops i. 2 silkworm breeding ii. 3.6 acres sugarcane breeding iii. BC1F1 30 / 87, BC2F1 11 / 33, BC3F1 7 / 21 and BC5F1 5 /15 crossed iv. 172 TCF1 crossing bred from female lines v. 0.5 acre purified sorghum lines breeding vi. 16.20 acres sesame crop parental line trials vii. 0.3 acres of tomatoes inbred line development viii. 1.79 acres tomato variety selection and breeding ix. 0.2 acres tomatoes resistant to TYLCV disease breeding x. 0.5 acre of ladyfinger in bred line development xi. 0.1 acres of turmeric inbred line development xii. 0.2 acres of taro inbred line development xiii. 0.1 acres of soybean inbred line development xiv. 0.5 acres of sweet potato inbred line development xv. 0.3 acre eggplant variety selection and breeding xvi. 0.3 acre chili variety selection and breeding

	• Enforcing compliance of nurseries with farm inputs quality standards; • Provide training and other support to enable accreditation of private seed certification laboratories to provide quality control and certification from private sector, in addition to services provided by Government; • Enforce legislation that compensates farmers when purchasing poor quality seed not complying with existing standards; • Explore options and pursue cooperative to allow evidence submitted to national seed committees elsewhere in ASEAN be accepted as equivalent to testing in Myanmar.	xvii. cucumber selected lines breeding xviii. 5 acres irrigated lowland rice 11 breeding experiments of with good promising varieties such as Yn 3,275 which is crossing from Yadana Toe × Yezin Lone Thwe, Yn 3,290 crossing from Shwe Myanmar × IR 7,302. xix. Rainfed lowland rice breeding xx. 36 crossings of breeding quality rice varieties during 2018 wet season and 2019 dry season. xxi. 3 acres maize inbred line development and selection xxii. 8.33 acres maize breeding - At least 21.84 acres used for 6 crops for collection and maintenance of breeder and foundation seeds, including germplasm collection i. Germplasm collection of 13 mulberry varieties ii. 1.95 acres of 18 tapioca varieties collection and maintenance iii. 5.79 acres of 145 sugarcane varieties collection and maintenance iv. 1 acre cotton varieties breeder seed collection and maintenance v. 1 acre long staple cotton breeder seed collection and maintenance vi. 1 acre long 75 staple cotton varieties collection and maintenance vii. 8.8 acres jute breeder and foundation seeds maintenance viii. 2.30 acres knef breeder and foundations seeds maintenance ix. Rice 104 B lines and 3 A lines breeder seed maintenance **Indicator 3: Number and type of good quality land races and open pollinated varieties (OPVs) of different crops maintained.** *No progress* **Indicator 4: Amount OPV seeds of various crops distributed to private sector and farmers.** *No progress* **Indicator 5: Partnerships established for production of quality seed and planting materials.** *No progress* **Indicator 6: Number of seed enterprise established.** *No progress* **Indicator 7: Volume of breeder distributed to DOA farms, private sector and foundation seeds to farmers.** *No progress* **Indicators 8: Capacity building on seed and planting materials breeding, etc.**

		- 4 training attended by 115 MoALI staff and farmers such as: i. 1 Training for Seed Inspectors on Execution of Field Inspection for Seed Quality Assurance in Green Gram and Sesame attended by 40 DOA staff. ii. 1 Training for Seed Farm Officials on Seed Post-Harvest Technology to Maintain the Seed Vigor attended by 25 MoALI farm officials. iii. 1 Training of Early Generation Seed (EGS) Production Technology and Quality Control on Chickpea and Sunflower attended by 18 farmers and 7 others iv. 1 Training of EGS Production Technology and Quality Control on Groundnut, Greengram, Pigeon pea and Black gram attended by 25 farmers **Indicators: Legislations formulated on seed breeding, multiplications and certifications.** No progress
	2.5.5. Promote production of hybrids, including: (a) allowing imports of suitable hybrids after necessary testing, and (b) encouraging local hybrid seed production within Government organizations, the private and cooperative sector, and in partnership with foreign companies	**Indicator 1: Type and volume of imported hybrid seeds crops** - 2 selection of imported F1 hybrids **Indicator 2: Type of crops and area used for hybridization, including research** - At least 25.38 acres used for 11 crops hybridization, including research such as: i. 0.3 acres hybridization of cotton ii. 0.6 acres hybrid cotton research iii. 5 acres hybrid maize yield trials iv. 8.33 acres maize hybridization v. rainfed lowland rice hybridization, total 126 lines selected from 8 crossings in 2018 wet season. vi. rice hybridization total 36 crossings vii. 2 rice hybridization, parental line (A, B and R lines) development viii. 2.15 acres blackgram hybridization, varietal selection and yield trials ix. 3.1 acres soybean hybridization. x. 3.20 acres pigeon pea of OPV varieties and hybrid varieties hybridization xi. 1.10 acres sugarcane hybridization xii. research works for hybrid line of cucumber, eggplant and tomato grafting. xiii. 1.6 acres for groundnut hybrid lines breeding

		Indicator 3: Type of crops and area used for hybrid seed production - 6.55 acres of hybrid maize F1 seeds production - 2 hybrid rice F1 seed production in collaboration with Golden Sunland Company, Limited. - 0.3 acres cotton hybrid seed production - 2.30 acres hybrid maize production - 25 acres of hybrid sunflower for F1 seeds production **Indicator4: Volume of hybrid seeds of cereal crops, pulses, oil seed crops and industrial crops distributed.** *No progress* **Indicator 5: Type and volume of breeder, foundation, registered, certified and quality seeds produced.** - 15.2 acres breeder seeds production of: i. 2 acres sesame seeds ii. 1 acre wheat seeds iii. 3.50 acres groundnut seeds iv. 5.5 acres rice seeds v. 2.7 acres greengram seeds vi. 0.5 acres pigeon pea seeds - 128.9 acres of foundation seeds production of: i. 7 acres sesame seeds ii. 38.2 acres greengram seeds iii. 10.7 acres groundnut seeds iv. 6.6 acres rice seeds v. 3 acres sunflower seeds vi. 3 acres pigeon pea seeds vii. 0.5 acres ladyfingers seeds viii. 0.5 acres soybean seeds - 491.42 registered seeds production of: i. 9 acres soybean seeds ii. 11.4 acres wheat seeds iii. 13.12 acres sesame seeds iv. 34.61 acres greengram seeds v. 2.7 acre blackgram seeds vi. 322.8 acres rice seeds vii. 7.77 acres groundnut viii. 57 acres sunflower seeds

		ix. 15 acres chickpea seeds ix. 18.02 acres pigeon pea seeds - 104.55 certified seeds production of: i. 8 acres long staple cotton seeds ii. 7 acres groundnut seeds iii. 45.05 acres rice seeds iv. 30.5 acres sesame seeds v. 4 acres greengram seeds vi. 4.4 acres soybean seeds x. 5.5 acres pigeon pea seeds vii. 0.1 acres onion - At least 10,392.47 acres, 75,000 packs, 187 boxes and 62,640 viss of quality seed production of: i. 4.40 acres greengram seeds ii. 12.62 acres soybean seeds iii. 0.2 acre of tomato seeds iv. 0.3 acre of chili seeds v. 0.15 acres lettuce seeds vi. 0.3 acres sin ladyfinger seeds vii. 0.5 acre each sweet potato, turmeric, sin ladyfinger, tomato, cucumber and broad bean seed viii. 2.50 acres hemp seed s ix. 1,596 acres rice seeds x. 45 acres peas, beans, corn and oil seeds xi. 116 acres vegetables seeds xii. 406 acres cotton seeds xiii. 62,640 viss cotton seeds xiv. 70 acres jute and kenaf seeds xv. 391 acres coffee seeds xvi. 800 cares rice summer seeds xvii. 1,597 rice monsoon seeds xviii. 1,750 acres pulses seeds xix. 655 acres wheat seeds xx. 591 acre perennial crops seeds xxi. 162 acres other crops seeds xxii. 75,000 packs mushroom seeds

		xxiii. 187 boxes silk worm eggs **Indicator 6: Volume of quality seeds of cereal crops, pulses, oil seed crops and industrial crops distributed.** - 319, 087 tons Sugarcane - 309 boxes Silkworm eggs - 189 kgs Coffee seeds - 83,000 hills Coffee seedlings - 33,294 viss Cotton seed - 334,360 hills Rubber seedlings
	2.5.7. Develop and implement Biodiversity Policy and Varietal Conservation , involving • strengthening collection, classification, assessment and conservation of diversified bio resources relevant to agriculture, and support scientific report/ documentation – supported by Myanmar Crops Gene Bank with cold storage facilities distributed in a number of Research Centers; • initiating a system of registration of agro-biodiversity; developing regulations and guidelines for the research and experimentation of Myanmar Bio-diversity and Genetic Resources; develop regulation of genetically modified organisms (GMO) having negative impact on bio-diversity, genetic resources, and human health.	**Indicator 1: Biodiversity policy developed and implemented.** *No progress* **Indicator 2: Varietal conservations established.** - Established Gene bank to conserve diverse genetic resources including wild types, landraces, and released varieties. **Indicator 3: Number and types of varieties conserved.** - 21,838 diverse genetic resources crop varieties conserved and maintained such as: i. Resistant varieties of rice, maize and mung bean ii. 1,000 diverse varieties of rice genetics multiplied in 3.23 acres. iii. 3,350 diverse rice genetic quality and characteristics recorded in 5.00 acres - 200 traditional diverse crops varieties were maintained in the Seed Bank, such as: i. upland rice ii. NaMaThaLay traditional rice iii. Pulses iv. vegetables - Chili germplasm conservation - Vegetable germplasm conservation - Conservation of AVRDC tomato germplasm - Tissue culture research for conservation of Myanmar medicinal orchids and other crops.

	2.5.8. Measures to improve productivity and fertilizer use efficiency will involve promoting a greater private sector role, and include: • Soil survey and mapping - to cover all Myanmar in greater detail than done in 1960s; • Promotion and demonstration of soil conservation techniques; • Promotion and demonstration of soil amelioration techniques with involvement of private sector; • Strengthen laboratory facilities to ensure that farmers can get access to timely and affordable soil testing and other services; • Enforce quality assurance systems, including fertilizer inspection; • Capacity building of Soil Division staff, Units and facilities; • Promote domestic fertilizer production and trade with involvement of private sector, including: - Feasibility studies on domestic production;	**Indicator 1: Number of measures to improve productivity and fertilizer use efficiency established and implemented involving promotion greater private sector role.** 1. *Policy measures* - A fertilizer technical committee has been established to provide technical expertise on fertilizer related matters. 2. *Capacity building* - 3 training occasions on the implementation of the fertilizer law and regulation. - Training on balanced-nutrient fertilizer application - 7,985 trainees attended the two above-mentioned training 3. *Production and Promotion of domestic fertilizer* - 50 package of groundnut rhizobium fertilizer was distributed to farmers that are growing pulses. - 7 demonstrations on fertilizer 4. *Soil survey mapping measures* - Soil testing and plant analysis laboratory under Soil Science Section has been analyzed 245 soil samples to measure physical and chemical structures and 64 plant samples to measure; - Spatial Variability of Soil Fertility Distribution in Selected Areas of Myanmar 5. *Enforcement of quality assurance systems, including fertilizer inspection* - fertilizer inspections in the Taungoo and Naypyitaw regions, aiming to reduce fake fertilizer distribution. - 1,068 kinds of fertilizers were registered and licensed. 6. *Establish database and monitoring system on fertilizer use and distribution* - Fertilizer Technical Committee (FTC) officers conducted monthly check at fertilizer markets and unregistered products were confiscated. - 46 kinds (1,007.53 tons) of illegal fertilizer products were confiscated. **Indicator 2: Number of private companies involved in improving productivity and efficiently use of fertilisers.** *No progress* **Indicator: Number and type of research experiments related to soil and water management**

	- Establishment of commercial bio-fertilizer production enterprises based on municipal biomass and agro-processing waste • Establish a fertilizer buffer stock under PPP arrangement; • Establish database and monitoring system on fertilizer use and distribution, including both official and informal import (the latter to be obtained through survey data).	- At least 130.54 acres used for 108 researches/experiments/ studies such as: i. Bio-fertiliser (3,200 KG of vermicompost and 1,950 gal of vermiwash) produced by YAU has been used for master students research usage. ii. Research study on rice yield changes on soil-tested results-based fertilizer application. iii. 0.62 acres experiment on recommended fertilizer dosages application. iv. 0.64 acres experiment on the impact of different rates of Nitrogen, Phosphorous and Potash fertilizers application on tomatoes yield and quality. v. 2 acre experiment on the impact of different rates of Potash fertilizer on onion yield and quality. vi. 1 acre analysis of boron residue on pulses after rice cropping using boron fertilizer. vii. 1 acre study on efficient utilization of fertilizers in horticultural crops production after rice production viii. 1 acre experiment on the measurement pulses nitrogen fixation amount from air using 15N-labelled urea ix. 1 acre study on proper yield of green gram varieties that are resistant to Phosphorous deficiency. x. Experiment on the effect of using different rates of organic and chemical fertilizers on sesame's growth, yield and quality xi. 1 acre research study of sesame plant growth, yield and seeds quality changes on organic and inorganic fertilizer application. xii. 70.87 acres research study of rice yield changes on Farm Yard Manure (FYM) and chemical fertilizer application. xiii. 1.28 acres experiment on rice crop yield measurement and silica uptake after calcium silica fertilizer application. xiv. 0.58 acres used in studying plant growth and rice yield after LH application. xv. 0.62 acres research on rice yield changes on soil-tested results based fertilizer application and recommended fertilizer dosages application.

		xvi. 0.58 acres study on sustainable rice yields and soil property changes in rice-fallow-rice and rice-pulses-rice cropping pattern. xvii. 4 acres use to measure effectiveness of rice yields and rice straw decomposition for two ways of rice harvesting. xviii. 1 acre study on maize yield and urea fertilizer requirement in pulses intercropping with maize. xix. 1 acre finding out groundnut varieties that are resistant on phosphorous deficiency but with reasonable yield. xx. 0.6 acres experiment on the effect of lodging and yield rates on different seeds with the application of urea fertilizers in rice cultivation practices. xxi. 0.6 acre experiment on the effect of different rates of fertilizer on lodging and yield of different rice varieties xxii. 1.10 acre experiment on the effect of different rates of fertilizers on sugarcane growth (new plant and ratoon). xxiii. 0.9 acre experiment on the effect of different rates of fertilizers on sugar cane number of tillers and weed incidence. xxiv. 0.5 acre study on the effect of different rates of fertilizer on lodging and yield of Pyi Taw Yin rice variety. xxv. 0.5 acre experiment on the effect of different rates of organic fertilizers on rice transplanting methods. xxvi. 2 acres research of different fertilizer rates on sugarcane cropping pattern. xxvii. Effect of different urea fertilizer rates and spacing on the yield of Pyi Taw Yin rice variety. xxviii. Profitability of rice cultivation practice by system of rice intensification (SRI). xxix. Effect of different rates of fertilizer on rice transplanting system. xxx. 34.85 acres study on improving soil fertility by growing rice-green manure cropping pattern and rice-rice cropping system. xxxi. 1.9 acres experiment on the effect of different rates of fertilizer on sugarcane yield. xxxii. Research on the effect of using both Rhizobium and chemical fertilizers.

		xxxiii. 2 researches on the effect of the effect of applying one strain of rhizobium against more than one strain on the vegetative growth of black gram. xxxiv. 2 researches on the effect of applying one strain of rhizobium against more than one strain on the vegetative growth of green gram. xxxv. 2 researches on the effect of using both Rhizobium and chemical fertilizers. xxxvi. Observation of native rhizobium for soybean and blackgram. xxxvii. Research on the effect fungi on tomato vegetative growth xxxviii. Study on growth and multiplication of Africa Worm, xxxix. Study on effective microbes on soil and plant samples from different regions to produce biofertilizer. xl. Testing quality of effective microbes and their effect on different crops, xli. Finding out suitable rates of rice bran and inert matter to produce biofertilizer, xlii. Finding out rhizobium bacteria to apply on pulses crops, xliii. Finding out suitable rates of fertilizer to multiply Azola and effect of different rates of inert matter and xliv. Study on the duration of mushroom package on mushroom yield. xlv. 16 rice-bio park experiments on: study of effective microbes, Africa Worm and waste product of paddy plants for using as organic fertilizer, and making of Myanmar traditional foods by using bran have been conducting. xlvi. Rice-bio park experiments on: comparison of the digestion rate of cattle. xlvii. Comparative study of feed block by using molasses and manure mixture. xlviii. Study on the effect of different rice straw pulp on the quality of paper. xlix. 40 research experiments conducted on: - Fertilizer applications on different crops. - SALIBU technology on rice - Different irrigation methods on onion crops - A workshop to develop project to establish database system for soil classification based on geographic data and to protect land resource degradation was carried out.

	2.5.9. Develop and promote integrated pest management (IPM) and bio-control of weeds.	**Indicator 1: Number and type of research studies conducted on IPM and bio-control of weeds.** - 7 plant pathology researches conducted such as: i. Study whether using effective micrboes Trichoderma can control rice root rot nematode disease. ii. Research on finding out if possible to reduce the severity of rice bacterial leaf blight disease using integrated pest management practices. iii. Research on finding out if possible to reduce the severity of onion anthracnose disease using integrated pest management practices. iv. Research on finding out if possible to reduce the severity of chili die-back disease using integrated pest management practices. v. Research on finding out an effective method to reduce Aspergillusflavus and Aflatoxin content in red Chili using integrated control measures. vi. Research on finding out suitable amount of garlic extract to reduce severity of tomato stem rot disease. vii. Research on finding out suitable amount of neem extract to reduce severity of tomato stem rot disease. - 4 entomology researches such as: viii. Raising brown plant hopper, tobacco caterpillar, fall army worm and gold snail. ix. Pesticide residue testing in daily food by using M9 test kit was conducting to know pesticide residue level. x. Field research detecting brown plant hoppers resistant varieties on 72 rice varieties, 37 irrigated rice varieties, 23 rain fed rice varieties, 12 drought tolerant rice varieties. xi. Collection of Trichoderma and Mycorrhiza fungi from soil. - 40 types of various researches/studies conducted such as: xii. 1.03 acres study on the growth and multiplication of Trichoderma by yearly application of Trichoderma on blackgram cultivated soil. xiii. Researches related on testing different rates of trichoderma on black gram,

		xiv. Testing pesticide residue of black gram by applying fungicide (a method widely used among farmers) for alternaria brassicae. xv. 0.5 acres study on the different rates of Metarrhizium to control sweet potato weevil xvi. Experiment on effect of different rates of verticillium on rice plants to control rice sucking pests. xvii. Experiments on effect of different rates Beauveria and Metarhizium on rice plants to control rice sucking pests. xviii. Testing different rates of verticillium, beauveria and metarhizium to control rice suckers. xix. Testing fungicide residue on cauliflower in cauliflower field by applying fungicide instead of pesticide. xx. Research on finding out resistant varieties and integrated pest management techniques for rice blast and bacterial leaf blight diseases xxi. Research on finding out resistant varieties for the diseases of rhizotonia , for leaf and sheath blight and dry root rot of sesame. xxii. Research on finding out resistant varieties for the stem rot disease of tomato, xxiii. 2 researches on the effect of Trichoderma and Mycorrhiza fungi on tomato vegetative growth. xxiv. Research on finding out resistant varieties for the fruit rot and die back of chili, xxv. Testing trichoderma rates to control rice stem borer disease. xxvi. 1.5 acres research on finding pre control measures of rice stem borer and plant hopper. xxvii. 1 acre stud on the relationship between rice stem borer, plant hopper and climate. xxviii. 2.5 acres research on finding the pre control measure of yellow mosaic in green gram xxix. 0.5 acres study on the incidence of army worm in the cauliflower field by controlling with trap crop. xxx. 1.5 acres rice research trial on testing integrated pest management techniques for different rice pests. xxxi. 11 plant protection researches conducted by DOA.

		xxxii. 1 acre study to find the pre-control measures of rice pests and a list of daily pests' occurrence received from light trap. xxxiii. 0.9 acre research on different rates of weedicide on yield of sugarcane. xxxiv. Screening of Different Rice Varieties Against Some Major Pests and Diseases xxxv. Screening for Resistance to Yellow Rice Stem Borer in Selected Rice Varieties xxxvi. Occurrence and Distribution of Sesame Disease in Major Sesame Growing Regions of Myanmar xxxvii. Establishment of Major Insect-Pest Warning Model through Defining Distribution Map for Insect Pests and Natural Enemies on Rice and Pulses. xxxviii. Determine the responses of rice and maize crops in central Myanmar to fertilizers and current fertilizer N efficiency at 4 locations. xxxix. Management of nutrients for improved profitability and sustainability of crop production in central Myanmar. **Indicator 2: Number and type of extension materials prepared from research findings on IPM and biocontrol of weeds** - Printed pamphlet and bulletin on Fall Army Worm trapping and integrated pest management methods. **Indicator 3: Type of capacity building and No. of extension officers/farmers trained on IPM and biocontrol of weeds, disaggregated by gender.** - Integrated Pest Management Workshop was held in November, 2018. - Conference of Integrated Pest Management was held in Department of Agricultural Research. - Conference on rice diseases was held with the attendance of 10 Government staff and 60 farmers from Phan Aan Township of Ka Yin State. - Prevention of Shwe Kha Yu forum was held with experts from DAR. - Technologies transfer training on light trap and integrated pest management in 3 States and Regions attended by DOA staff and local farmers. - Five cabbage and cauliflower growing farmers from a village around Naypyitaw were trained on integrated pest management practices. - Knowledge sharing on pest management control methods workshop especially Fall Army Worm was conducted in 3 States and Regions. - Conducted 4 training of plant protection in Sagaing, Mandalay, Nay Pyi Taw and Bago under the ADSP project)

	2.5.10. Strengthen pesticide and herbicide laboratories	**Indicator 1: Pesticide and herbicide laboratories fully staffed and equipped.** - Bought 2 plant protection LCMS Lab machine and HPCL UV Detector for Yangon lab for pesticides analytical residue. **Indicator 2: Number and type of capacity building activities provided to pesticide and herbicide laboratories staff.** - Pesticide residue testing on consumed daily using M9 test kit. **Indicator 3: Number of pesticide and herbicide laboratories staff trained, disaggregated by gender.** *No progress*
	2.5.11. Establish quality assurance for pesticides and other plant protection products. This will involve: • Strengthening pesticides, herbicides, and other products inspection through improved capacity of concerned public organizations. • Enforcing compliance of importers and dealers with quality standards, comprising: - Enforce the law on Fertilizer; - Enforce Law on pesticides and herbicides; - - Approve and implement a modern law on trademarks; - Ensure proper testing and enforcement processes to prevent circulation of counterfeit, adulterated or mislabelled products. • Encouraging provision of quality control and certification from private sector as well as Government.	**Indicator: Number of registered importer, dealers and retailers of fertilizers, pesticides and herbicides.** - 21,203 retail and wholesale shops were provided license to operate. - 3,801 registered pesticides distributors. **Indicator 2: Types of capacity building of concerned public organizations and importers/dealers/retailers of fertilizers, pesticides and herbicides.** - 12 training sessions for Certified Pesticide Applicator Training conducted in 4 States and Regions attended by 1,815 participants. **Indicator 3: Volume of confiscated and destroyed counterfeit/ illegal pesticides and herbicides.** - 1,179 litres of unregistered liquid pesticide and 4,986 kilograms of pesticide powder were seized and destroyed.

	2.5.12 Plant and animal quarantine – border and inland control facilities, including laboratories, storage, and replication/ testing plots	**Indicator 1: Number of plant and animal quarantine control facilities established and operational.** *No progress* **Indicator 2: Number and types of plants and animals quarantined and tested per year.** *No progress* **Indicator 3: Type of capacity building and No. of technical staff trained.** - 6 trainings for the Operationalization of Animal Quarantine Station, attended by 93 LBVD technical officers. - An inspector training was conducted in Nay Pyi Taw.

Table 13: Achievement of output indicators under outcome 2.6

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.6. Increased application of appropriate mechanisation in the agricultural value chain.	2.6.1. Encourage farmers to consolidate their fields to promote mechanization of land preparation, seeding and transplanting, as well as harvesting.	**Indicator: Total area of consolidated fields.** - 6,827.66 acres have been transformed into systemic mechanized farms including 300 acres funded by the Union Government and 575 acres by the AIIP Project (108%) of planned target); - 1,040 acres terrace reclaimed in upland areas including 400 acres using the Union Government budget (100% of planned target); - 1,102,447.84 acres consolidated land preparation using 1,440 tractors (105% of annual planned target). - 410 units of Machineries for land consolidation in Shwe Bo, Wetlet,Ye-U, Butalin, Kantbalu Townships, Sagaing Regions. - 2,562.5 acres consolidated land for transplanting using 52 units transplanting machines (128% of annual planned target). - 68,664.5 acres consolidated harvesting using 314 combine harvesters (104% of planned target). - Cooperate with IWUMD in organizing an administration committee that later on could be formed as water user association/group. This administration committee is valid until the land consolidation works finished. -
	2.6.2 Improve the enabling environment for private financial institutions (and others, such as input suppliers and buyers) to expand credit to farmers and SMEs to purchase machinery and expand options for leasing and renting equipment, including sharing the use of expensive equipment among a number of farms.	**Indicator 1: Number and type of machines provided to farmers by AMD either through cash-down and short term installment basis.** - 7,072 units of farm machinery sold to farmers either cash or installment such as: i. 245 units of tractors. ii. 6,719 units power tiller iii. 108 units of combine harvesters **Indicator 2: Number and type of machines provided to farmers by the private sector (input supplier) through long-term installment plan.** - 365 units of farm machinery sold to the private companies that granted farmers for long term installment such as:

		i. 332 units of tractor ii. 33 units of combine harvester
	2.6.3. Ensure a gradual handover of the hiring service and its related capital stock in which agricultural mechanization stations are currently working under the AMD to private sector or farmer organizations and provide the required service to farmers for allowing access to it during the transfer period	**Indicator 1: Number of machines distributed or mechanization stations handed over to private sector or farmer organization for hiring mechanization services** - 50 units farm machinery for rental services. **Indicator 2: Number of private sector associations or farmer organizations organized and received mechanization machineries and or mechanization stations.** - 121 private hiring mechanization associations have been established in 13 States and Regions. **Indicator 3: Total area covered by the private mechanization hiring services.** *No progress*

	2.6.4. Train and demonstrate machine use, repair, and maintenance on farm (private sector and farmers)	**Indicator: Number of trainings and participants in demonstration activities, on machine use, repair and maintenance** - 4 training of trainers on machine operation/repair & maintenance Course attended by 76 AMD technical officers. - 115 trainings on farm machinery operation & maintenance conducted for farmers. - 3,597 farmers attended training on farm machinery Operation & Maintenance (O&M). - 30 training on farm machinery repair and maintenance. - 941farmers attended training on farm machinery repair and maintenance - 6 Training attended by 298 participants for which 47 staff and 251 farmers such as: i. 2 advance farm machinery operation and maintenance training ii. 2 advance combine harvester operation and maintenance courses iii. Basic farm machinery operation and maintenance iv. Tractor repair and maintenance course - 8 staff attended 2 international training on farm machineries use and management in Japan. - Invited farmers to view modern mechanized farms. - Disseminated results and benefits from practicing agricultural mechanization - 255 demonstrations using different farm machineries - 17 rice planting demonstrations using rice planting machines. - 20 sets of dryers for demonstration. - 40 land preparations demonstrations - 12 transplanting demonstrations - 24 harvesting demonstrations - 9,001 farmers attended land preparation, transplanting and harvesting demonstrations in Tatkone Township, Naypyitaw, Yedashal Township,Bago Region, Madaya Township,Mandalay Region and Yinmarpin Township, Sagaing. - 52 demonstrations participated by 1,448 AMD staff and 4,930 farmers on land preparation, transplanting and harvesting. - 6 training conducted in Bayargyi Township, Bago Region and Meikhtila Township,Mandalay Region.

	2.6.5. Promote emergence of rural workshop for agricultural machinery repair and maintenance	**Indicator: Number of rural workshops established and operational for agricultural machinery repair and maintenance.** - 55 workshop facilities upgraded for Tractor, Combine harvester, Power Tiller in 7 workshop buildings in Katha Township, Sagaing Region. Pyay Township, Bago Region Phyu Township, Bago Region Aunglan Township, Magwe Region Madaya Township, Mandalay Region , Mawlamyine Township, Mon State and Zalun Townships, Ayeyarwaddy Region that were accessed/used by 1,070 farmers. - 5 workshop facilities upgraded for 143 machineries in Swhe Bo, Wetlet, Ye-U, Butalin, Kantbalu twonships, Sagaing region. - 2 base workshop facilities upgraded with 5 units of machinery to repair Tractors, Combine Harvesters in Mingalardon, Yangon and Kyaukse, Mandalay region that were used by 63 farmers.
	2.6.7. Provide financial analysis for use of alternative machinery to guide investment decision of farmers under different agroecological conditions	**Indicator: Number of financial analysis and researches for use of alternative machinery to guide investment decision of farmers under different agro ecological conditions.** - 12 research activities on crops seeding and transplanting - 16 research activities on crop digging and harvesting - 17 research activities on weeding or weed control - 16 research activities on tillage. - A research and case study for 74 machineries on straw management & mechanized cultivation systems which are sustainable for local conditions. - 112 joint researches on Farm Machinery by Agricultural Machinery System and Engineering Co. Ltd (AGM S & E) on land preparation and Harvesting in Amapura Township, Mandalay Region, Maubin Township, Ayeyarwaddy Region, Pyinmana Township, Naypyitaw, Sagaing Township, Sagaing Region, Halegu Township, Yangon Region and Oak-twin township, Bago Region. - Established testing center building in Mandalay Region.

Table 14: Achievement of output indicators under outcome 2.7

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.7. Livestock and fish - Increased use of improved livestock and fish breeding, health and husbandry service and technologies by livestock and fish producers	2.7.1. Myanmar Animal Genetic Resources Information System developed and maintained	**Indicator: Number and type of animal genetic information stored in the animal genetic resource information system.** - 15 modified animal genetic conservation farms.
	2.7.3. Nation-wide artificial insemination (AI) /industry established	**Indicator: National AI / industry established** - Established maintenance office for bull farm. - 7 Laboratory facilities to support the AI - Purchase of liquid nitrogen (LN2) - 7 AI training sessions on cattle attended by 76 LBVD staff and 30 farmers - 1 AI training session on goat attended by 6 LBVD staff and 10 farmers - 1 AI training session on swine attended by 15 LBVD staff. - 3 AI training sessions provided to 43 veterinarians of Animal Resources Development Section, Mingalardon Township (Paung Ngu), Yangon Region. **Indicator 2: Number of private sector enterprises providing AI services** - LBVD provided AI services to 3,500 Commercial Farms **Indicator 3 : Number of farmers using AI services per year, disaggregated by location** - 40,000 livestock farmers using AI services throughout the whole country. **Indicator 4: No. of farm animals inseminated using AI per year** - 97,586 farm animals inseminated using AI

	2.7.4. Animal health information systems strengthened, including the National Animal Health and Disease Surveillance Plan and associated surveillance and reporting activities	**Indicator 1: National animal health and disease surveillance plan adopted** - 5 National animal health and disease surveillance plan were developed for: i. Foot and Mouth Disease ii. African Swine Fever iii. Peste de Petits Ruminants (PPR) iv. Avian Influenza v. Rabies. - 3 field visits by veterinarians for the Peste de Petits Ruminants (PPR) sero surveillance on goats at 58 townships in Mandalay, Sagaing and Magway Regions - 4 surveillance on native chicken production and effect of vaccination against Newcastle Disease (I2 vaccine) in Mandalay, Sagaing, Bago, Magway, and Yangon Region. - 26 surveillance and extension visits on I_2 vaccine usage for native chickens in Nay Pyi Taw, Magway, Sagaing, Mandalay, Yangon and Bago Regions. - 27 veterinarians field visits on the vaccination of foot and mouth disease (FMD) in Mandalay, Sagaing, Magway Region. - 3 field visits for FMD sero surveillance on cattle in 8 townships of Magway Region. - 3 disease surveillance on pigs in northern and eastern part of Shan State. **Indicator 2: Number and type of animal health surveillance activities and reported outbreaks per year** - 2 animal hospital equipment and GPS acquired for conducting animal health and disease surveillance activities. **Indicator 3: Number and type of animal health disease outbreaks reported per year.** - 13 FMD outbreaks in 3 Regions and 2 States were reported. - A meeting for the establishment of one health in Myanmar was arranged by UVS on 27th January 2019.

	2.7.5. Production/ importation and distribution of vaccines, including cold-chain management strengthened, including through private sector investment	**Indicator 1: Number and type of vaccines produced domestically per year** - 4 laboratory facilities renovated. - 9 domestically produced vaccines for Bovine Haemorrhagic Septicaemia (HS), Bovine Anthrax (AA), Bovine Black Quarter (BQ), Bovine Foot and Mouth Disease (FMD) "O", Pig FMD, Hog Cholera, Avian Newcastle Disease (I2), Elephant AA and Rose Bangal Antigen. - 1 reagent for Brucella - 1 laboratory room was built to produce FMD vaccine. **Indicator 2: Number and type of vaccines imported per year.** *No progress* **Indicator 3: Cold chain management system fully operational.** - 4 cold chains in Yangon. - 1 cold chain in Mandalay. - 1 cold chain in Nay Pyi Taw **Indicator 4: Number and type of animals vaccinated per year.** - 1,601,110 cattle & buffalo heads vaccinated with Bovine HS (Hemorrhagic Septicaemia). - 9,347,090 cattle & buffalo vaccinated with Bovine Anthrax AA - 1,121,776 cattle & buffalo vaccinated with Bovine BQ (Black Quarter) - 7,598,976 I2 chicken vaccinated with Newcastle Disease Vaccine **Indicator 5: Number of registered companies producing and importing livestock inputs.** - 474 registered companies are producing and importing livestock inputs such as: i. 197 companies for veterinary drugs and medicine ii. 161 companies for animal feed and feed additive iii. 5 companies for animal vaccines, and iv. 111 companies for other inputs
	2.7.9. Inventory and data based on animal pastures, fodder and feed systems compiled	**Indicator 1: Inventory data on animal pasture, fodder and feed system** - 3 straw warehouses and machines for pasture and feeding practices constructed **Indicator 2: Database for inventory data.** *No progress*

	2.7.10. Physical, human resource and financial capacity of the Livestock Breeding and Veterinary Department (LBVD) Feed Testing Laboratory strengthened	**Indicator 1: LBVD feed testing laboratory fully staffed and equipped** - Infrastructure and 6 lab tools/equipment for feed testing laboratory purchased; **Indicator 2: Number and type of capacity development activities to LBVD feed testing laboratory staff per year.** - 1 training on laboratory management. - 2 research and technology training on the use of nuclear derived techniques for early detection of Foot and Mouth Disease (FMD) and differentiation of priority and zoonotics. - 1 research training on the detection of Multiple Pathogens for differential diagnosis and syndromic surveillance for Transboundary Animal Disease. - 1 training on China-Myanmar Cross-Border Animal Epidemic and Beef Cattle Breeding Technology. - 1 research and technology for laboratory technician. - 1 research and technology training on surveillance and diagnosis development of Foot and Mouth Disease (Myanmar). - 1 training on Good Clinical Practice for veterinary practitioners, attended by **Indicator 3: Number of LBVD Feed Testing Laboratory staff trained per year, disaggregated by gender.** - 11 LBVD staff attended a training session on laboratory management. - 6 LBVD staff attended training on Good Clinical Practice for veterinary practitioners. **Other output progress reported:** - 1,470 samples, including dead carcass, blood, urine, organs and specimens collected at autopsy, external parasites, animal feed, meat, milk, feathers, etc. to identify animal diseases for the safety of human consumption conducted at the Veterinary Disease Diagnostic Laboratories throughout Myanmar. - 9,320 samples submitted for laboratory testing
	2.7.11 National animal feed strategy prepared	**Indicator 1: National animal feed strategy adopted.** *No progress* **Indicator 2: Guidelines, procedures and action plan for national animal feed strategy.** - 1 workshop on animal feeding strategy participated by 28 LBVD technical officers and partners.

	2.7.12 Good Animal Husbandry Practices for livestock production prepared and adopted	**Indicator 1: GAHP guidelines and instruction manuals prepared and used.** - GAHP guidelines for commercial swine farming, backyard swine, layer, broiler, backyard poultry and bee have been developed. **Indicator 2: Number and type of capacity development activities on GAHP.** - 1 Good Animal Husbandry Practice Training of Trainers - 172 GAHP Trainings for farmers engaged in raising livestock in Bago, Tanintharyi, Mandalay, Sagaing, Shan, Chin and Mon. **Indicator 3: Number of farmers trained on GAHP, disaggregated by gender.** - 17 LBVD technical officers attended 1 Good Animal Husbandry Practice Training. - 4,411 farmers engaged in raising livestock attended the GAHP Trainings.
	2.7.13. Study including surveys and field trials to assess the biological and ecological potential and capacity of apiculture as a source of income prepared	**Indicator 1: Number and type of studies, surveys and field trial conducted on apiculture** - 2 research facilities for testing honey **Indicator 2: No. of farming households involved in apiculture per year** - 999 farmers involved in apiculture activities **Indicator 3: # of farming households trained in apiculture per year** - 1,020 bee keepers were trained for apiculture **Indicator 4: Percentage of farming households that increase household income from apiculture activities.** *No progress*
	2.7.14. Aquaculture seedling infrastructure (hatcheries & breeding ponds) for production and distribution of fish and shrimp seeds reorganised, including privatisation where appropriate	**Indicator 1: Number and type of Aquaculture seedling infrastructure (hatcheries & breeding ponds) for production and distribution of fish and shrimp seeds reorganised** - 2 marine water treatment tanks and 2 freshwater treatment tanks with 20 tons holding capacity were constructed for Kyauk Tan Freshwater Prawn Hatchery and Thar kay Ta Crocodile Farming Station, Yangon Region. - Nursery of Tilapia brood fish - Improvement of hatchery facility of Talipa brood fish. - 1 building of RC Shrimp Hatchery constructed, including 20 larval rearing tanks (LRT). **Indicator 2: Number and type of Aquaculture seedling infrastructure (hatcheries & breeding ponds) privatized.** *No progress* **Indicator 3: Volume and Type of fish and shrimp seeds produced and distributed.** - 30,000 of an inch Rothee alfredian carplet have been spawned before distributed to farmers, and - 80,000 an inch of juveniles have been spawned before releasing it to water. - 0.1 million fingerlings were produced and released in Ayeyarwaddy River.

	2.7.15: Identification, inventory and fishery resource conservation of adaptable fish species established.	**Indicator 1: Number and type of fishery resources identification and inventories conducted.** - A data collection system was in-placed that records the frequency of marine fishing activities, number of licenses issued for fishing vessels, seed production, and volume of exports. - 2 domestic fish species such as Nga Myinn (Giant Butter Catfish) and Nga Tha Lauk (Hilsa illisha) are being investigated for potential farming in aquaculture. - Experiments on induced breeding of Nga Phae Oung (Rohtee belangerii), Nga Phan Ma (Rothee alfredian), Nga Phae (Notopterus notopterus) and Nga Myin (Silonia Silondia). - Analysis on the fluctuation of fish species with local communities, DOF and relevant Government Departments. - Induced breeding of Viet Nam Climbing Perch (Nga Pyay Ma) - Comparison between HCG (Human Chorionic Gonadotropin) and Superfecthormons. - Comparison of rearing Thai sliver barb in ordinary water of Sei Daw Gyi Dam and poorly filtered water. **Indicator 2: Number and type of fisheries conservation activities conducted.** - 24,643 acres Locally Managed Marine Areas (LMMAs) established in : i. Done Pale Aw village (4,637 acres) ii. Lin Lon village (8,907 acres) on the Thayawtha-Dangyi island in Myeik District iii. Langann village (11,099 acres) on Langann Island, Kawthaung District - Awarded certificate for inshore fishery co-management area in Kyeintali. - Field visit to observe the established Pon Nyet inshore fishery co-management area - Installed the VMS/ PDS in inshore fishing boat in Kywe Gyaing area. - Extension of new conservation area at the View Point in KaThar Township, KaThar District, Sagaing Region, - Regular patrolling in the targeted conservation area No.1 Mingun-KyaukMyaung and area No.2 Htee Chaing-KhaThar-ShweKu, - Checked on the unregulated electric fishing and conducted awareness for fisheries resources - Distributed inland fishery law pamphlet, established awareness poster on the prohibition of electric fishing and donated note book with printed awareness photos. - Engaged in strengthening the operational framework for fisheries co-management and ecosystem approach through the Sustainable Coastal Fisheries Engagement (SCF Engagement – 2015-2020), and the Ecosystem Approach to Fisheries Management (EAFM – 2017-2021).

	2.7.16 Network of Aquaculture Technology Centers (KOICA Research Center – Marine Biology Departments of Universities of Mawlamaine, Pathein, Meik and Yangon) with supporting laboratory facilities established.	**Indicator: Number of aquaculture technology centers with supporting laboratory facilities established.** - Freshwater Aquaculture Research and Extension Center (FAREC) established in Thayetkone Fishery Station in Aung Myay Tharzan Township, Mandalay
	2.7.17. Provision and availability of fishing infrastructure facilitated and aquaculture initiatives including land development and cage and pen technology integrated with existing ponds or reservoirs under appropriate legal frameworks	**Indicator: Number and type of fishing infrastructure providing and available to facilitate aquaculture initiatives.** - 2,600 feet fence with blade zinc rope constructed in Nat Yay Khan Fishery Station (Amarapura), Mandalay Region. - 11 KV line and 11/0.4 KVA and 160 transformer installation in Kyauk Phyu Shrimp Hatchery in Rakhine State, Kyauk Phyu Township. - 2,875 feet zinc rope fence with iron door plate (12'6 x6') installed in Yae Oo Fishery Station, Sagaing Region. - 120 acres fishery station compound fenced with Chain Link. **Indicator 2: Number and type of existing ponds with integrated cage and pen technology.** *No progress*
	2.7.18: Prepare a new Fisheries Law.	**Indicator 1: Number and type of consultation and discussion conducted for the new Marine Law and Aquaculture Law** - Consultation with the Attorney General Office to update the current existing Marine Fishery Law and Aquaculture Law. - Held a meeting for the promulgation of the draft Aquaculture Law. - General public consultation through publication of the new law in the newspaper for public feedback and suggestions. - Consultations with Amyotha Hluttaw. - Discussions with Myanmar fisheries foundation. - Consultation with the Ministry of Planning and Finance (MOPFI). - Joint discussion with the Ministry of Natural Resources and Environmental Conservation (MONREC), Ministry of Investment and Foreign Economic Relations, Ministry of Commerce, Union Attorney office and Myanmar Fisheries Foundation.

		Indicator 2: New Fisheries Law prepared and approved. - Drafted two new laws (Marine Fishery Law and Aquaculture Development Law) based on the Attorney General Office guidance. - Submitted the two new laws to the Attorney General Office for approval. - Submitted the law to Amyotha Hluttaw - Submitted the laws to Pyidaungsu Hluttaw and gathered comments and suggestions. - The 2 new laws are now Bills waiting to be finalized in 2022 **Indicator 3: Enforcement of the existing fisheries law** - 86 unregulated and unlicensed fishing vessels including 3 foreign fishing vessels were confiscated and fined. - Prepared the National Plan of Action on Illegal, Unregulated and Unreported (IUU) Fishing. - 70% of the activities based on the recommendations from the Myanmar NPOA-IUU were conducted - Setting up the Vessel Monitoring Section - Installed the VMS to monitor, control and surveillance of off shore fishing vessels that are operating in Myanmar waters. - Installed seven units of Vessel Tracking System (VTS) in Pyin Phyu Maw village, Kyaukphyu township - Conducted stakeholder consultation for the installation of VMS and Fishery Management related activities. - Conducted monthly patrolling - Conducted meeting with the fishers on inshore fisheries co-management area establishment. - Handed over six electro fishing boats for control and patrolling

Table 15: Achievement of output indicators under outcome 2.8

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.8. Sustainable Practices - Sustainable Farming, Good Agricultural Practices (GAP), Good Animal Husbandry Practices (GAHP), Good Aquaculture Practices (GAqP), and Organic Agriculture (OA) practices are established and adopted.	2.8.1. Coordinate, formulate, elaborate, document, and promote concepts, principles, guidelines, laws, regulations and protocols for GAP (including GAHP, GAqP and OA) in Myanmar	**Indicator 1: GAP, GAHP, GAqP and OA principles, guidelines, regulations and protocols established.** i. GAP guidelines for each crop based on the safe use of fertilizers, pesticides and post-harvest practices have been developed. ii. National Aquaculture Development Plan developed under the Myanmar Sustainable Aquaculture (MYSAP) jointly funded and implemented by DOF and GIZ. **Indicator 2: GAP Unit established, fully staffed, and operational.** *No progress* **Indicator 3: Number and type of capacity development activities for GAP, GAHP, GAqP and OA inspection and certification conducted per year** - 211GAP Training and 342 acres demonstrations and 56 Field Days conducted such as: i. 4 training sessions were conducted for GAP under Sugar Crops Division. ii. 225 GAP training conducted iii. Coffee GAP expert management training. iv. 25 horticulture GAP training attended by 756 field officers and 1,230 farmers. v. GAP trainings were provided on fruits and vegetables. vi. 33% of annual plan for GAP inspector training was conducted. vii. One coffee forum was conducted. viii. 341.5 acres of demonstration farms for sugarcane were conducted. ix. 0.5 acres GAP experiments on tomato x. 23 GAP field days on sugarcane, cotton, jute, kenaf and mulberry production. xi. 33 GAP field days were conducted xii. Conducted demonstrations including field training, lecture and practical applications of GAP in 10 locations. - 923 participants completed 2 GAqP training - 185 GAHP training conducted such as:

		i. a Good Animal Husbandry Practices (GAHP) TOT training, attended by 17 staff. ii. 121 GAHP training attended by livestock farmers in Bago, Tanintharyi, Mandalay, Sagaing, Shan, Mon and Chin iii. a GAHP Training were provided to 1,278 livestock farmers in those areas. iv. 62 GAHP Trainings provided to livestock farmers in Bago, Tanintharyi, Mandalay, Shan, Chin and Mon. - 20, 600 handbooks and 215,394 pamphlets were distributed. **Indicator 4: National Laboratory for GAP established, fully equipped and staffed, and operational.** - 2 milk pasteurizers acquired in order to move towards GAHP standards. - Conducted ISO 9001:2015 certificate training for laboratory staff **Indicator 5: Number and type of monitoring, control, regulation and enforcement actions conducted on GAP per year** - Survey on GAHP for backyard and commercial pigs in Mon State. - Field visit for the surveillance of GAHP (backyard and commercial pigs) was also conducted in Mon State. - Fields and products insopection by DOA Regional office to ensure whether the cultivation practices were done using GAP accordance with GAP guidelines. - Inspected and controlled applications of GAP on 557 acres of Sesame farm. **Indicator 6: Number of farmers receiving GAP, GAHP, GAqP and OA certification per year, disaggregated by gender.** - GAP certification issuance is according to the ASEAN GAP guideline. - 3,017.72 acres and 132 farms GAP certified such as: i. 557 acres of sesame farm using GAP in Loikaw district. ii. 2,363.72 acres Sesame farm of rainy season sesame GAP certified using Quick Response (QR) codes in Magway Division. iii. 111 vegetables farms GAPS certified including 94 private farms and 17 Government farms.

		iv. 40 acres medicinal herbal plant GAP certified v. 57 acres pomelo fruit farm GAP certified vi. 9 private coffee farms GAP certified vii. 12 public coffee farms GAP certified - 9,254.74 acres and 8 companies GAqP certified such as: i. 7,994.78 acres were Good Aquaculture Practices (GAqP) certified such as: Kaung-Kaung (220 acres), Wah wah Win (7,614.78 acres), SG Crab World (80 acres) and Pyi Phyo Tun Company (80 acres). ii. 811 acres of 2 fish companies GAqP certified such as Pyi Phon Tun Company (60 acres) and Global Lucky Fish Company (751 acres). iii. 403 acres GAqP certified for Global Earth Agro & Aqua Industry Public Company. iv. 45.96 acres GAqP certified for Texchem <Marmine Labutta Company.
	2.8.2. Increase production, value-addition, sale and consumption of GAP and OA rice, pulses, vegetables, fruits, meat, dairy, honey, cash crops, and other products	**Indicator 1: Percentage increase in production of GAP and OA products per year.** - Promoted Good Animal Husbandry Practices (GAHP) to increase production of backyard pig and commercial pigs, layers, broiler and native chicken in Yangon, Ayeyarwaddy, Tanintharyi, Sagaing, Shan, Mon, Chin for better livestock production and food safety. - Analytical Laboratory Unit (DOF) accredited under ISO / IEC 17025:2005) to issue lab test reports for frozen freshwater fish, seawater fish, shrimp, crustaceans and dried fish and shrimp. - 5, 239 lab test reports have been prepared **Indicator 2: Percentage increase in market price for GAP and OA certified products per year.** - Food safety quality certificate issued for four different types of fish and fishery products, namely: frozen, chilled, live and dry form for export to EU, Korea and Saudi Arabia (under exploration). - 68 Hazards Analysis and Critical Control Points (HACCP) certificates issued - 6 GMP certificates issued - 6,069 health certificates issued **Indicator 3: Percentage increase in market sales of GAP and OA products.** *No progress* **Indicator 4: Number and type of value chain analysis studies conducted.** *No progress*

Table 16: Achievement of output indicators under outcome 2.9

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
2.9. Resilience - Resilience of Farmers to Climate Change and Disasters improved	2.9.1. Conduct research on stress tolerant varieties and breeds of crops, livestock and fish for the development of climate resilient agriculture that are at the same time higher in yield	**Indicator 1: Number and area used for research, studies conducted on stress tolerant varieties and breeds, disaggregated by crops, livestock and fish.** - 25 researches/studies/trials/varietal selections conducted such as. i. Varietal selection experiment of IRRI submergence tolerant rice verities and Mee Kauk rice variety (local submergence tolerant rice variety) (IR 10F 126 IR 85,306-Sub 1-28-1-1-1-1 IR 12F) i. Varietal selection experiment of IRRI salt tolerant rice varieties and Pyi Myanmar Sein rice variety (local salt tolerant rice variety). ii. Experiment on good eating quality and drought tolerant rice varieties by hybridizing of Yeanelo-3 and Sin Akari-3, iii. Research on yellow mosaic virus resistant soybean varieties. iv. Research on drought tolerant groundnut mutated lines by using mutation technologies; v. 2 researches on drought tolerant groundnut lines. vi. Research on the impact of high temperature on rice plant growth. vii. Research on drought tolerant cotton variety. viii. Research on drought resistant sugarcane. ix. Testing tomato cultivation practices suitable for adverse climate condition. x. 2 testing experiments of TYLCV disease resistant gene in tomato BC3F1 lines and F5 lines. xi. Research to analyze BPH resistant varieties of 37 irrigated rice varieties, 23 rainfed rice varieties and 12 Yeanaelo varieties. xii. Experiment to develop Sinthukha rice variety that include submergence tolerant gene and xiii. Experiment of Sinthwelatt rice variety that include submergence tolerance, salt tolerance and BB resistant genes. xiv. 2 researches on yellow mosaic resistant greengram lines by using mutation technologies. xv. Experiment on comparison of effect of climate change and cropping pattern on the yield of rice-black gram, rice-soybean, rice-niger, rice-sunflower, rice-cow pea.

		xvi. Study GHG emission of rice fields on different soil types and different irrigation techniques. xvii. Study GHG emission of rice fields cultivated using organic and inorganic fertilizers. xviii. Farmer Participatory Selection for Biotic and Abiotic Tolerant Rice Varieties in Selected Area of Myanmar. xix. Evaluation of Salt and Drought Tolerance on Rice Varieties in Terms of Agronomic Parameters and Water Use Efficiency. xx. Genetic Confirmation for Drought and Salt Tolerant Gene in Selected Rice (Oryza sativa) xxi. - 10.21 acres used for the research/studies/trials such as: i. 3 acres salt/salinity tolerant rice research trials for 164 lines ii. 0.71 acre heat stress tolerant rice research trials for 29 lines iii. 3 acres submergence rice research trials for 52 lines iv. 2.8 acres drought tolerant rice research trials for 141 lines. v. 0.5 acres of vegetables sustainable organic farming systems research. vi. 0.2 acres testing tomato cultivation practices suitable for adverse climate condition. **Indicator 2: Number of stress tolerant varies and breeds identified, disaggregated by crops, livestock and fish.** - 130 lines from 12 parental submergence tolerant rice lines were selected. - 402 varietal lines more resistant to flood submergence rice identified. - 160 salt tolerant rice lines selected from7 parental lines. - Identified IR 14T 131 IR 55,179-38-11-3 varietal lines that are more resistant in salt prone area. - Identified Yn 3,342- B-2-3 Yn 3,342- B-3-1 Yn 3,342- B-3-2 and Yn 3,345- B-4-1 lines that have good eating quality and drought tolerant rice varieties. - 8 pods selected of the mosaic virus resistant soybean varieties (Yezin 3 and Yezin 10). - Production of adaptable and resistant varieties of rice, maize and mung bean.

		Indicator 3: Number and type of extension materials prepared on stress tolerant varieties and breeds, disaggregated by crops, livestock and fish. - DAR released drought tolerant rice variety **Indicator 4: Number of extension workers trained on stress tolerant varieties and breeds, disaggregated by crops, livestock and fish, disaggregated by gender.** - Attended the regional workshop on Innovative Rice-Fish climate resilient Tilapia farming in Asia Pacific. **Indicator 5: Yield of stress tolerant varieties, disaggregated by crop variety.** - 29 rice varieties of four heat tolerant rice experiments and 94 varieties of five Yeanaelo rice experiments in summer season were harvested.
	2.9.6. Improve capacity of extension staff and farmers in climate smart agricultural practices through training, farmer field schools (FFS), and demonstrations	**Indicator 1: Number and type of capacity development activities on CSAP provided to extension staff per year.** - 82 training conducted such as: i. 2 training on Climate Smart Agricultural practices on Sugarcane production. ii. 3 Training of trainers (TOT) and farmer training on CSA sugarcane iii. 36 CSA training on mushroom farming iv. 4 CSA training on coffee production v. 13 Mulberry cultivation and silkworm CSA farming techniques vi. CSA training on rubber production and manufacturing vii. 23 CSA training on cotton, allied fibre, sericulture for staffs and farmers in states and regions - 3 FFS meeting - 50 Education tour for farmers on CSA rice production **Indicator 2: Number of extension staff and farmers trained on CSAP per year, disaggregated by gender.** - 26,658 extension staff and farmers attended CSA training such as: i. 300 participants on CSA training. ii. 158 participants on CSA coffee production iii. 1,200 participants attended the CSA mushroom farming training iv. 2,500 DOA extension officers and farmers attended the education tour for farmers on CSA improve rice production v. 370 extension officers and farmers attended the Mulberry cultivation and silkworm CSA farming techniques vi. 4,940 extension officers and farmers attended the CSA training on rubber production and manufacturing

		vii. 883 extension officers and farmers attended CSA training on cotton, allied fibre, sericulture for staffs and farmers in states and regions. viii. 149 extension officers attended training on alternative agricultural practices related to climate change adaption. ix. 16,158 Training for farmers on alternative agricultural practices related to climate change adaption - 1,950 extension officers and farmers attended field days such as: i. 975 extension officers and farmers attended Field day on cotton, jute and kenaf, mulberry production using CSA techniques ii. 428 extension staff and farmers attended Field day for cotton production on CSA advanced technology. iii. 370 extension staff and farmers attended Field day for jute and kenaf production using CSA advanced technology iv. 177 extension officers and farmers attended Field day for mulberry cultivation, silkworm breeding, and cocoon production using CSA **Indicator 3: Number and type of capacity development activities on CSAP provided to farmers by extension staff per year.** - 195 acres and 26 demonstration plots on CSA such as: i. 26 CSA demonstration plots on Sugarcane. ii. 195 acres cultivation of Sunn Hemp for green manure. - 23 CSA field days conducted such as: i. 12 Field day on cotton, jute and kenaf, mulberry production using CSA techniques. ii. 3 Field day for cotton production on CSA advanced technology. iii. 6 Field day for jute and kenaf production advanced technology. iv. 2 Field day for mulberry cultivation, silkworm breeding, and cocoon production using CSA. - 23,000 CSA manuals and pamphlets on cotton and allied Fiber crops distributed. - 3,887 CSA Pamphlet and handbook on Mushroom production - Rice Varietal Assessment for Climate Change with Farmer.

	2.9.7: Implement programme to in-build mitigation factors and resilience of livestock farmers to climate change, natural disasters and other uncertainties.	**Indicator 1: Programme implemented on mitigation factors and resilience of livestock, fisheries and crop farmers to climate change, natural disasters and other uncertainties.** - Implemented national based approach project called FishAdapt for strengthening the adaptive capacity and resilience of fisheries and aquaculture dependent livelihoods in Myanmar. A 4-years project from 2017 to 2021, the project include 4-components and component (1) and (4) to cover for the whole country and component (2) and (3) for coastal and inland capture and aquaculture communities under the three specific target area, namely: 1) Yangon Region, 2) Ayeyarwaddy Region and 3) Rakhnie State. - Strengthening, maintenance and care of flood protected embankments in line with climate change adaptation have been carried out during the reporting period. - 9,385 acres of flood protected Area - 2,813,056 acres length of embankment - 897,241 acres length of drainage canal **Indicator 2: Number and type of training activities conducted.** - Farmers mobilized through participatory land use planning, **Indicator 3: No. of livestock farmers participating in the training per year, disaggregated by gender.** *No progress*
	2.9.10. Carry out Community Based Disaster Risk Management (CBDRM) capacity building	**Indicator 1: Number and type of CBDRM capacity building and training activities conducted per year** - 1 animal shelter for prevention of damage caused by natural disasters built. **Indicator 2: Number of people trained in CBDRM per year, disaggregated by gender.** *No progress*

Table 17: Achievement of output indicators under outcome 3.1

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.1. Improved business environment, information and investment along the agri-food	3.1.4 Design and implement an investment promotion strategy for the agricultural and food sector	**Indicator: Number and type of agricultural and food sector investment promotion strategy formulated and implemented.** - 3 Training of Trainers facilities in Tanintharyi Region and Mon State. - 6 rubber factories in Kachin and Mon States.
	3.1.5 To help strengthen the capacity of Myanmar Investment Commission to expedite investment applications in the agriculture sector while effectively accounting for environmental and social impact assessment.	**Indicator: Number and Type of support provided to strengthen the capacity of Myanmar Investment Commission** - MoALI supported the first meeting of the Investment Committee (IPC) that presented the objectives of the Myanmar Investment Promotion Plan (MIPP), the introduction of the IPC, and 5 Task Force Members. - 150 people attended the first IPC meeting, including 4 MoALI technical officers from ADSISU, DOP, DOA and SSID as task force members.

Table 18: Achievement of output indicators under outcome 3.2

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.2 Protected intellectual property rights for the agricultural and food sector.	3.2.1. Develop, approve and implement a Plant Variety Protection Law that is consistent with the requirements of the International Union for the Protection of New Varieties of Plants (UPOV). Ratify (or accede to) the 1991 Act of the UPOV Convention.	**Indicator: Plant Variety Protection Law developed and approved.** - The Myanmar Plant Variety Protection Law following the International Union for the Protection of New Varieties of Plants (UPOV) has been enacted on 24 September 2019 Pyidaungsu Hluttaw Law number 29.

Table 19: Achievement of output indicators under outcome 3.3

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.3. Reliable quality system developed that helps farmers and food processors get higher prices for higher quality goods, incentivizing quality upgrading develop	3.3.1. To help develop product standards and certifications, quality grading, quality control measures, and reliable conformity assessment (testing) procedures	**Indicator: Product standards and certification, quality grading, quality control measures, and reliable conformity assessment established and applied.** - 63 SSID staff (32 men and 31 women) trained on Good Hygiene Practice (GHP). - 35 SSID staff (21 men and 14 women) trained on Good Manufacturing Practice and Good Hygiene Practice (GMP) facilitated by Food and Drug Administration (FDA). - 30 SSID staff (19 men and 11 women) attended Training of Trainer (ToT) on setting up laboratory and registration. **Indicator: Percentage of products tested which conform with the standards** - 3,806 food products passed the test and conform with the standards - 934 consumer products conform with the standards - 181 cosmetic products passed the test and conform with the standards
	3.3.5 To help improve the quality standards, testing laboratories, skills and awareness for agricultural and processed products to be in line with international best practices and those used by major export destinations where possible.	**Indicator 1: Number and type of quality standards testing laboratories established** - 18 laboratory equipment procured **Indicator 2: Number and type of skills and awareness facilities on agricultural and processed products installed** - ELIB, a Library with automation system was installed

Table 20: Achievement of output indicators under outcome 3.4

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.4. Enhanced framework for gender-equitable and participatory planning and implementation of rural development programmes institutionalized.	3.4.3 Village level community development initiatives (e.g. DRD Green Village Project).	**Indicator 1: Number of villages implemented village level community development initiatives.** - 2,746 villages in implemented Villages development planning. - 944 villages in 800 project units (Mya Sein Yaung) received revolving fund of 30 million MMK (about US$ 30,000) for each village. **Indicator 2: Number of capacity building implemented and participants attended.** - 786 capacity building training, including natural disaster management. conducted - 30,497 participants attended the 786 capacity building training for which 1,075 DRD technical officers, 5,182 farmers/community members, 149 cooperative members, 22,551 committee members, 80 private sector and 1,460 from other institutions under the Mya Sein Yaung Project.
	3.4.4 Township level community development initiative (DRD Community based project example).	**Indicator 1: Number and type of community development initiatives** - 995 villages received Villages development planning training. - 2,299 development activities have been implemented under the NCCDP - 386 development activities[100] including 184 school/education infrastructure, 14 healthcare centers, 135 village halls, 10 libraries, and 43 other development activities. - 203 activities on Enhancing Rural Livelihoods and Incomes Project (ERLIP) implemented in 3 townships. - township level multi - stakeholder review meeting **Indicator 2: Number of townships implemented community development initiatives** - 54 townships implemented community driven development (CDD) project - 222 townships implemented Village Development Project)

	3.4.5. Community capacity building in preparation and drafting of action plan projects	**Indicator 1: Number and type of capacity building in drafting/ preparing project action plan implemented.** - 89 rural development project refresher training organized. - 6 Waste Planning Training - 2 Gender Training sessions at the Union level, - 46 Gender Training sessions at Township level, - 7,958 community training sessions - 2 ToT/ Training of Technical for Facilitator (TTF)/ Training of Facilitator (TOF), sessions at Union level - 148 ToT/TTF/TOF sessions at Township level - 12 capacity building training at Union level - 275 capacity building training at Township level - 59 Engineering training - 371 sessions of capacity building trainings in the preparation and drafting of action plan **Indicator 2: Number of people received capacity building in drafting/preparing project action plan** - 1,385 participants attended the 89 rural development refresher training for which 488 DRD staff, 197 farmers/ community members, 595 committee members and 105 private sector. - 512 participants attended the waste planning training - 156,335m, 148,369f attended the community training - 190 participants attended the engineering training for which 160 DRD technical staff and 30 committee members. - 7,270 participants attended the capacity building trainings in the preparation and drafting of action plan - 89 people (39m & 50f) trained on Gender at Union level - 76,553 people (36,973m & 39,580f) trained on Gender at Township level - 53 people (28m & 25f) attended the ToT/TTF/TOF sessions at Union level - 6,815 people (3,241m & 3,574f) attended the ToT/TTF/ TOF sessions at Township level - 615 people (285m & 330f) trained on capacity building at Union level - 10,758 people (5,197m & 5,561f) trained on capacity building at Township level.

		Indicator 3: Number and type of knowledge sharing and learning activities to promote community capacity building to implement rural development activities: - 55 of exchange visits - 76 of multi-stakeholder workshops - 31 of Village Development Plan (VDP) workshops - 150 of Publicity, promotion and information campaigns - 1 village knowledge sharing training - **Indicator 4: Number of participants attended the knowledge sharing and learning activities** - 2,059 participants attended the exchange visits - 30,521 participants attended the multi-stakeholder workshops - 6,258 participants attended the Village Development Plan (VDP) workshops - 29,618 participants received publicity, promotion and information campaigns - 3 DRD technical officers and 400 cooperative members attended the village knowledge sharing training
	3.4.6. Training on rural entrepreneurship and enterprise development (e.g. rural livestock raising)	**Indicator 1: Number and type of training activities on rural entrepreneurship and enterprise development (rural livestock raising), including number of participants, disaggregated by gender** - 220 agriculture and livestock breeding training - 37 livestock and veterinary training - 58 computer training - 88 diesel/wiring training - 108 carpentry/masonry training - 359 handicraft making training - 293 of other rural entrepreneurship and enterprise development training - 1,219 vocational training - 186 GAP,GAHP,GAqP training - 12 agriculture training - sewing training at the Garment Factory in Ye Ne township in Bago region - setting up model farms in project villages

		Indicator 2: Number of people trained on entrepreneurship and enterprise development - 8,837 people (5,011m & 3,826f) trained on agriculture and livestock breeding - 1,535 people trained on livestock raising and veterinary practices - 1,466 people (623m & 843f) trained on computer operation - 2,138 people (2,093m & 45f) trained on diesel/wiring - 2,419 people (2,222m & 197f) trained on carpentry/masonry - 8,296 people (365m & 7,931f) trained on handicraft making - 6,499 people (4,946m &1,553f) trained on other rural entrepreneurship and enterprise development. - 1,965 people (13 DRD staff, 1023 farmers/community members and 929 cooperative members) attended the vocational training - 12,696 people (115 DRD staff, 10,001 farmers, 340 cooperative members, 1015 farmer associations representatives, 1022 committee members, 175 private sector and 28 people) trained on GAP,GAHP,GAqP - 215 people trained on agriculture - 5 people trained on sewing in Garment Factory in Ye Ne township in Bago region

Table 21: Achievement of output indicators under outcome 3.5

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.5. Rural infrastructure improves smallholder agriculture efficiency and profitability.	3.5.1. Improve rural road infrastructure consistently with master plan for transportation (Ministry of Transport and Communication and Rural Road Strategy) • Rural road construction (improved access to areas outside the villages to collection center. • Reduce the time burden on rural family members for mobility and transfer of goods. • Reducing damage to perishable crops during transport	**Indicator: Number and length (in miles) of rural roads constructed per year** - 266.84 miles farm-to-market rural roads - 2,340.6 feet rural roads and bridges with culverts - 2 roads (57 km) upgraded **Indicator 2: Number of communities benefitting from farm road construction** - 241 villages - 176,829 acres of agricultural land and/livestock - 371,658 people **Indicator 3: Number of miles per location with improved rural road infrastructure (NCDDP project).** - 1,509 Concrete road (292.13 miles) - 554 Earth road (640.98 miles) - 6,638 furlong Earth-roads (58 miles) - 279 Footpath (concrete/ earth) (97.84 miles) - 1478 Gravel roads (748.13 miles) - 306 Macadam roads (84.66 miles) - 249 Wheel tract (58.94 miles) - 15 Bitumen (4.7 miles) - 309 Bridges & culverts (12,185 feet). - 112 rural roads and bridges - 7.37 furlong Laterita/kankar roads (78 miles) - 7.216 furlong Earth & kankar roads (111 miles) **Indicator 4: Number of communities accessing improved rural road infrastructure** - 4,269 villages - 856,863 households - 3,217,180 people **Indicator 5: Percentage reduction in travel time for members of rural households.** *No progress*
	3.5.3 Rural (off-grid) electricity projects	**Indicator 1: Number of rural electrification (off-grid) installed** - 599 rural (off-grid) electrification installed

	3.5.4. Facilitate connecting of rural communities and households to national grid	**Indicator 1: Number of communities connected to the national grid (NCDDP)** - 351 villages connected to national grid such as: i. 348 village National grid (cable/lamp-post) ii. 3 villages powere meter/meter - 124 villages have engine (house/engine/cable/lamp-post) - 518 villages have generator set power source such as: i. 504 villages Generator set (cable/lamp-post) ii. 13 villages Generator set (generator+wire+lamp-post) iii. 1 villages Generator set (wire+lamp-post) **Indicator 2: Number of households connected to the national grid (NCDDP)** - 14,847 HHs connected to engine - 76,261 HHs are connected to generator set power generated - 59,712HHs connected to national grid
	3.5.5. Promote renewable energies (mini-hydro, solar, biomass, biogas)	**Indicator1 : Number of villages with houses using renewable energy (mini-hydro, solar, bio-mass, and bio-gas)** - 4,167 rural villages have houses with solar home system - 76 villages Mini-grid (solar, hydro, bio-mass, bio-gas) - 49 villages Solar street lighting (NCDDP project) - 31 villages using hydro power (NCDDP project) - 8 village small hydro **Indicator 2: Number of households per community, using renewable energy (mini-hydro, solar, bio-mass, and bio-gas)** - 203,602 households have solar home system - 17,164 using mini-grid (solar, hydro, bio-mass, bio-gas), - 4,285 households using solar street light - 3,725 households using hydro power **Indicator 3: Number of public facilities using renewable energy (mini-hydro, solar, bio-mass, and bio-gas)** - 31,278 public facilities using solar system power generated - 4,940 community buildings using mini grid

		Indicator 4: Number and type of capacity strengthening carried out - 33 National Electrification Project (NEP) related capacity building training attended by 34 DRD staff, 100 cooperative members/farmers/community, 160 committee members and 3 other institutions.. - 33 NEP/Solar Home System (SHS)-I (Inspection Verification Agent (VA)/Annual Village Investment Plan (AVIP) committee training attended by 34 DRD staff, 100 cooperative members, 160 committee members and 3 other institutions.
	3.5.7. Construction of rural water supply infrastructure	**Indicator 1: Number of rural water supply infrastructure constructed and rehabilitated** - 315 Shallow Tube wells - 719 Deep Tube wells - 682 Hand dug wells - 253 Ponds - 559 Spring/Gravity Flow - 1,087 Other water supply infrastructure - 186 overhead/ground Tanks (Tank + pipes+pump) - 73 Engine/ Pumping system - 8 Pipes - 30 Water supply fencing - 11 Water treatment **Indicator 2: Number of villages have improved/safe managed rural water supply** - 2,496 villages have improved/safe managed rural water supply **Indicator 3: Number of households and people accessed improved/safe managed rural water supply** - 443,386 households - 2,150,965 people **Indicator 4: Number of water committees per community established and functional** - 2,275 Water Committees established and functional
	3.5.8. Knowledge sharing on access to clean drinking water technology programme	**Indicator: Number and type of entrepreneurship and knowledge sharing on access to clean drinking water technology programme** - 2 training on rehabilitation of drilling rigs with 36 participants. - 129 water supply training attended by 341 DRD staff, 1,236 farmers/community, 10 cooperative members, 1,376 committee members, and 241 other institutions.

Table 22: Achievement of output indicators under outcome 3.6

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.6. Increased competitiveness and stakeholder participation in agricultural value chains engaged with prioritized commodities.	3.6.1. Establish 7 prioritized National Value Chain Programmes (including crops, livestock, and aquaculture). Example: rice, vegetables, pulses, oilseeds, coffee, rubber, cotton, sugarcane, poultry, cattle, aquaculture	**Indicator: Seven National Value Chain Programmes established.** - 1 Agri-product processing technology (APPT) project
	3.6.2. Conduct value chain study and identify bottlenecks and opportunities for respective prioritized enterprises	**Indicator: Number and type of value chain studies conducted, as well as number of recommendations provided on identified bottlenecks and opportunities** - Value chain study on tomato. - Research on pulses value chain - Conducted consultation on maize value chain development to increase farmer's income in Myanmar
	3.6.12. Organize annual value chain fairs, exhibits, seminars, workshops, conferences, and training both in Myanmar and abroad aimed to have access to markets for agri-food products from Myanmar	**Indicator : Number and type of value chain fairs, exhibitions, seminars, workshops, conferences and training conducted per year** - 2 seminars and a workshop on capital, technology and market the development of small-scale enterprises. - 2 exhibitions to promote Myanmar small-scale industry products (wood handicrafts, cotton shawls and silk), in cooperation with Asia Crafts Link (ACL). - 409 wood handicraft products, 25 cotton shawl and one silk string were sent to Japan as part of the Myanmar small scale industry promotion effort for international market through ACL cooperation. - 10 training and 10 demonstrations on designed for production of high-value-chain products - 16 SSID regular Training - 502 SSID non-regular Training - 19 Training of Trainers - 20 international training, seminar, workshop - 2 seminar - 1 workshop

		Indicator 2: Number and type of organisations involved in value chain fairs, exhibits, seminars, workshops, conferences, and trainings. - 142 small-scale industries participated the 2 exhibitions to promote Myanmar small-scale industry products **Indicator 3: No. of attendees of value chain fairs, exhibits, seminars, workshops, conferences, and trainings.** - 1,126 private sector attended SSID regular value chain training - 10,363 private sector attended SSID non-regular value chain training - 88 SSID technical officers attended seminar - 243 SSID staff trained on ToT - 50 SSID technical officers attended workshop
	3.6.14 Training on Trainers (ToT on Climate Friendly Agribusiness Value Chains	**Pre-condition:** - Signing of the Climate Friendly Agribusiness Value Chains Sector (CFAVC) project loan and grant agreement. - Cabinet Approval on Technical Assistance of Impact evaluation of the Climate Friendly Agribusiness Value Chain Sector (CFAVCS) Project. - Training workshop on ADB Procurement and Safeguards for the CFAVC Sector Project - Approval for assigning Specialists for Climate Friendly Agribusiness Value Chain Sector Project (CFAVCS). **Indicator 1: Number of TOT sessions held.** *No progress* **Indicator 2: Number of trainers trained, disaggregated by gender.** *No progress*
	3.6.16 Promote establishment of Agribusiness incubators	**Indicator: Number and type of agribusiness incubators established per year.** - Preparation in the establishment of the agribusiness cell - Registration of 2,560 Small Medium Enterprises (SMEs)

Table 23: Achievement of output indicators under outcome 3.7

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.7. Enhanced food quality and safety.	3.7.5. Strengthen and upgrade laboratories to international accreditation standards	**Indicator 1: Food law passed.** *No progress* **Indicator 2: Number and type of laboratories strengthened or upgraded including human resources.** - 27 Laboratories strengthened and upgraded with the installation of new laboratory equipment and facilities. **Indicator 3: Percentage of laboratories qualified for International Organization for Standardization ISO) accreditation** - Analytical Laboratory Unit (DOF) accredited under ISO / IEC 17025:2005) to issue lab test reports for frozen freshwater fish (Note: also reported under output 2.8.1) - ISO/IEC 17025-2017 awareness and information sharing workshop concerning general requirements for testing laboratories. - SSID analytical laboratory a member of network of laboratories
	3.7.13. Build capacities to trace production processes for agricultural and food products, both for implementation of domestic food safety and crop and animal health measures, but also to meet Government and private requirements for traceability in countries where Myanmar exports agricultural and food products	**Indicator: System established and operational for tracing production process for agricultural and food products** - 2 Laboratory equipment acquired to test antibiotics for food safety procured.

Table 24: Achievement of output indicators under outcome 3.9

OUTCOME	OUTPUTS	INDICATORS OF ACHIEVEMENT
3.9. Trade and Exports. Trade facilitated agri-food and agricultural products export growth	3.9.2. To help develop more effective trade facilitation capacities to reduce the cost of clearing goods through customs and border control by (i) streamlining and automating non-tariff measure processes, including for SPS measures; and (ii) completing the customs automation programme and integrating approvals of non-tariff measures into a National Single Window (NSW) for customs clearance, linking the NSW to the ASEAN Single Window.	**Indicator 1: Number and type of strengthening capacities on trade facilitation conducted** - 3rd meeting of National-level Trade Facilitation Committee on World Trade Organisation's Trade Facilitation Agreement (WTO TFA) **Indicator 2: Number and type of facilities built to effectively and efficiently facilitate import and export trading** - 6 infrastructure to support cattle trade.

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ADS Implementation Support Unit (ADSISU)
Ministry of Agriculture, Livestock and Irrigation
The Republic of the Union of Myanmar
Building No. 15, Nay Pyi Taw
Email: adsisu.moali2@gmail.com
Phone: (95) 0673 410614/ 410615