THE GAMBIA

THE E-AGRICULTURE DEVELOPMENT AND MODERNIZATION STRATEGY

(e-ADM) 2021-2024

[A Pillar of The Information and Communication Technology for Development Policy Statement 2018-2028]

Commissioned

By

The Ministry of Information and Communication Infrastructure

TABLE OF CONTENTS

1 ACRONYMS ANDF ABBREVIATIONS

3G	*Third Generation Technology*
4G	*Fourth Generation Technology*
ACE-GSC	*Africa Coast to Europe & Gambia Submarine Cable Company*
AfDB	*African Development Bank*
ANRP	*Agriculture and Natural Resources Policy*
AMIS	*Agricultural Management Information System*
AU	*African Union*
CAADP	*Comprehensive African Agricultural Development Program*
CFSVA	*Comprehensive Food Security and Vulnerability Analysis*
CPF	*Country Programming Framework of the FAO*
COSOP	*Country Strategic Opportunities Programme 2019-2024*
e-ADM-2024	*e-Agriculture Development and Modernisation Strategy*
ECOWAN	*Ecowas Wide Area Network*
ECOWAP	*Ecowas Regional Agricultural Policy*
ECOWAS	*Economic Community of West African States*
ETLS	*ECOWAS Trade Liberalization Scheme*
EU	*European Union*
FAO	*Food and Agriculture Organisation*
FOs	*Farmer Organisations*
GBOS	*Gambia Bureau of Statistics*
G2C	*Government-to-Citizen*
GDP	*Gross Domestic Product*
GIS	*Geographic Information System*
GSM	*Global System for Mobile Communications*
HDI	*Human Development Index*
IMF	*International monetary Fund*
IMF-WEOR	*International monetary Fund – World Economic Outlook Report*
ICT	*Information and Communications Technologies*
ICT4D	*Information Communications Technology for Development Policy*
IFAD	*International Fund for Agricultural Development*
HIS	*Integrated Household Survey*
IOTs	*Internet of Things*
IMF	*International Monetary Fund*
ISRT	*Inter-State Road Transit Scheme of ECOWAS*
IT	*Information Technology*
ITC	*International Trade Centre*
ITU	*International Telecommunication Union*
IVR	*Interactive Voice Response*
LADEP	*Lowlands Agricultural Development Programme*
LGA	*Local Government Area*
LHDP	*Livestock and Horticulture Development Project*
LRR	*Lower River Region*
MDGs	*Millennium Development Goals*
M-Farm	*Mobile Farming*
MIS	*Management information System*
MOA	*Ministry of Agriculture*

MOICI	*Ministry of Information and Communications Infrastructure*
MOTIE	*Ministry of Trade Industry and Employment*
NAIP	*National Agricultural Investment Programs*
NARI	*National Agricultural Research Institute*
NEAP	*National Employment Action Plan*
NEMA	*National Environment Management Agency*
NEPAD	*New Partnership for Africa's Development*
NGO	*Non-Governmental Organisation*
OECD	*Organisation for Economic Co-operation and Development*
PGR	*Plant Growth Retardants*
PIWAM	*Participatory Integrated Watershed Management Project*
PPP	*Public Private Partnership*
Q1, Q2, Q3, Q4	*Quarter 1, Quarter 2, Quarter 3 and Quarter 4*
RAIP	*Regional Agricultural Investment Program*
SDGs	*Sustainable Development Goals*
SMS	*Short Message Service*
TANGO	*The Association of Non-Governmental Organisations*
TVET	*Technical and Vocational Education and Training*
UN 2030	*UN 2030 Agenda for Sustainable Development*
UNCPD	*UN Commission on Population and Development*
UNDAF	*United Nations Development Assistance Framework*
UNDP	*United Nations Development Programme*
UNEP	*United Nations Environment Programme*
WB	*World Bank*

2 FORWARD

The Ministry of Information Communications Infrastructure (MOICI) in collaboration with other key stakeholders particularly the Ministry of Agriculture (MOA) led the development of this strategy for agriculture development and modernisation through the use of ICTs.

The strategy is a result of the valuable support and inputs from the key stakeholders and with the recognition of the key strategic paths that are outlined by both the national Development Plan and the agenda with the Ministry of Agriculture for the further development and modernisation of this important sector of the economy.

The strategy recognizes the efforts of the country's development partners including the FAO in the domain of Agriculture and the use of ICTs for its development and modernisation.

The identified strategic goals focus on the use ICTs to scale-up climate-smart agriculture for the objectives of increasing productivity and resilience. This is supported by the goal of ensuring sustainability by developing key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness.

There is the recognition that the broad goals could be achieved by supporting key structural policy reforms and the strengthening of the capacity of institutions responsible for the agri-food sector.

With the successful implementation of the defined strategic activities for the achievement of the strategic goals, the expectation is to enhance food security, import substitution, income generation, job creation, and poverty reduction.

Key fundamentals like having effective policy monitoring measures, reinforced research in agriculture, improved farming process and practices are within the gauging of this strategy. Ultimately, there will be an increased and improved financial inclusion of the farming community with more credit, insurance and risk management schemes and the further enhancement of the disaster management and early warning systems in addressing the associated risks and uncertainties of climate change.

At the regional and international levels, the strategy would enable the country to progress further in implementing the ECOWAS trade integration instruments as well as create the right environment for ensuring compliance WTO sanitary and phytosanitary requirements and Technical Barriers to Trade Agreements.

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3 EXECUTIVE SUMMARY

The broad aim of this Strategy is to outline measures for the development and modernisation of agriculture by the us e of ICTs. The Strategy is covering the period 2021 – 2024.

The unprecedented changes in ICTs is having profound impacts on all productive sectors of any economy. There are, among others, technological developments all triggering changes in the all sub-sectors of agriculture as activity and process. The greater part of the impact is on methods of farming and its related services.

The Strategy is based on the conviction that agriculture development and modernisation will enhance the nation's status and advance the nation's competitiveness at both regional and international levels.

The strategy is informed by international best practices in its development, with a special emphasis on what obtains in Ecowas countries with a similar development context to that of The Gambia. Its formulation is based on a consultative process with stakeholders from the government, civil society, and the private sector. Some key reports have been considered as well as the developments at the international level especially with regards to the SDGs and the ECOWAS and AU commitments on agriculture development and modernisation.

The context is determined by the statistical developments. The Gambia has a population of about 2 million, 40% live in the rural areas. With an average household size of 6.9, there is an annual population increase of 3.5%. Almost 60% of the population is under the age of 25 and this is likely to persist because the country's total fertility rate remains strong at nearly 4 children per woman. The gender inequality index is 0.6. The people living below US$3.10 per day is 68% and the national poverty line is 48% of which 74% live in the rural areas. The country has an HDI of 0.466 giving it the rank of 174. It must be said that the Gambia's HDI ranking was 178 in 2017 and this improved to 174 in 2019 representing an average annual HDI growth of 1.26.

With a GDP per capita of US$483 in 2017, this represents one-third of the average for sub-Saharan Africa (US$1,553 per capita). The average GDP growth of 3 percent per annum is also barely keeping pace with population growth of 3.5 percent. Agriculture is the source of livelihood for 80 percent of the rural population based on the 2015/16 Integrated Household Survey (IHS). For about 72 percent of poor households and 91 percent of extremely poor rural households, agriculture is the main source of income.

Agriculture as a major economic activity in the Gambia contributes not less than 25% of the GDP. The contribution of agriculture to GDP declined from 29 percent in 2010 to 17 percent in 2017 even though 46 percent of the

national labour force works in the agricultural sector. This is partly because of the net increase in the share of services in GDP (66 percent). This agricultural GDP consists of livestock (30 percent), groundnuts (20 percent, and a main source of foreign exchange), other crops (40 percent, with horticulture growing in importance), and a small share of fisheries and forestry. In any case the sector contributes 17 percent of GDP and 30–40 percent of all foreign exchange earnings from exports.

The Fisheries sector contributes on average 12% of GDP. Not less than 30 000 people are employed in the artisanal fishery sub-sector and this is serving as a source of livelihood for about 200 000 people. The artisanal fishing sector is the dominant fishery in the Gambia providing direct employment to not less than 1 410 head fishermen and 4 694 assistant fishermen.

Based on the IMF's projections about The Gambia (IMF- World Economic Outlook Report) IMF-WEO, the real GDP growth was expected to reach 5.4% in 2019 and decelerate over the remaining three years to 4.8% by 2022. It is important to state that the public and publicly guaranteed debt as a share of GDP since reached an estimated 107% of GDP in 2017.

Agriculture employs about 70% of the labour force providing a source of income for about 72% of the extremely poor rural households in The Gambia. About 32% of the agricultural jobs (161,800) are employed in primary production agriculture out of which 54% are women and 46% are men. About 80 percent of farm households are engaged in groundnut farming which generate 60-80 percent of their income.

The Gambia's agricultural land constitutes approximately 54% of the country's total land area and in the last two decades the area of land under agriculture has increased from 557 000 hectares to 605 000 hectares. The total arable land area increased by 173% (about 8.7% per annum) and regardless of the significant increases in population, the country's forest cover increased by 8.2% between 1994 and 2014 as a result of its participatory forest management policy.

In 2017, the total harvested area was estimated at 405,200 hectares and the gross production value at US$110.80 million. On agricultural productivity and income an in terms of value added per worker is not more than US$400 (US$311 in 2005) when the West African level was US1,564 and the OECD level was US$21,793 all in 2005.

With The Gambia's enormous agricultural land (estimated at 655,000 hectares and arable land at 588,000 hectares) and water resources the potential is there to develop by increasing the area under cultivation from about 334,000 hectares. With one of the highest levels of annual rainfall among Sahelian countries (830 millimetres per year), a surface water resources (estimated at 8 billion cubic meters) and groundwater resources

(estimated at 0.5 billion cubic meters), all these represent opportunities for development and modernisation.

The average farm size decreased from about 3 hectares in 2005 to 1.3 hectares in 2015 due to demographic trends and the inheritance system. Based on the 2011 Agricultural Census, about 37 percent of farm households are operating six or more agricultural plots, an indication of land fragmentation. Fragmented production makes it more difficult to generate a marketable surplus.

Of the country's three main agroecological zones the Sahelian Zone records less than 600 mm total annual rainfall with up to about 70 days of active crop production during the raining season. This zone is recognised for early maturing, short-duration and drought tolerant crops Secondly, the Sudan-Sahelian Zone with a longer growing season of about 79 -119 days has about 600 to 900 mm rainfall. Lastly, the Sudanian-Guinean Zone has about 900 to 1200 mm rainfall with a growing season of about 120-150 days.

At the moment the agriculture activities (farming) is mainly dependent on rainfall and about 5% of the land is under cultivation equipped with irrigation. The livestock sub-sector continues to contribute to the livelihood of the rural population as it enhances food security and income. The cattle totalling on average (from 2010 – 2014) 422,302 heads are the most valuable asset in the sub-sector, closely followed by small ruminants comprising sheep (359 799) and goats (319 056).

In the last 5 years the imports of agricultural products (rice, onions, milk, wheat, nuts etc) exceed US$148 million whereas the exports (groundnuts-15%, cashewnuts-12%, tea-6%, cow milk-2% and rice-1%) is within the range of US$30 million.

The Gambia imports 83 percent of its requirement for rice, the staple food for most Gambians. With an annual population growth rate of 3.5 percent, there is the projection that the population would double every 22 years with a rising urbanisation. Based on similar projections of the demand for rice is projected to increase from 221,661 metric tons in 2018 to 319,746 in 2030 and 443,902 in 2040. The country would absolutely need 7 times its current level of domestic rice production (38,000 metric tons in 2018) by 2030 and 10 times by 2040, which represents a huge market opportunity.

According to the 2015/16 IHS, 55 percent of Gambians are food insecure and food insecurity is both a household and national concern. The Integrated Household Survey (HIS) reveals that rural poverty increased from 64.2 percent in 2010 to 69.5 percent in 2015/16, even as poverty at the national level remained virtually unchanged (moving from 48.1 percent to 48.6 percent).

The potential for agricultural growth and imports substitution exists because the domestic market still remains underserved, while, for selected agricultural products, there is potential for exportation to be explored. In fact, between 2014 and 2016, there was a sharp increase of 128 percent in the value of agricultural exports (from US$21,746 to US$49,641). The horticulture market could absorb significant growth in production considering the fact that an estimated 50 percent of vegetables are imported. The value of horticultural exports rose by 378 percent between 2014 and 2015, moving from US$6.35 million to US$30.38 million.

As the macro-economic situation of the country is challenging with high indebtedness there is the dare need for more resources to address numerous development constraints. Agriculture sector has experienced a weak performance since 1995 and performance improvement is critical in boosting rural incomes, alleviating poverty and contributing to inclusive growth. Comparatively, the performance of The Gambia's agricultural sector is lagging behind that of other West African countries as only half of the country's food consumption needs is covered by the country's agricultural production.

With this statistic, The Gambia is classified as a 'low income' and 'food deficit' country. The CFSVA report of 2016 did reveal that 148,458 persons (8%) of the population in 4 regions of the country (Basse, Janjangbure, Kuntaur and Mansa Konko) are food insecure and or highly vulnerable to food insecurity. The said report further reveals that the majority of the Gambian households earn not more than USD 438 on annual basis.

What the statistics reveal is that the country needs to strive harder to ensure that agriculture is developed and modernised in view of the country's imminent requirements.

Based on the findings there are challenges for the successful implementation of this strategy. These relate the limited institutional capacity and challenge to the capacity and functions of the agriculture extension agents. The rice taxes and non-compliance with the high standards for exported groundnuts are constraining factors. Further, there are supply-side constraints that prevent it from taking full advantage of these export opportunities and the country is failing to maximize trade benefits in the domestic and ECOWAS markets.

With a rather low levels of computer literacy among the farmers and their poor access to and use of new agricultural technologies, the expanded range of commodities and farming systems with different production compound the challenges.

The degradation of the environment compounded by weak management of resources, weak enforcement of policies, laws, inadequate data base and management information system and underfunding of most environment

and natural resources programs including climate change all remain a challenge. The challenge of the capacity to develop, to access and to manage agricultural information and knowledge for agricultural production is deepening.

Based on the challenges, the goals developed are considered to contribute to the development and modernisation of agriculture. The strategy focuses its resources on the biggest opportunities for enhancing the development and modernisation process for agriculture. The outlined related objectives are complimented by the institutional and capacity issues that need to be addressed in order for the Government to fully realize the potential of ICTs in agriculture development and modernisation.

The strategic vision is to "use ICTs for the development and modernisation of agriculture and its related sub-sectors" by leveraging on the benefits of ICTs in improving the productive capacity and base of the agriculture sector through the optimal utilisation of ICTs in a knowledge-based and technology-driven economy. The mission statement on the other hand is to "transform the Gambia into a middle-income food self-sufficient economy through the use of ICTs and its related applications".

The following goals in the table below are set:

NO.	GOALS
Goal 1	The use ICTs to scale-up climate-smart agriculture and increase productivity and resilience;
Goal 2	To develop key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness;
Goal 3	To support key structural policy reforms;
Goal 4	To strengthen the capacity of institutions responsible for the agri-food sector;

The first applicable guiding principle in the implementation of the e-ADM Strategy-2024 relate to the concept of encouraging PPP to boost

investment with an unconditional commitment for policy and operational efficiencies in facilitating access to agri-finance and investment at lesser transaction cost. The emphasis on job creation and adherence to the AU position on 10% of the GDP to be utilised as the budget for the agriculture are matters to be strictly pursued.

Based on the mapping, issues of risks management and mitigation strategies are considered followed by the crucial issue of funding. This is because the budget considered for this strategy is determined at an estimated total of D 68,750,000 (Sixty-Eight Million Seven Hundred and Fifty Thousand Dalasis) in terms of programs to set up the framework. This excludes other costs relating directly to the stakeholders' other administrative requirements.

The strategic framework for e-ADM Strategy-2024 implementation is created to facilitate coordination and accountability. There is an e-Agriculture Steering Committee, Experts and Advisory Group and the National Assembly Committee. The membership of the first two are in an annex to this strategy.

This Strategy too adopts the traditional project financing approach where the entire project can be funded through Government budgetary resources. Other funding measures like the use of donors. Agencies like the FAO, UNEP, AfDB, WB etc.

In order to achieve the goals and objectives of this Strategy there will be a coherent and steady monitoring and evaluation of the outcome indicators by the Cabinet committee. There will be annual review of the strategy's implementation and a full review at the end of the fourth (4th) year.

4 INTRODUCTION

Arguably, poverty and food insufficiency are a challenge to almost all developing countries. Many are pursuing measures to increase agricultural productivity as a main driver for poverty reduction. Applying the use of ICTs in Agriculture is expected to lead to transformation in all agricultural value chain in the forms of boosting productivity in both the formal and informal sectors, With the optimal use of ICTs there is potential to increase commercialization of agriculture production, enhance employment in small and off-farm agriculture businesses.

The extraordinary transformative impacts of ICTs in almost all sectors of any economy, more so in agriculture, are not in doubt. Countries are using ICTs as enabling tools and super infrastructure to optimally enhance and boost productivity in the respective economic sectors. This dynamic strategic document for Agricultural development and modernisation through ICTs is developed to cover the period 2021-2024. The specific strategic paths have been outlined with suggested ICT solutions and or applications for implementation. The solutions are arranged in order of priority taking into consideration their Impact on meeting the national goals set for the agriculture sector, their finesse for the purposes and within the existing policy, regulatory and legislative frameworks. The list of the solutions is in ANNEX 15.2 of this strategy.

The strategic goals are outlined to impact on the country's poor capacity to develop, to access and to manage agricultural information and knowledge. This is because there is an apparent disconnect between the e-Agricultural products available in the market and the general information needs of the farmers. Creating a single and pervasive information access point through information integration is expected to resolve this challenge as the possibility would exit to provide anywhere, anytime and any device information access while meeting the need to avail timely, relevant, accurate and consumable information to farmers.

A greater number of farming and farming related activities in The Gambia are on small scale. The farmers have multifaceted challenges including the limitations of small farm sizes, with diseconomies of scale and low productivity. A good number have inadequate knowledge, skills and management approaches in modern farming techniques. There are storage difficulties and inadequate farmer experience (especially the women in vegetable farming) with the marketing of products.

Clearly there is that lack of adequate information on inputs, markets, credit, improved technologies and commercial farming on the part of the farmers. The ICTs are considered to be used in order to deliver training and information for improving production, productivity and access to markets. The need is for farmers to have information on trending cropping

techniques for pre-harvest, harvest and post-harvest activities through an integrated and comprehensive platform.

This e-ADM strategy is a framework that identifies sustainable path for services and solutions based on the use of ICTs in agriculture development and modernisation. It provides innovative ways to use ICTs for agriculture.

The objective to improve access to valuable information that can help farmers make the best possible decisions and also to use the available resources in the most productive and sustainable manner. The dimensions for ICT use could be through devices, networks, services and applications and technologies like the Internet-based technologies, radio, telephones, mobile phones, television and satellites. The scope is broad as it covers the agricultural services provided by the Governments to farmers through ICTs as well as a range of products, services and infrastructure provided by government, the private sector, public research and extension, NGOs and farmers' organizations.

The strategy's implementation is expected to drive further economic growth, raising incomes and improving livelihoods among farmers, through increased efficiency of agricultural production and value chain development. The use of ICT-driven solutions can address the problems of climate change, pests and diseases as well as poor market access. As it would enhance agricultural innovative systems and sustainable farming, the use of ICTs in disaster risk management and early warning systems and market access cannot be overemphasised. Its role in capacity development and empowerment and food safety and traceability is fundamentally unique and valuable. A part of the approach is for ICTs to be used to aid in implementing regulatory policies frameworks and ways to monitor farming progress as well as to improve access to financial services for farming community.

5 BACKGROUND

This is the first organization-wide strategy that explicitly caters for the use of ICTs for agriculture development and modernisation. This is a pillar of the ICT4D Policy action plans with the overarching objective of using ICTs as "enabler of the agriculture sector development" and more specifically it is:

> *"to develop and modernize The Gambia's agriculture sector and develop a dynamic and vibrant export-oriented agro-business industry through the development, deployment, and exploitation of ICTs to improve on agricultural productivity, and the production of agricultural value-added products and services".*

As highlighted earlier this is also closely linked to the NDP 2017-2020 that is premised on a transition for having "a green economy with climate-smart agricultural technologies for ensuring higher productivity. The Government of The Gambia recognizes the power of the ICTs to further enhance the development and modernisation of the country's agriculture. This strategy is premised on identifying new measures for facilitating the culture, adoption of ICTs for the agricultural sector's development and modernisation. With the recent available applications and machine hardware and their related software, ICTs offer invaluable opportunities for agriculture. The many past policy measures and initiatives do have some significant impact for the development of agriculture. Although the impacts could have different results if a number of specific ICT applications are used in the implementation and or utilisation. With their unique objectives and timings, they are summarised as under:

5.1 Agriculture in Vision 2020

As this Vision 2020 was formally launched in May 2006, the objectives set out for agriculture and natural resources (ANR) relate to:

a) *increase output of both domestic and exports produce;*
b) *create employment and income generation;*
c) *diversification of ANR base;*
d) *the reduction of disparities and the provision of effective linkages between ANR and other sectors of the economy;*
e) *the creation of sustainable and balanced mix between rain-fed and irrigated agriculture;*

5.2 The Gambia National Agricultural Investment Program

The ECOWAS Action Plan (2005– 2010) relates to implementing both the CAADP and ECOWAP through the RAIP Program. The NAIP is a product of the CAADP Program through NEPAD of the AU.

To formulate the RAIP the NAIPs Programs of ECOWAS member states was prepared and in recognition of this the government prepared the NAIP. This provides the country's agricultural investment program in the six areas identified in the RAIP:

a) *development of agricultural chains and market promotion;*
b) *improvement of water management;*
c) *prevention and management of food crises and other natural disasters;*
d) *improved management of the other shared resources;*
e) *sustainable farm development;*
f) *institutional capacity building for the implementation of the RAIP;*

5.3 Poverty Reduction Strategy Paper 2007–2011 (PRSP II)

The PRSP II policy frame- work was designed for growth and poverty reduction with the objectives of attaining the MDGs with focus on enhancing the capacity and output of productive sectors including agriculture as the prime sector for investments to raise income, improve food security and reduce poverty. Specific interventions are in areas of training.

5.4 Agriculture and Natural Resources Policy (ANRP)

In addition to what is stated above, the vision was to have a strengthened sector supported with at least 10% of national budgetary allocations (excluding debt servicing) and to further achieve:

a) *the attainment of sustainable increased levels of self-sufficiency in food production, by at least 25% of present levels;*
b) *increased food security at household level;*
c) *sustainable increase of rice by at least 25% of levels of production a commencement of the policy's implementation*
d) *increased production of artisanal fisheries with over 90% of the catch/production process by indigenous small holders;*
e) *the reduction of unregulated exploitation of fish in territorial waters of the country by at least 50%;*
f) *a well-developed forest land area covering at least 30%;*

Based on the above targets and even after the policy's phase the desired contributions from the agriculture sector are yet to be fully realized. The matter of inadequate direction, focusing, planning and programming for the sector as well as resource mobilization to develop and invest in capacities to produce appropriate results.

The optimal utilisation or the strategic promotion of the use of ICTs for a number of the above-mentioned policy measures is not clearly addressed or considered. This strategic plan recommends an expanded application of ICTs for agriculture development and modernisation.

5.5 The Issues with Policy Implementation

The outlined strategy documents underlined the government's commitment to agricultural development. The interesting regionalization of agricultural policy in ECOWAS region and the CAADP all enable collaboration between the government's technical teams and ECOWAS in the formulation of the NAIP.

A number of the implementation challenges in the form of no undertaken systematic assessment of the implementation and results of those strategies to inform the formulation of subsequent policy. There has been a mismatch between objectives and resources characterised by insufficient domestic and external funding all limiting the achievement of the objectives. Equally, the rather low budget allocations, the scarcity of qualified staff created a major implementation challenge. It is observed that the budgetary commitments to agriculture decreased sharply from 17.30 percent in 1980 to 5.97 percent in 1990. This fluctuated since then but has always remained far below the CAADP Program target of 10 percent of total public expenditures. Within the period 2010–2017, public expenditure in agriculture in The Gambia averaged 3.30 percent, compared to 4.34 percent for West Africa and 10.13 percent for the neighbouring Senegal.

Further, the lack of effective coordination between the Ministry of Agriculture and relevant line ministries responsible for providing crucial public or quasi-public goods and services indispensable for agricultural growth (roads, energy, telecommunications, environment and natural resources, and so on) has also contributed to poor implementation of previous strategies and development plans.

5.6 Rationale for this Strategy

The Strategy is based on the conviction that agriculture development and modernisation is for increasing productivity, improve food security and nutrition, reduce poverty and enhance the nation's competitiveness at both regional and international levels. This strategy is responsive to the current opportunities provided by ICTs for the advancement of agriculture.

It is partly premised on the related objectives of the NDP and the support provided by the international partners in the country including the FAO's CPF Framework 2018 to 2021 that has four government priority areas for the FAO to support through partnership with the Government. The said priority areas are informed by the NDP (2018 – 2021), UNDAF (2017 – 2021) as well as the regional and global commitments including the Malabo Declaration, the AU Agenda 2063 and the 2030 agenda (SDGs) more specifically SDGs 1, 2, 3, 4, 5, 6 and 16 as high priority. The NDP's (2018–21) third strategic priority is to build:

"a modern, sustainable, and market-oriented agriculture and livestock sector for increased food and nutrition security, income and employment generation, poverty reduction, and economic transformation."

It is observed that the three expected outcomes of this priority area are:

i. *Consolidated agriculture sector policy with appropriate subsector policies to create an enabling environment for modern, market-led agriculture in place;*

ii. *Value chains enhanced for agriculture and livestock transformation. Increased production of basic agricultural commodities (crops and livestock) for enhanced food and nutrition security;*

iii. *corresponding agricultural policies, strategies, and programs must be updated and developed to put the elements of the NDP into operation;*

A summary of the CPF priority areas are:

a) *"Enhance enabling environment and capacity development for increased, sustainable and diversified agricultural and fisheries production and nutrition through policies, strategies and work plans aiming at, among others, modernizing the agriculture, livestock and fisheries sectors, promoting and strengthening agribusiness;*

b) *Sustainable natural resources management for climate change adaptation and mitigation with emphasis on the five principles of sustainable food and agriculture to promote integrated natural resources management for climate change adaptation and mitigation;*

c) *Strengthened food and anr value chains for income generation and employment creation through the commercialization of agriculture and strengthening of the agricultural and natural resources value-chains;*

d) *Strengthened resilience and capacities for disaster risk reduction and management and climate change adaptation and mitigation through technical assistance";*

Ultimately this strategy is to help prevent e-agriculture projects from being implemented in isolation, avoiding duplication of efforts and resources and it is expected to enhance and develop efficiency gains from intra-sector and cross-sector synergy. The strategy would equally help in addressing the digital divide in the rural areas of the country. It would facilitate research in agriculture by NARI through established standards for open data and

interoperability that would al enable the sharing of national research outputs and global knowledge. In effect it represents the broader vision as clothed within the NDP.

5.7 The Process in Developing this e-ADM Strategy-2024

The Strategy was informed by international best practices in its development, with a special emphasis on what obtains at Ecowas countries with a similar development context to that of The Gambia and the complimenting efforts of the key development partners like the FAO and UNEP. The strategy is formulated based on a consultative process with stakeholders from the government, civil society, and the private sector. Some key reports have been considered as well as the developments at the international level especially with regards to the works of the UN agencies in agriculture development and advancement, the SDGs and the ECOWAS and AU commitments on agriculture development and modernisation.

The result of these consultations is reflected in this strategy with primary focus on key interdependent areas, to wit:

a) *Structural policy reforms;*
b) *Information system for climate-smart agricultural market;*
c) *Developing key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness;*
d) *The known applicable applications and services for agriculture;*
e) *The capacity strengthening of institutions responsible for agri-food sector;*
f) *The communication system for supporting MOA;*

6 KEY FINDINGS

6.1 Economic relevance of agriculture to The Gambia

Agriculture as a major economic activity in The Gambia contributes not less than 25% of the GDP. It employs about 70% of the labour force with 32% into active primary agricultural production. Agriculture is the main source of income for about 72% of the extremely poor rural households in The Gambia. The areas of agricultural production relate to small-scale, subsistence rain-fed crop production, traditional livestock rearing, semi-commercial groundnut and horticultural production, small-scale cotton farming and a large artisanal fisheries sub-sector.

The main cash crop is groundnuts, although there are some developments in areas of horticulture and cashews. About 80 percent of farm households are engaged in groundnut farming which generate 60-80 percent of their income. Groundnut remains the dominant crop followed by millet, rice, maize and sorghum in terms of harvested area and gross production value.

In 2017, the total harvested area was estimated at 405,200 hectares and the gross production value at US$110.80 million.

In the last 5 years the imports of agricultural products (rice, onions, milk, wheat, nuts etc) exceed US$148 million whereas the exports (groundnuts-15%, cashewnuts-12%, tea-6%, cow milk-2% and rice-1%) is within the range of US$30 million. With a population of about 2 million, 40% live in the rural areas. About 32% of the agricultural jobs (161,800) are employed in primary production agriculture out of which 54% are women and 46% are men. The gender inequality index is 0.6. The people living below US$3.10 per day is 68% and the national poverty line is 48% of which 74% live in the rural areas. About 90% of the total population has access to portable water and 84% of the rural population has access to portable water. About 47% of the population has access to electricity out of which 13% are of the rural population. Importantly 61% of the youth are literate. Agricultural productivity and income in terms of value added per worker is not more than US$400 (US$311 in 2005) when the West African level was US1,564 and the OECD level was US$21,793 all in 2005.

In IMF's projections about The Gambia (IMF World Economic Outlook), the real GDP growth was expected to reach 5.4% in 2019 and decelerate over the remaining three years to 4.8% by 2022. It is important to state that the public and publicly guaranteed debt as a share of GDP since reached an estimated 107% of GDP in 2017. The Government's commitment to further increase public investment, with a focus on the agricultural sector, tourism and energy sector and infrastructure were all expected to support growth. The risks in the form of climate variability (the recent flooding) and Covid-19 outbreak all impact on growth expectations. This would consequently impact on the national currency and also increase the probability of debt distress.

With a GDP per capita of US$483 in 2017, this represents one-third of the average for sub-Saharan Africa (US$1,553 per capita). The average GDP growth of 3 percent per annum is also barely keeping pace with population growth of 3.5 percent. Agriculture is the source of livelihood for 80 percent of the rural population based on the 2015/16 Integrated Household Survey (IHS). For about 72 percent of poor households and 91 percent of extremely poor rural households, agriculture is the main source of income.

As the macro-economic situation of the country is challenging with high indebtedness there is the dare need for more resources to address numerous development constraints. Agriculture sector has experienced a weak performance since 1995 and performance improvement is critical in boosting rural incomes, alleviating poverty and contributing to inclusive growth. Comparatively, the performance of The Gambia's agricultural sector is lagging behind that of other West African countries as only half of the country's food consumption needs is covered by the country's agricultural production.

The Gambia imports 83 percent of its requirement for rice, the staple food for most Gambians. According to the 2015/16 IHS, 55 percent of Gambians are food insecure and food insecurity is both a household and national concern. The Integrated Household Survey (HIS) reveals that rural poverty increased from 64.2 percent in 2010 to 69.5 percent in 2015/16, even as poverty at the national level remained virtually unchanged (moving from 48.1 percent to 48.6 percent).

The contribution of agriculture to GDP declined from 29 percent in 2010 to 17 percent in 2017 even though 46 percent of the national labour force works in the agricultural sector. This is partly because of the net increase in the share of services in GDP (66 percent). This agricultural GDP consists of livestock (30 percent), groundnuts (20 percent, and a main source of foreign exchange), other crops (40 percent, with horticulture growing in importance), and a small share of fisheries and forestry. In any case the sector contributes 17 percent of GDP and 30–40 percent of all foreign exchange earnings from exports.

6.2 Land Use

The Gambia's agricultural land constitutes approximately 54% of the country's total land area and in the last two decades the area of land under agriculture has increased from 557 000 hectares to 605 000 hectares. The total arable land area increased by 173% (about 8.7% per annum) and regardless of the significant increases in population, the country's forest cover increased by 8.2% between 1994 and 2014 as a result of its participatory forest management policy.

6.3 Agricultural Production Systems

Of the country's three main agroecological zones the Sahelian Zone records less than 600 mm total annual rainfall with up to about 70 days of active crop production during the raining season. This zone is recognised for early maturing, short-duration and drought tolerant crops Secondly, the Sudan-Sahelian Zone with a longer growing season of about 79 -119 days has about 600 to 900 mm rainfall. Lastly, the Sudanian-Guinean Zone has about 900 to 1200 mm rainfall with a growing season of about 120-150 days.

At the moment the agriculture activities (farming) is mainly dependent on rainfall and about 5% of the land is under cultivation equipped with irrigation. The livestock sub-sector continues to contribute to the livelihood of the rural population as it enhance food security and income. The cattle totaling on average (from 2010 – 2014) 422,302 heads are the most valuable asset in the sub-sector, closely followed by small ruminants comprising sheep (359 799) and goats (319 056).

The Fisheries sector contributes on average 12% of GDP. Not less than 30 000 people are employed in the artisanal fishery sub-sector and this is serving as a source of livelihood for about 200 000 people. The artisanal fishing sector is the dominant fishery in the Gambia providing direct employment to not less than 1 410 head fishermen and 4 694 assistant fishermen.

6.4 Food Security and Nutrition

The country has an HDI of 0.466 giving it the rank of 174. It must be said that the Gambia's HDI ranking was 178 in 2017 and this improved to 174 in 2019 representing an average annual HDI growth of 1.26. While the life expectancy at birth is 61.7 years, the life expectancy at birth for female is 63.2 and male is 60.4. The country's gender development index in 2018 was 0.832 with female being 0.416 and male being 0.500. With this statistic, The Gambia is classified as a 'low income' and 'food deficit' country. The Comprehensive Food Security and Vulnerability Analysis (CFSVA) report of 2016 did reveal that 148,458 persons (8%) of the population in 4 regions of the country (Basse, Janjangbure, Kuntaur and Mansa Konko) are food insecure and or highly vulnerable to food insecurity. The said report further reveals that the majority of The Gambian households earn not more than USD 438 on annual basis.

6.5 ANR Policy (2009 – 2015) & Limitations

The ANR policy that covered the period 2009 to 2015 was focusing on four major strategic objectives, to wit:

a) *"Improved and sustainable measurable levels of food and nutrition security in the country in general and vulnerable populations in particular;*

b) *A Commercialized ANR sector ensuring measurable competitive, efficient, and sustainable food and agricultural value chains, and linkages to markets;*

c) *Institutions (public and private) in the sector are strengthened, and providing needed services, strong and enabling environment, and reducing vulnerability in food and nutrition security;*

d) *Sustainable effective management of the natural resource base of the sector "*

In going through the focus areas of the policy and within the options of actions the issues of awareness creation and dialogue with the stakeholders, food production for national sufficiency on a self-reliant basis and the strengthening of selected institutions to deliver needed services for the public and private sectors.

There was an outlined option for "advancing the process of commercializing and modernizing the sector through implementation of special programmes promoting and popularising the use and access to affordable technologies, essential inputs and other resource in order to increase productivity and competitiveness in selected commodities for high value markets". There was rather no special focus on the use of ICTs and the targeted program options relate to selected high value market commodities, ensuring affordability and access to resources and the maximization of effective use of the services and facilities by small and medium scale users, availability and access to affordable water supplies year round and popularising mechanised farm power. The private sector was to be facilitated to involve in investing in the value chains of selected high value market commodities and the enhancement of agribusiness through partnerships with large commercial entities and operators of high value markets.

The said policy did not have any specifically defined or comprehensive strategic actions for the use of ICTs in enhancing the development of agriculture. MOICI as a ministry could have been partly involved with an obligation for specific roles.

The policy carved out a role for the public sector which was to focus largely in the areas of "policy formulation and monitoring, coordination of all development cooperation activities and programmes in the sector, research and development, knowledge transfer, resource mobilization and other minor roles that will be clearly defined in various Frameworks of policy implementation". Whereas the private sector was to focus on "commercial aspects" of agriculture. This rather creates an unintended disconnect between the public sector and the private sector. With a total of about 67 NGOs that are registered with TANGO about 34 of those have been working "in one or a combination of ANR sub-sectors such as environmental protection, agriculture, water resources, fisheries, beekeeping or livestock".

The policy was partly premised on the need for the Government to carry out policy and legislative reforms of the cooperative movement including the constituent member societies by establishing supervisory and monitoring mechanisms of the activities of the cooperative movement and resource mobilisation.

The policy's targets included having by 2015 a modernized, commercialized and vibrant horticulture sub sector with sustainable measurable increased productivity and competitive products supported by "established infrastructures (particularly warehouses, processing facilities, market information systems and transport) and sustainable linkages and transactions". A good number of these targets are not sufficiently addressed.

6.6 COSOP 2019-2024

After the change of government in 2016, there is now the Country Strategic Opportunities Programme 2019-2024 (COSOP) under the support of the International Fund for Agricultural Development (IFAD). This COCOP proposes, among other things, an agenda of climate-resilient agricultural transformation that involves changes in farming systems and farmers' organization towards a market-based approach. This is anchored to the National Development Plan (NDP) 2017-2020 that is premised on a transition for having "a green economy driven by small and medium-sized sector investment and delivering sustainable and inclusive benefits through the involvement of youth and women as key economic actors". There is a recognition of the use of climate-smart agricultural technologies as embedded in the NDP for harnessing the benefits of innovative technologies to increase labour productivity and decrease menial labour, particularly for women.

The objectives of COSOP include: enhancing "the productivity and resilience of family farms through sustainable management of natural resources and adaptation to climate change, with a focus on youth and gender impacts" and secondly on the improvement of "the management capacity and inclusiveness of professional farmers' organizations/cooperatives, and enhance farmers' access to communal assets, markets, and profitable agricultural value chains." The target is on family farms and their management capacity. The COSOP exhibits strategic adaptation and alternatives options in relation to agriculture.

It is important to state that IFAD has since 1982 financed 10 rural development projects in The Gambia with its focus on the most remote and marginalized areas and its special attention to women, youth and agricultural production, water management, and community-based infrastructure. A number of these projects could have incorporated elements of ICTs or been clothed with a special facilitation through ICTs. Some of the very critical ones include:

a) *the Lowlands Agricultural Development Programme (LADEP);*
b) *the Participatory Integrated Watershed Management Project (PIWAMP);*
c) *the Livestock and Horticulture Development Project (LHDP);*
d) *the Rural Finance Project;*
e) *the National Agricultural Land and Water Management Development Project (NEMA);*

It has since been observed that within the lessons of the experiences of IFAD related projects, the beneficiary ownership was a key challenge. There was a need for the active participation of beneficiaries in the planning, implementation and monitoring of project-financed activities. The beneficiaries were not adequately consulted in project planning,

implementation and monitoring impacting on the ownership with effects of poor maintenance and sustainability of project-funded investments. The use of ICTs could have addressed this major challenge. This would have further facilitated an in-depth analysis for the understanding of the beneficiary needs before embarking on the projects.

For reasons of the misconceptions, image and perceptions about working in agriculture and the need for new technologies including the ICTs, modern farming systems, skills, knowledge and market opportunities many youth or targeted farmers found it rather difficult to be attracted to agriculture. The need for capacity-building in managerial skills, that ICTs could have facilitated, still remain to be adequately addressed.

6.7 The Internal and External Capabilities and Environment

Based on the above summary of some critical matters in the form of findings, the consideration of the internal and external capabilities some of the key issues are worth listing, to wit:

6.7.1 Political Support and ICT Communication Infrastructure

There is some strong political support and will for the use of ICTs in agriculture development and modernisation. The ACE-GSC submarine cable connectivity, ECOWAN network infrastructure and the coverage of the country by other communication network and service providers all represent some degree of existing strength for using ICTs for agriculture. The youth groups are very much involved in ICTs usage and this is a significant group and stakeholder for the advance of agriculture. The institutional framework for ICTs is equally adequate to cater for the primary requirements in the use of ICTs for agriculture. The higher mobile penetration rate, the strong public private partnerships and the investment environment for ICT development in the country all represent opportunities for the development and advancement of agriculture.

6.7.2 Sufficient Land size for Cultivation & Water Resource

It is equally observed that with The Gambia's enormous agricultural land (estimated at 655,000 hectares and arable land at 588,000 hectares) and water resources the potential is there to develop by increasing the area under cultivation from about 334,000 hectares. With one of the highest levels of annual rainfall among Sahelian countries (830 millimetres per year), a surface water resources (estimated at 8 billion cubic meters) and groundwater resources (estimated at 0.5 billion cubic meters), all these represent opportunities for development and modernisation.

6.7.3 The Numerous Market Opportunities

There are numerous market opportunities at the domestic, regional and international levels. There are important agricultural market shares, especially considering that it has the agroclimatic conditions to grow a wide range of produce and geographic proximity to Europe and the USA. Domestically, the demand for food is on the rise as the population rises but the supply is rather limited. With an annual population growth rate of 3.5 percent, there is the projection that the population would double every 22 years with a rising urbanisation.

Based on similar projections the demand for rice is projected to increase from 221,661 metric tons in 2018 to 319,746 in 2030 and 443,902 in 2040. The country would absolutely need 7 times its current level of domestic rice production (38,000 metric tons in 2018) by 2030 and 10 times by 2040, which represents a huge market opportunity.

The potential for agricultural growth and imports substitution exists because the domestic market still remains underserved, while, for selected agricultural products, there is potential for exportation to be explored. In fact, between 2014 and 2016, there was a sharp increase of 128 percent in the value of agricultural exports (from US$21,746 to US$49,641). The horticulture market could absorb significant growth in production considering the fact that an estimated 50 percent of vegetables are imported. The value of horticultural exports rose by 378 percent between 2014 and 2015, moving from US$6.35 million to US$30.38 million.

6.7.4 Duplication of Challenges

As broadly provided hereafter, there are fundamental weaknesses of duplication of efforts through numerous agriculture projects and this is compounded by the rather inadequate and weak co-ordination of the projects. In most cases there is inadequate or poor information sharing that alienates the beneficiaries of the projects especially where content for some project materials is either missing or difficult to access for reasons of no proper related ICT applications.

6.7.5 The Electricity Challenge

Further, the lack of electricity as a national challenge impacts on many aspects of the country's development. Closely related to this is the general lack of capacity and financial resources as well as the appropriate easy to use technologies for e-agriculture. The applications part could be partly addressed by proper regulatory framework for ICT applications and this too is missing.

6.7.6 Vulnerability to Climate Change

The country is highly vulnerable to climate by virtue of its size and location in the Sahelian region and on the coast. The Gambian agri-food sector has

had to cope with harsh and variable environmental conditions. In fact between 2011 and 2016 the Gambia experienced five weather shocks: the droughts of 2011, 2014, and 2015, the devastating floods and winds storms in 2012 and 2016 all impacting on agricultural output to plunge by 24 percent with consequence of national GDP that contracted by 4 percent during 2010–15. ICTs could be of value in this area especially where irrigation infrastructure is very limited, leaving the country's agriculture almost entirely dependent on rainfall (90 percent dependent), despite the availability of important inland water resources.

6.7.7 Declining Farm Size and Fragmentation

There is the concern of a declining farm size and the fragmentation of landholdings and this impact on the modernization of production systems. The average farm size decreased from about 3 hectares in 2005 to 1.3 hectares in 2015 due to demographic trends and the inheritance system. Based on the 2011 Agricultural Census, about 37 percent of farm households are operating six or more agricultural plots, an indication of land fragmentation. Fragmented production makes it more difficult to generate a marketable surplus.

6.7.8 Weak Innovation System

The agricultural innovation system is weak ad lot need to be address in areas of the institutional capacity and funding for research (especially by NARI), extension, veterinary services and producer organizations. There is weak national research system, and this is not generating technologies for adoption in order to increase agricultural productivity. The funding for NARI is limited to implement proper research programs and rehabilitate facilities. There is the constraint of the human resources especially where the budget for NARI is generally financing wages and allowances, leaving little to cover research costs.

In fact, there are overwhelmed agricultural extension workers as one extension agent can cover for over 3,500 farmers (World Bank 2006, 2012) and this makes the current agricultural advisory system to be seriously affected. Compounding this is the shortage of labour as the young people (70 percent of the population) regard agriculture as a less attractive livelihood and are migrating in search of alternative occupations in urban areas or other countries.

The identified goals and strategic objectives are expected to address the constraints of high costs to acquire power, appropriate equipment and solutions. The solutions and applications are to facilitate the provision of digitized extension material, proper project coordination and achieving systematic capacity building for key agriculture stakeholders.

7 CHALLENGES

In addition to the findings there are challenges that ought to be considered for the successful implementation of this strategy. As they are numerous the listing focuses on those that could be addressed by ICTs with solutions to each for the growth and modernisation of the agriculture sector. They are as follows:

a) *There is limited institutional capacity constraining the performance of the Ministry of Agriculture in formulating new sectoral policies, development strategy, and programs;*

b) *Along with the minimum reference price, a risk sharing mechanism (the Price Stabilization Fund) further insulates groundnut farmers against downside risk relative to a given threshold.*

c) *While the government has liberalized groundnut marketing and exports, it still taxes the commodity and struggles to meet high standards for exported groundnuts.*

d) *Although The Gambia is part of many bilateral trade agreements, supply-side constraints prevent it from taking full advantage of these export opportunities.*

e) *The Gambia is also failing to maximize trade benefits in the domestic and ECOWAS markets.*

f) *The agriculture extension agents are to become more than trainers of farmers. They must be able to provide a wider range of services not only to farmers, but also contribute to the wider development of the farming community and the agricultural sector in general;*

g) *The limited coordination of extension services, its decentralization and fragmentation ought to be adequately addressed;*

h) *There are expanded range of commodities and farming systems with different production problems all compounded by a large number of clients including the traditional producers who must all be serviced;*

i) *There is a challenge with functional literacy and low levels of computer literacy among the farmers also compounded by poor access to and use of new agricultural technologies and information by the farmers and or even the extension agents;*

j) *The national environment and the related development challenges partly characterized by limited human and financial resources could be addressed by having the right relevant and effective extension infrastructure and systems;*

k) *In this attempt to support an increase in the use of ICTs for agriculture development and empowerment, there will be the need to embrace and view agriculture as both food and non-food items. The "new agriculture" requires a different set of extension, educational and research skills and programmes and is closely linked to other sectors of the economy such as tourism, education, health, transport, trade and finance.*

l) *The degradation of the environment compounded by weak management of resources, weak enforcement of policies, laws, inadequate data base and management information system and underfunding of most environment and natural resources programs including climate change all remain a challenge. There is a challenge of the capacity to develop, to access and to manage agricultural information and knowledge for agricultural production. This would require the need to integrate information required by the farmers and all stakeholders in agriculture into a single access point to provide anywhere-anytime and any device information. This will facilitate and enable the stakeholders to interact and maximize the benefit of shared and accessible information for the development and advancement of agriculture.*

8 CRITICAL SUCCESS FACTORS

Having outlined the challenges, below is the summary of the critical success factors for the implementation of this strategy:

a. *There must be an approved road map with detail action plans, to be informed by this strategic plan, including activities and how they should be managed, funded and coordinated, and the identification of the key actors;*

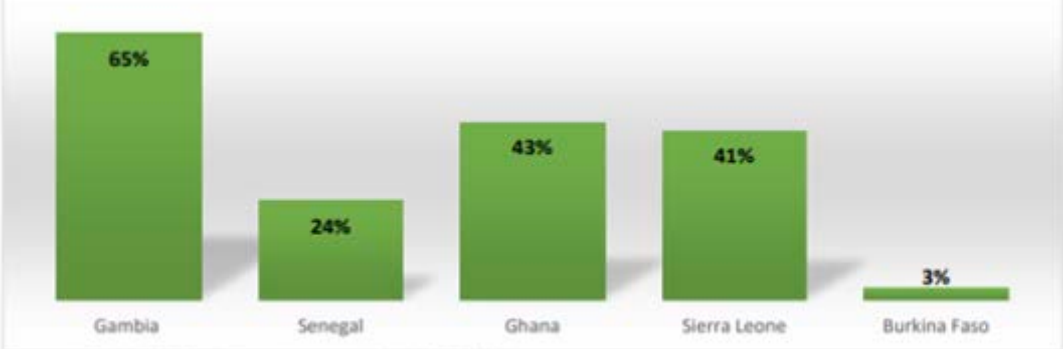
b. *There must be a holistic, multi-stakeholder approach, with cross-cutting support spanning various government ministries, including those dealing with ICTs for the implementation of the strategy;*

c. *The provision of adequate resources and funding for the implementation of the requirements especially in addressing the outlined challenges;*

d. *The strengthening of the stakeholder Ministries to provide effective services in planning, agricultural statistics, extension and research services as well as mobilizing and strengthening grassroots institutions to prepare them for market oriented commercialized farming through public-private partnerships with sound business models;*

e. *Encouraging the youth to embrace agriculture and reducing, through special incentives, the large-scale emigration as the latter drains the country of its most educated and productive rural workers. By 2013, an estimated 135,000 Gambians, or 7 per cent of the population, reside abroad, most of whom are under 24 years of age. This number has significantly increased by a huge number. As seen in the following chart, the emigration rate among skilled workers is far higher than those of comparable countries in the subregion. At the same time, the increase in remittances remains a major source of social, political and economic resilience, especially in rural areas;*

Emigration among workers with higher education, The Gambia and comparators



Source: Kebbeh (2013) and Docquier and Marfouk (2006)[63,64]

f. *To provide and support open and big data for the farmers in order to ensure the provision of real-time data via multiple channels to smallholders and others involved in value chains;*

g. *Facilitating the farmers to have access to ICT solutions to enable them take advantages of the technologies, in terms of cost, availability and usability;*

h. *Ensuring last mile connectivity especially for those in the rural areas and electricity for ICTs;*

i. *Having a comprehensive ICT "solution architecture for agriculture" to facilitate greater access to information that drive or support knowledge sharing.*

9 VISION & MISSION

The vision and mission statements are to covey and encourage the creation of an ecosystem for the development and modernisation of agriculture by the use of ICTs and in line with the NDP. The FAO-ITU E-agriculture strategy guide also informed the vision and mission statements.

9.1 The Vision Statement

To use ICTs for the development and modernisation of agriculture and its related sub-sectors.

9.2 The Mission Statement

To transform the Gambia into a middle-income food self-sufficient economy through the use of ICTs and its related applications.

10 THE GOALS

10.1 The Basis

The FAO classifies the Gambia as

> *"a Low-Income Food Deficit Country facing severe food security issues at both household and national levels."*

For the above reason and among others, the NDP envisages

> *"a modern, sustainable, and market- oriented agriculture and livestock sector for increased food and nutrition security, income and employment generation, poverty reduction, and economic transformation,"*

This places the agriculture sector as a priority sector for achieving the country's development goals. The ultimate targets within the vision is to have a productive, resilient, competitive and market-oriented agri-food sector anchored in a strong institutional and policy framework. This is to cater for the optimization of smallholders' and private sector investments along values chains.

The goals addressed comprised pillars that are based on the domestic and international best practice dimensions for agriculture development and modernisation through ICTs. They are to foster the transformation from subsistence to market-oriented agriculture.

10.2 The Four Goals (Priority Areas) with ICTs

The four issues considered, as highlighted above, relate to climate-smart agriculture, value chain development through PPPs, structural policy reforms and institutional capacity building.

10.2.1 Climate-smart agriculture to increase productivity and resilience

This is to use ICTs to scale-up climate-smart agriculture and increase productivity and resilience by;

i. *Promoting the deployment and exploitation of ICTs to support and enhance production, processing, marketing and distribution of agriculture products and services;*

ii. *The identification and adoption of e-solutions for improving water management and increasing irrigated area in order to achieve the targeted outcomes;*

iii. *Ensuring the availability and accuracy of agricultural information and innovation system by creating, updating, analysing and linking critical databases by taking advantage of digital technologies;*

- *Develop technical guidelines and appropriate institutional framework for interoperability, privacy and security of connected databases and network infrastructure;*
- *Develop guidelines for data sharing amongst stakeholders particularly government, LGAs, private sector and academia;*
- *Creating and updating of various government and private databases for e- agriculture services;*
- *Ensuring the linkage and integration of databases as well as the integration of databases with application platform to unleash the growth of government and third-party services;*
- *Align the e-agriculture services with the e-Government services;*

iv. *Creating accessible, affordable and secure ICT platforms, networks and devices that enhance quality inputs with enhanced sensing, hosting, analytical, identification, tracking and communicating features;*

- *Establish an agriculture information system including GIS to provide support for the planning, production, storage, monitoring sustainable environment usage in areas like land and water management, offshore resource exploitation, yield assessment and livestock management as well as the distribution of related products (horticultural crops, livestock, fisheries etc.);*
- *Ensure universal access to affordable broadband and low-cost smartphones as per the broadband policy and strategy;*
- *Putting in place a secure digital application platform for e-agriculture for delivery of services and sharing of information with government and non-government entities;*
- *Adopting smart sensing technologies and integration of required databases in order to make accurate information available in real time or near real time for the sector;*

- *Enhance the sensing capabilities of agriculture and associated services using modern technologies (e.g. satellite, drones, IOTs and systematically integrate into database;*

- *Put in place a framework for the effective monitoring of agriculture sector using ICTs with capability to track and trace issues within the sector nationwide;*

- *To deploy effective and efficient analytics systems and capabilities to harness the big data generated in the agriculture sector;*

- *Create and strengthen the call centres for agriculture services in terms of capabilities in scope and quality;*

- *Having improved certified seed and mineral and organic fertilizers for integrated soil fertility management;*

- *Integrated pest-management practices with improved technologies;*

- *Encouraging the professional seed cooperatives to apply the use of ICTs;*

v. *Putting in place an expanded and improved water management systems facilitated by ICTs;*

- *having strong and well-organized water user associations to efficiently operate and maintain irrigation infrastructure through ICTs;*

- *The adoption of simple, efficient, and labour-saving water management technologies (use of solar pumping systems and efficient irrigation technologies that conserve water and save time);*

vi. *Encouraging and ensuring risk management of all projects;*

- *Bridging the information gap and improving the efficiency of risk management tools and procedures using ICTs;*

- *Introduce new risk management services in the form of micro-insurance, government subsidy, etc.;*

- *Having a platform, preferably a mobile platform, for effective early warning systems and agricultural disaster alerts;*

10.2.2 Develop Key Agri-food Value Chains & PPPs

The focus is to develop key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness through;

i. *Ensuring the existence of a framework for the process of tracing, verifying, certifying, and monitoring in relation to food safety and quality, storage and preservation, wildlife tracking and biosafety, and eliminating agricultural food waste;*

ii. *Carry out awareness campaigns and improving the education and skills levels of farmers, extension workers, livestock herders and other sector end-users;*

   - *Bridging the skills and knowledge gap by using e-learning and networking tools;*
   - *Improving the confidence in the use of extension and advisory services via ICTs (online knowledge resources);*
   - *Facilitate education and better health in agriculture sector through ICT interventions;*

iii. *Outline measures to reduce the demand and supply gap, and enhance outreach and profitability of agriculture products and services;*

   - *Create and use ICT tools (applications and solutions) for analysing and linking nationwide demand and supply of agricultural produce;*
   - *Develop a platform to serve as an e-agriculture marketplace for sharing information on supply and demand, product promotion with advices on international trading norms and practices;*
   - *Promote e-services that can enhance the efficiency of logistics linked with workforce, transportation, storage, farm machinery etc.;*
   - *Promote greenhouse technologies especially for the horticulture;*

iv. *Having more resources for agriculture and more efficiency in their allocation;*

- *Adopting 10% of the GDP as budget for the agriculture sector*

v. *Putting in place applications to connect and link smallholders and the private sector to upstream and downstream services and markets in order to meet consumers' quality and price expectations;*

vi. *To put in place e-market platforms based on mobile phone applications and using text or voice recordings for informing value chain actors about market prices, linking producers to buyers and other market actors, and fostering more efficient market transactions.*

10.2.3 Supporting Key Structural Policy Reforms

Under this the support is to have key structural policy reforms through:

i. *Establishing an e-Agriculture Steering Committee as in an Annex 15.4 to this strategy.*

- *Ensuring inclusiveness and broader representation of all critical stakeholders;*
- *Raising awareness and addressing the identified including access and use of ICTs;*
- *Ensuring proper coordination and planning to eliminate duplication and the waste of resources;*

ii. *The establishment of an Experts and Advisory Group as in an Annex 15.4 to this strategy*

iii. *Enhance innovation in e-agriculture services through incentives;*

- *Through the ICT Agency, establish a dedicated centre for agriculture e-services to focus on;*
    - *ICT applications development with agriculture given top priority;*
    - *develop a framework for service delivery by private sector using digital platform;*
    - *providing hosting for private sector application and services and serve as a one stop shop for e-agriculture services;*

- *Managing queries from farmers through mobile and web applications;*

- *Serving as a knowledge portal, that is, an online repository of agricultural content that could be accessed through mobile applications;*

- *Facilitating e-agricultural training of small and marginal farmers on important aspects of the different farming methods and types via short instructional videos and mobile applications;*

- *Having a consumer protection system for confidence building for agriculture e-services;*

- *An incentive framework for universities and academia to strengthen research and capability to develop applications and services;*

iv. *Identifying policy measures for improving the financing, investing and banking outreach to agriculture sector by leveraging on new technologies;*

- *Facilitate the availability of credit and loan through electronic and mobile credit verification systems;*

- *Measures to strengthen mobile payment and special agriculture banking systems for uptake by agriculture sector stakeholders;*

v. *Carry out a review of the existing policies, legislations, regulations and guidelines critical for e-agriculture and ensure their effective implementation;*

- *Putting in place an e-agriculture steering committee to be part of the implementation of this strategy and spearhead the review works;*

- *input subsidy policy reform for better targeting, transparency and efficiency, and for a functioning input market led by the private sector;*

- *groundnut pricing reform with the removal of groundnut price setting and of the export tax to allow more competitiveness;*

- *policy reform to secure farmers' land property rights while fostering private investments;*

- *Identify gaps within the existing policies or practices and addressing them with clear guidelines;*

- *Putting in place a coordination framework with key stakeholders from agriculture, banking, telecom, IT, governance, insurance, donor agencies etc. to enhance synergy and ensure strategic alignment with other sectoral developments;*

10.2.4 Strengthen the Capacity of Institutions within the Agri-food Sector

The strengthening of the capacity of institutions responsible for the agri-food sector by.

i. *Improving the research capability, quality and credibility of NARI using ICTs;*

   - *Providing NARI's with modern laboratories by upgrading core research facilities and equipment;*

   - *Building the capacity of researchers;*

   - *Enhanced research funds for funding priority research programs;*

   - *NARI to also partner with the Regional Centers of Excellence that have been established in West Africa and others (the research centers of the Consultative Group on International Agricultural Research, the International Institute of Tropical Agriculture, Africa Rice Center, International Livestock Research Institute, International Rice Research Institute, and International Crops Research Institute for the Semi-Arid Tropics) to take advantage of regional research capacities;*

ii. *Improving the links between agricultural research, extension, and producers with the adoption of an e-extension platform to provide agricultural advice to large numbers of farmers and promote large-scale adoption of improved technologies and best practices.*

iii. *Expanding the digitization of agricultural research and extension systems;*

iv. *Having a coherent ICT human capital development program and capacity building (on-the-job and academic training with short-term technical assistance on ICTs to address immediate capacity constraints;*

v. *Improving the logistics systems and facilities of those institutions for more efficient working conditions with ICT applications/solutions;*

vi. *Putting in place a farmer management support and information system with different databases that will be used for services ranging from the registration of agricultural lands and farmers, crop cultivation, seed distribution, fertilizer utilization etc.:*

vii. *Putting in place results management framework with a platform to ensure compliance and achievement of the targets;*

10.3 Expected Impacts of the Goals

Once the interventions in the defined priority areas are implemented the expected impacts to be generated in the short to medium term, will be on food security, import substitution, income generation, job creation, and poverty reduction.

More specifically, it will facilitate policy making and implementation through effective monitoring measures.

Research in agriculture will be reinforced with strengthening effects on agricultural extension and advisory services, national agricultural information systems, data availability and analytics for food safety and traceability and the enhancement of knowledge management and access to information. The government, researchers and producers will have established linkage for effective policy making.

As for the farming process the farming practices will become more sustainable with improvements in postharvest handling and logistics issues. With an enhanced domestic market access and trade, this will impact on the facilitation of international trade. However, it must be state that The Gambia is still having difficulties in meeting export quality requirements for food-grade groundnuts. In the case of EU, The Gambia's main export market, groundnuts have been downgraded to the bird-feed market segment due to noncompliance with sanitary and phytosanitary standards (on aflatoxin).

This is because The Gambia is still not in compliance with World Trade Organization (WTO) sanitary and phytosanitary requirements and Technical Barriers to Trade Agreements and the country needs to also comply with standards and technical requirements in the EU export markets. With these issues and market information gaps, the Gambia's agricultural exports perform under their potential. This could be addressed once the goals and outlined objectives are realised in the course of the implementation.

The export tax imposed on groundnuts has not addressed issues limiting the competitiveness of the value chain, as the tax revenue is not reinvested in the groundnut value chain to increase productivity and quality. Equally, ICTs can address a number of the roadblocks, illegal payments to road agents, and the lack of harmonized border procedures between The Gambia and Senegal through tracking for enhancing growth of domestic and regional trade. The rather slow progress in implementing the ECOWAS trade integration instruments, namely the ETLS and ISRT, prevents The Gambia from reaping the benefits of the growing regional market. The use of ICTs can facilitate a change in this state of things.

There will be increased and improved financial inclusion of the farming community with more credit, insurance and risk management schemes. This will ultimately improve the income levels of the farmers and their productivity on a sustainable basis. At all stages of the farming cycle (pre-cultivation, crop management and harvesting and post-harvest) ICTs will have significant positive impacts.

In terms of risks and uncertainties associated with the climate change, there will be the enhancement of the disaster management and early warning systems.

11 GUIDING PRINCIPLES

Fundamentally, the very basis for the use of ICTs for agriculture development and modernisation is found in the NDP. The possibilities are clothed with the inference that the financial, human and other resource constraints even within the ICTs all need to be addressed. The critical ones being matters of ICTs costs, access, content and sustainable use. To ensure the addressing of the issues and the successful implementation of this strategy, the following are the guiding principles to be observed for the implementation of this strategy:

a) *Unconditional commitment for policy and operational efficiencies in facilitating access to agri-finance and investment at lesser transaction cost;*

b) *Encouraging PPP to boost investment with the allocation of public resources and private sector skills and capacity for the realisation of the objectives within the goals;*

c) *Promoting job creation and optimal utilisation of the resources for the benefit of both the ICT and agriculture subsectors of the economy;*

d) *Adhering to the AU position on 10% of the GDP to be utilised as the budget for the agriculture;*

12 THE STRATEGY'S CRITICAL SUCCESS FACTORS

The following are the list of the critical success factors for the implementation of this strategy:

a. *The adoption of the right, relevant and responsive e-agriculture framework with the necessary and timely robust and accessible applications for the sector;*

b. *The successful addressing of the challenges of the sector and the establishment of the e-Agriculture Steering Committee and as well as the Expert and Advisory Group for advice with the right financial facilitation;*

c. *A clear framework for ensuring strengthened partnerships with the relevant stakeholders for the implementation of this strategy;*

d. *Having an adequate funding solution for the resources needed for this strategy including the utilisation of the 10% of the GDP as budget for the agriculture sector;*

e. *The farmers must through effective consultation have proper ownership of the strategy without any form of alienation or the existence of any information gap;*

f. *Eliminating any form of "Digital Divide" in relation to the capacity and productivity of farmers;*

g. *Having the right ICT physical infrastructure for ensuring and guaranteeing connectivity of the farmers to the various platforms regardless of the changes in the technologies of the handset devices;*

h. *Having an adaptation of relevant local content to the needs of the farmers in terms of languages and contexts. Hence, agricultural content should be adapted to national languages and repackaged to suit formats that meet the different information needs of farmers;*

i. *The development of digital literacy in rural institutions and communities by taking into consideration farmers' needs and constraints in the provision of appropriate learning opportunities for the various disciplines of farming;*

13 IMPLEMENTATION & GOVERNANCE

This strategy requires special attention for its implementation by the concern ministries, the steering committee and taskforce, the expert advisory group and the other relevant stakeholders. The e-agriculture steering committee will be set up to ensure effective implementation of the Strategy. It is to raise awareness and coordinate the implementation with is broader representation. The membership of the e-agriculture steering committee is in Annex 15.4 of this strategy.

There will be an Experts and Advisory Group and its membership is contained in Annex 15.4 to this strategy.

The e-agriculture steering committee chaired by MOA will provide overall implementation direction and guidance for the implementation and governance of this strategy. This does not reduce the work of MoA as the one with the authority and responsibility for the overall coordination and implementation of the Strategy.

The Experts and Advisory Group will be dealing with the technical matters for the implementation of strategy in collaboration with any other working group to be established by either any concerned ministry and or the government. This Group will provide quality check for all related ICT projects for agriculture based on results and impact and that it will guide, advice, and support in the development and implementation of any required standards.

Further, it can advise on the acquisition, evaluation and acceptability process of ICT applications, solutions, systems, hardware resources, and consultancy services. In doing this it can also identify and promote strategic partnership programs and areas of collaboration among the key and relevant stakeholders.

Equally, the head of the Experts and Advisory Group shall have the authority required to implement the strategy, and accept the responsibility for its outcome, with full authority over resources but under the direction of the steering committee.

With a four-year term, the strategy's implementation is expected to be in four phases, that is year-1, year-2, year-3 and year-4. Accordingly, the solutions would have to be grouped into the phase although this could be altered for just cause in the course of implementation. The solutions relate to the strengthening of existing agriculture services, the launch of high impact feasible services, the preparation and linking of databases, improving financing and risk mitigation solution, creating an enabling environment and the necessary guidelines for other applications.

14 MONITORING AND EVALUATION

The effectiveness of this strategy will largely depend on the effectiveness of the monitoring, measurement and evaluation of its implementation.

There will be another committee to be called the National Assembly Committee with membership drawn from relevant national assembly members that would be responsible for the Monitoring and Evaluation of the implementation of this strategy. MoA shall report to the national assembly annually.

The National Assembly Committee provides overall guidance and orientation on key priorities of the program in terms of monitoring and evaluation. It receives and approves progress reports on an annual basis before budgeting, and assessments and provides recommendations and feedback for policy and program adjustment towards effective implementations.

Monitoring and evaluation will be in accordance with a results matrix and monitoring and evaluation plan agreed upon by MoA (through the e-agriculture steering committee & Experts and Advisory Group) and the Government. The annual report shall show progress on implementation. The Experts and Advisory Group will provide periodic reports on progress, achievements and results in accordance with a format established by MoA.

The reporting will be systematic with more qualitative and quantitative information on the progress towards outcomes.

15 COST AND FINANCING OF THIS e-ADM STRATEGY-2024

The estimated cost of implementing this strategy is D 68,750,000 (Sixty-Eight Million Seven Hundred and Fifty Thousand Dalasis) This is spread across the four goals, their objectives and related actions.

Funding for the financing of the Strategy is one of the key critical success factors for its effective implementation and without which the development and modernisation of agriculture sector would not be realized. Three sources of funding are envisaged for the implementation of this Strategy, to wit:

The adoption of the traditional project financing approach where the entire project is funded through Government budgetary resources (10% of the GDP). As part of the said best practice, the Government provides the funds required to propel this Strategy through MoA. The Government, through MoA, MOICI and MOFEA, can create a Fund for the srategy's implementation. Contributions are to come from special fees levied on special related services, donor support, and support from bilateral and multilateral institutions like the FAO, UNEP, etc.

This Fund will provide for better planning and utilization more specifically with regards to coordination initiatives. Having a central funding vote will ensure that focus is maintained on all the key building blocks in relation to the goals and objectives.

The e-agriculture steering committee, through MoA, would also look out for PPP arrangements, donor support as an important source of funding.

15.1 Cost Estimates

A number of activities have been outlined in the implementation plan. Some of them fall under the special categories in the table below. Each is given an associated cost based on the cost standards in the table. Where the contemplation is for a training or capacity building, special allocation is made based on past experience. The cost that is assigned to each activity in the table below is used in establishing general cost.

NO	*ITEM*	*ASSIGNED COSTS -DALASI*
a)	*Legislation*	*750,000*
b)	*Regulation*	*250,000*
c)	*Review process*	*250,000*
d)	*Standards (related)*	*600,000*
e)	*Guidelines*	*250,000*
f)	*Management Reports, Planning and evaluation (related)*	*400,000*
g)	*Simple framework*	*250,000*
h)	*Ecosystem, Tracking (related)*	*600,000*
i)	*Surveys*	*1,500,000*
j)	*Nationwide awareness campaign (radio, TV, workshops etc.)*	*5,000,000 per annum*

In some cases, depending on the issue and its scope (e.g. software application) the specific assigned cost can change.

15.2 Detail Cost Estimates

GOALS	ACTIVITY	ESTIMATED COST (DALASI)	SPECIAL REMARKS (Some unique costs)
Goal 1	The use ICTs to scale-up climate-smart agriculture and increase productivity and resilience;	7,700,000	There are a number of applications requiring integration
Goal 2	To develop key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness;	24,100,000	The element of education and awareness is costly.
Goal 3	To support key structural policy reforms;	8,850,000	The e-agriculture steering committee and the Experts and Advisory Group is also costly to keep
Goal 4	To strengthen the capacity of institutions responsible for the agri-food sector;	28,100,000	The NARI part adds more to the cost
	MAIN TOTAL ESTIMATE	68,750,000	

16 ANNEXES

16.1 The Indicators to Guide the Implementation of e-ADM-2024

These indicators are categorised in parts.

16.1.1 Indicators within COSOP

A greater part of the indicators has been set within COSOP and in line with the objectives of the NDP – 2017-2020. This relates to the following:

a) *Develop climate change resilience;*
b) *Increase private investment in the agricultural sector;*
c) *Decrease dependence on food imports through increased productivity.*
d) *Create remunerative employment opportunities for Gambian youth,*
e) *Decrease stifling fiscal deficits.*
f) *Expand exports with regional neighbours and European markets;*
g) *Diversify exports.*
h) *Increase tourism.*

The related SDG - United Nations Development Assistance Framework (UNDAF) outcome with the government of The Gambia in terms of the national development priorities centre on eight SDGs (with specific focus on Sustainable agriculture, natural resources, environment and climate change management), as in the table below.

Goal 1	*End poverty in all its forms everywhere;*
Goal 2	*End hunger, achieve food security and improved nutrition and promote sustainable agriculture;*
Goal 5	*Achieve gender equality and empower all women and girls;*
Goal 7	*Ensure access to affordable, reliable, sustainable and modern energy for all;*
Goal 8	*Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;*
Goal 9	*Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;*
Goal 13	*Take urgent action to combat climate change and its impacts;*
Goal 15	*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;*

16.1.2 The Strategic Objectives and Impact of the COSOP Period

a) *Productivity and resilience of Gambian family farms are sustainably enhanced through accelerated adaption to changing climate and riverine water availability;*

b) *Improve professional farmers organizations/cooperatives capacities, better access to communal assets, markets and profitable agricultural value chains;*

16.1.3 Table on the Outcome Indicators

75% of family farms reporting a significant increase in production for more than 3 years;
75% of family farms reporting lasting adoption of new technologies and practices;
80% of rural women reporting reduction in workload;
80% of farmers (male/female) members of professional organization;
70% of women and youth reporting improved access to land and water for productive purpose;
60% Literacy rate in targeted communities;
60% of households reporting improved nutritional status;
50% increase of volume and value of sales by supported FOs;
70% of farmers (male and female) reporting improved access to processing and storage facilities;
70% of farmers reporting improved access to market;

16.1.4 The Milestone indicators on COSOP implementation

2000 hectares of swamp rice fields rehabilitated;
500 hectares of new swamp rice fields.
8000 hectares of upland fields benefiting from anti-erosion and water management structures;
Average rice yield increase of 50%
200 rice transplanters distributed
500 ATI threshing machines in use.
10,000 farmers benefiting from improved inputs;
250 extension personnel trained by project
at least 5000 farmers participating
At least 50 nutrition modules
At least 10 farmer exchange visits with Senegal
50% yield increase
At least 5000 farmers using productivity enhancing technologies;
At least 300 storage facilities constructed or rehabilitated;

16.1.5 Additional Indicators for Successful Implementation

This is not within the indicator list of COSOP but they are expected to enhance this strategy's implementation:

a) *Increase total lending to farmers by commercial banks to additional 15%;*

b) *Register all farmers countrywide from current in a centralized, accessible, and secure database;*

c) *Increase private sector investment in agriculture by a margin of 20% in the course of the implementation of this strategy;*

d) *Launch not less than 75% of the e-agriculture applications within the term of this strategy;*

e) *Digitize all agriculture related knowledge material and make it available online and mobile telephone;*

16.2 List on Possible e-Agriculture Services and Applications

The e-agriculture services and applications are arranged into the following categories:

a) *Database and information related*
b) *Safety and Security related*
c) *Education and Research related*
d) *Products, Resources & Finance related*

By applying the FAO-ITU model, the steering committee shall first give priority to the following numbers in each category:

CATEGORY	*NUMBER WITH FIRST PRIORITY*
a) *Database and information related*	*1, 2, 3, 4, 5, 6 and 7*
b) *Safety and security related*	*1, 2, 3 and 4*
c) *Education and research related*	*1, 2 and 3*
d) *Products, resources & finance related*	*1, 2, 3, 4, 5, 6, 7, 8, 9 and 10*

A number of progressive e-agriculture nations have ensured to cater for the applications / solutions with the numbers above and have them prepared in the first two years of their strategies.

16.2.1 Database & Information Related

DATABASE & INFORMATION RELATED		
NO	*NAME OF THE APPLICATION / SOLUTION*	*OBJECTIVE*
1)	*Online Agriculture workforce information and services*	*Creation of an online workforce (skilled and non-skilled) requirement and availability information system.*
2)	*Online information on offseason crop production technology package*	*This provides information, access to training on offseason crop production as well as the crop production technology package.*
3)	*Accessible information resources on government policies and guidelines*	*It provides iInformation and access to government policies and guidelines. It can serve as a single information access point that integrates all the agricultural solutions that farmers may need and that it empowers the farmers with the right and accessible information in order to make decisions anytime-anywhere to improve agricultural productivity.*
4)	*Farm mechanization information and service*	*Creation of online machine and equipment information system linked with market machine availability and rentals.*
5)	*Information on climate smart technologies and climate resilient crops and breeds*	*It provides information, access to training on climate smart agricultural practices, and new technologies and specifically facilitates an area mapping of wildlife crop damage/prone, online system for wildlife conflict management, wildlife*

		cyber tracking and alert.
6)	*Agromet data and services*	*Online availability of weather and other climate data, forecasting, and knowledge base.*
7)	*Setting up / strengthening of IVR systems*	*This is an interactive voice response system on topics such as land preparation, pests, management, balanced nutrition, deficiency syndrome etc.*
8)	*Agricultural management Information System (AMIS)*	*Information gateway contains all agricultural information: reports, research, surveys, Audio and video extension material, Yellow and white page directories.*
9)	*Geographic Information System solutions (GIS)*	*This provides agricultural map production which guides in planning and other related agricultural major decision*
10)	*Interactive website*	*An agricultural extension content management in a simple and intuitive website and disseminates agricultural technical / extension information to the extension workers and farmers with all information categorized by commodity.*
11)	*Agriculture information Service Center*	*Provide agricultural and livestock products information, cultivation techniques, policy to farmers via radio, video, mobile phones and other appropriate medium*
12)	*Information on fertilizer history by land area*	*An application to provide history of fertilizer use in the land area. It can serves as a guide in the use of what fertilizer and on what size of agriculture land.*
13)	*Integrate e-agriculture services with G2C*	*Service integration of e-government and e-agriculture services including security, interoperability*.
14)	*ICT policy on data sharing, data classification, data formats, secure e-documents*	*Policy and guidelines on data formats, data classification, implementation*
15)	*Social network amongst agriculture users*	*To create a network of agriculture sector stakeholders including (producers, marketers, extension workers, policy makers etc.) to distribute information (informal) and enhanced engagement.*
16)	*Online agricultural information repository/library*	*Agricultural library is accessible online with online cataloguing and location of the books in the shelves.*
17)	*M-farm for agro-input distribution management*	*An application supporting agro- input management*

16.2.2 Safety & Security Related

SAFETY & SECURITY RELATED		
NO	*NAME OF THE APPLICATION / SOLUTION*	*OBJECTIVE*
1)	*Credible GAP content aggregation and packaging*	*Creation of agriculture content, which is packaged for various dissemination medium (video, audio, website, text) or could be repurposed for capacity building.*
2)	*Agriculture Early warning system*	*Early warning systems for agriculture stakeholders against disasters and hazards alert and response system, integration with disaster management.*
3)	*Electronic pest surveillance system*	*Pest online database with historic vector linked with crop lifecycle, climate data, video-based verification, remote compensation and GIS maps. Pests and pest management online database, advisories and knowledge sharing*
4)	*Online food quality and safety verification and bio-safety monitoring*	*For the monitoring of food quality and biosafety*
5)	*Hotline*	*This is used to collect feedback and or inputs from the farmers and other agricultural actors.*
6)	*Traceability and DNA coding of prioritized species*	*DNA bar coding of wildlife & plants and tracking at checkpoints.*
7)	*Interoperable and secure e/m-agriculture applications platform with content*	*An integrated application platform interoperable with e-government services for E-agriculture service delivery.*
8)	*Remote video-based surveillance*	*A solution to carry out remote video-based information capture and remote surveillance.*
9)	*E/M App for certification standard, compliance and traceability*	*Electronic /Mobile Applications for certification standard, compliance and traceability.*
10)	*Database of approved chemicals, fertilizers*	*Database of approved chemicals, fertilizers.*
11)	*Traceability of agro-chemical movement through value chain*	*Aids in tracing the agro-chemical movement through value chain.*
12)	*Climate change modelling*	*Estimating the impact of climactic parameters (change) on crop, fisheries and livestock productivity.*
13)	*Agro-smart traceability*	*It is for tracking, recording and accountability of agricultural products.*

16.2.3 Education and Research Related

EDUCATION AND RESEARCH RELATED		
NO	*NAME OF THE APPLICATION / SOLUTION*	*OBJECTIVE*
1)	*E-agriculture advisory services (with possible consumer protection)*	*Advisory services offered by extension workers, consultants, researchers in country or abroad through electronic media (phone, Internet, email, video chat), face to face meetings or paper reports. Recognizing that the lack of credibility may deter agriculturists to deploy good agricultural practices, credible advisory services with consumer protection can be created. The dissemination can be through computers, telecom, Internet or broadcasting network.*
2)	*Capacity development and education using ICT*	*Use of videos, audios, texts, brochures on good agricultural practices and their dissemination through web based, mobile based, print or broadcasting networks. Using multimedia tools to build skills and offer distance education. It also includes vocational and skill-based courses.*
3)	*Linking research institutes with industry, extensions, producers and other stakeholders.*	*linking research institutes with extensions, producers and agriculturists for anytime anywhere learning, certification or business etc.*
4)	*Capacity Building through online farming schools modelled on massive online open courses (MOOCs)*	*Online training program to help young farmers learn what it takes to run a small modern farm operation from business planning to specialized advanced workshops in both livestock and agro-farming. This includes the use of social forums to encourage youth to engage in agriculture.*
5)	*Knowledge Management System*	*This is usually developed to strengthen the implementers of the strategy in the planning, coordination and Monitoring and Evaluation*
6)	*Data capture and analytical tool*	*Data capture and analytical tool to syndicate demand from farmers.*
7)	*Global plan of action for plant genetic resources-information sharing mechanism*	*Information on conservation, utilization and capacity building on PGR in the country.*
8)	*Central database of research programmes and new technologies*	*Repository of research findings/abstracts and information on on-going research programs to find and analyses the present*

		and past research titles/findings toward designing appropriate research for the benefit of farmers and the country
9)	*Central database of agriculture statistics*	*Reliable data collection and updating mechanism with compliance to national data from census and statistic department.*
10)	*Monitoring of groups / cooperatives through online systems*	*Creation of database, linking of database, registration and monitoring processes.*
11)	*E-agriculture extension monitoring*	*Creation of monitoring feedback and extension service request and complaint redressal.*
12)	*Monitoring of compliance to government policies, guidelines*	*Systems for monitoring of compliance to government policies, guidelines.*

16.2.4 Products, Resources & Finance Related

PRODUCTS, RESOURCES & FINANCE RELATED		
NO	NAME OF THE APPLICATION / SOLUTION	OBJECTIVE
1)	Integrated natural resource management information system	Information system that includes GIS data (incl. high resolution satellite image) and other information on land use / land cover / land degradation, Soil map/ land fertility, forest resource use, Geo portal and geo morphology, Irrigation and water management, Bio-diversity, invasive alien species, Disaster management, weather forecasting, fire history and forest preservation.
2)	E-market place for agriculture	Creation of e/m-market place, market information and scalable payment systems for national and international trade, promotion and awareness raising on use of e/m-services.
3)	Logistics (storage and transport) information linking agriculture service providers and markets	Creation of database of storage and transportation service providers with information management, tracking and payment capability
4)	Certified higher yielding seeds/ planting/ breeding materials verification and traceability	Database with web interface (barcoded) to verify the authenticity of seeds.
5)	Online compensation for affected crop and livestock	Database of livestock with capability of remote verification and online compensation
6)	Information on enabling environment and agri-business opportunities	Information on investment opportunities for entrepreneurs and international investors, buyers and suppliers.
7)	Electronic banking and payment	Creation of banking facilities for all using electronic / mobile banking.
8)	Credit rating and loan availability	Create a credit management system that makes credits available using simplified procedure and online verification. A credit rating mechanism can also be developed.
9)	Policy guidelines and support to agriculture insurance providing companies	Guidelines to enable micro-insurance, field database, disaster and compensation.
10)	Smart water management	Deployment of sensors, GIS maps to manage information around water and manage their smart utilization. Knowledge sharing, access to weather data online, geo-

		referenced (map) water source identification (ground water, river, etc.) and sub-surface moisture sensors.
11)	*Mobile Payment/Banking/Credit Generation*	*This facilitate access to credit acquisition, insurance, and other related services via mobile phone*
12)	*e-SOKO*	*This is a market price information system with collect relevant timely market price information which supports market actors and inform decision makers at different levels.*
13)	*Commodity Exchange*	*Reduces market barriers to trading as well as generating transparent regional economy that can help financing to trader and farmers. It also provides auction facilities for agricultural and non -agricultural commodities.*
14)	*Silo warehouse management system*	*An application that assist, manage, monitor and control the products stored in the silos. It also manages both humidity and heat control of the products stored in silos*
15)	*Farmer Management Support System*	*This facilitates land registration, links farmers to the credit, insurance and agro-input acquisition as well as Agricultural Land Information System*
16)	*Agro-processing management system*	*Integrated system that automates agro product processing processes (for crop and meat processing management system)*
17)	*Agriculture Growth Management System*	*Growth management of agricultural products using computer technologies and sensor network technology*
18)	*Credit models that allow banks to vet farmers for loans and develop appropriate products*	*An integration of databases of data from population distribution, predominant crop types and soil types, to previous weather patterns and estimates of supply.*
19)	*Universal mobile broadband connectivity, deployment of low-cost mobile phones, tablets*	*G, 4G connectivity with tablets and broadband services.*
20)	*Commodity outlook modelling*	*Forecasting future demand and supply of specific commodity.*
21)	*Nutrition sensitive agriculture content*	*Information on linkage between food nutrition and health and promoting indigenous nutrition diets*
22)	*Plant genetic resource database*	*Information on plant genetic resources at the Plant genetic resource centre*
23)	*Database for seed and planting*	*Planning seed and planting material*

	material	*production public and private both to meet the farmers/country need, monitoring the progress of the production programs, forecasting the seed and planting material production, making awareness and access to the information on available seed and planting materiel stocks.*
24)	*Weighbridge management system (NAEB - PHHS)*	*A weighing and computing system with extensive data extraction, collection and processing functions.*

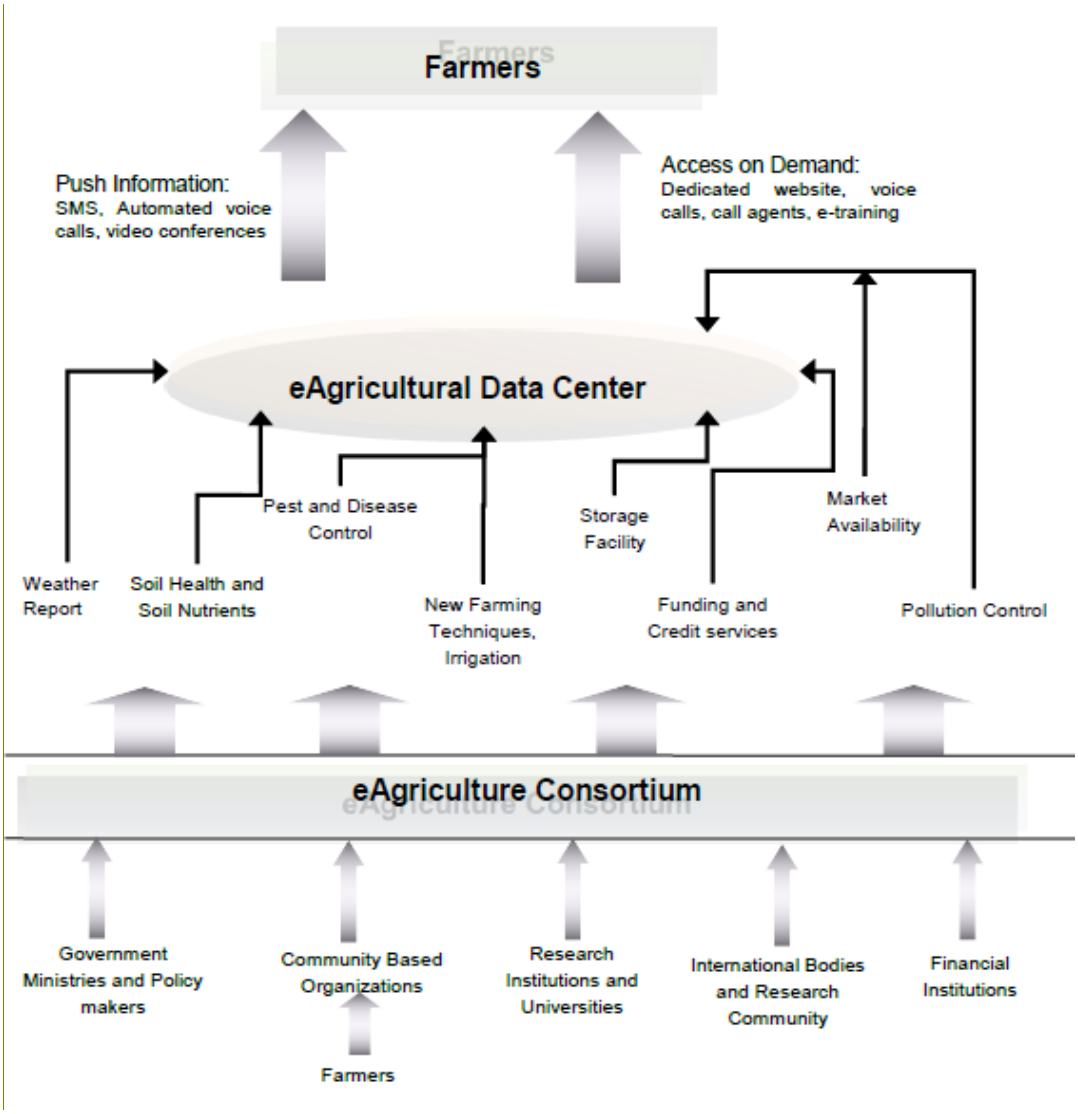
16.3 E-Agriculture Framework

The FAO-ITU framework was considered in addition to others. In the beginning and as the applications and solutions are identified based on the priorities (as in the NDP) the specific issues to be reflected will be the farmers, a consortium or association of the e-agriculture stakeholders, the e-agriculture data centre.

Within the consortium will include the concerned ministries and policy makers, community-based organisations, research institutions (NARI) and universities, international bodies and research community and financial institutions.

The data centre will be catering for weather reports, soil health and soil nutrients, pest and disease control, new farming technics, irrigation, storage facility, funding and credit services, market availability and pollution control.

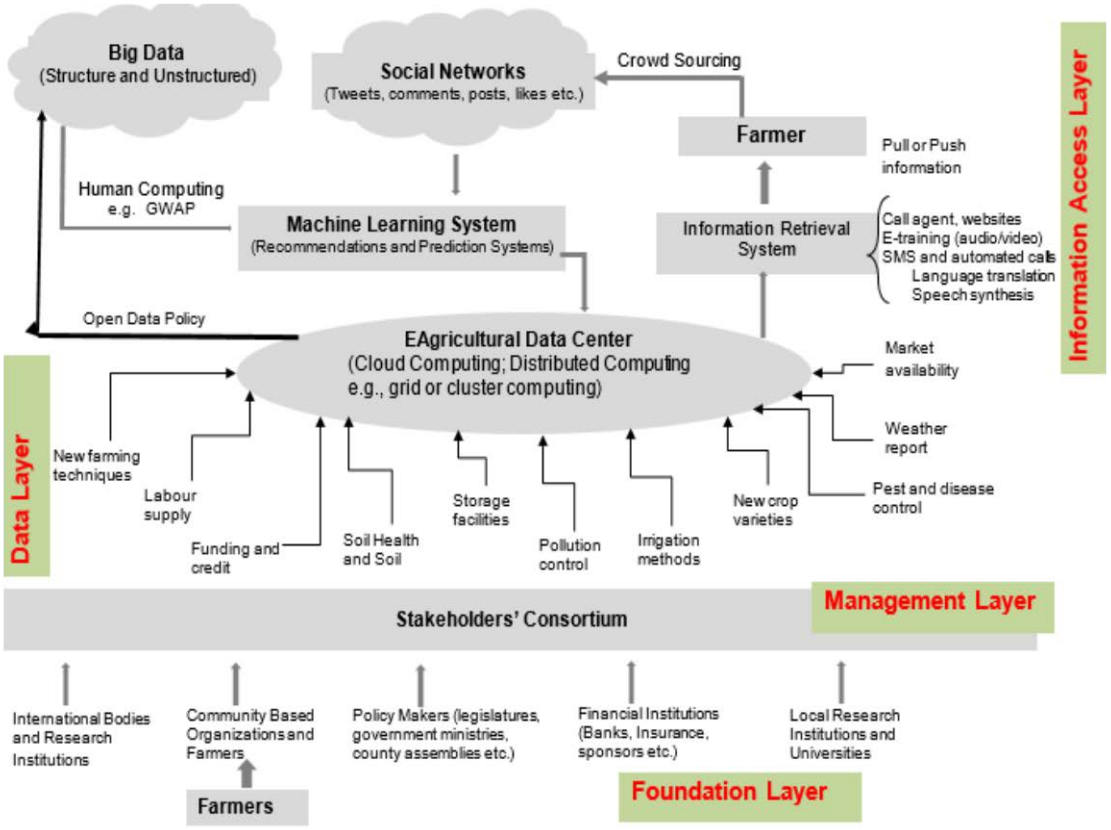
The farmers would need to have access on demand to the data center through dedicated websites, voice calls, call agents, e-training etc. The push information for the farmers would be the SMS, automated voice calls, video conferences etc. All this is depicted in the framework below.



By the time a greater number of the applications are adopted and secured, the framework would significantly change in response to the the numerous changing needs of the many stakeholders for e-agriculture. The building blocks of the advance framework will include:

a) *Agricultural stakeholder consortium;*
b) *Data centre;*
c) *Big data and internet;*
d) *Social networks;*
e) *Machine learning algorithms and information retrieval modules;*

As the framework could be seen below, the above are grouped into four layers, that is, the foundation layer, management layer, data layer and the access layer.



The foundation layer contains all the stakeholders who participate in agriculture, that is, the farmers, government, research institutions, international organizations and financial institutions. This layer identifies stakeholders and their related interests and contribution and each stakeholder is expected to perform its role and together achieve desired high productivity in agriculture.

The management layer is to coordinate and integrate the roles of each stakeholder towards increasing its contribution to agricultural development and modernisation by enhancing cooperation among the stakeholders such that they complement each other.

The data layer is to develop and maintain a data center that collects, process and stores all the data from the stakeholders. The desire is to meet the information needs of farmers that have been shown to meet specific criterion such being timely, accurate, relevant and consumable. The functionalities in this data centre become numerous and advance with the addition of labour supply, funding and credit, irrigation methods, new crop varieties etc.

The information access layer is used by the farmers to meet their information needs as the farmers become empowered to retrieve information from the data center that host information from all stakeholders therein giving farmers a single information access point.

This is intended to serve as a guide since many other countries with advanced e-agriculture have in fact been using this particular framework.

16.4 The e-Agriculture Steering Committee & Experts and Advisory Group

This Annex contains the membership criteria for the e-Agriculture Steering Committee and the Committee and the Experts and Advisory Group as in the strategy for agriculture development and modernisation through gthe use of ICTs.

The e-Agriculture Steering Committee shall comprise the following:

NO	FUNCTION	MINISTRY
1)	Minister of Agriculture	Ministry of Agriculture - Chairman
2)	Permanent Secretary	Ministry of Agriculture
3)	Permanent Secretary	Ministry of Information and communication Infrastructure
4)	Permanent Secretary	Ministry of Finance and Economic Affairs
5)	Permanent Secretary	Ministry of Trade, Industry, Regional Integration and Employment
6)	Permanent Secretary	Ministry of Forestry, Environment, Climate Change and Natural Resources
7)	Permanent Secretary	Ministry of Fisheries, Water Resources and National Assembly Matters
8)	Permanent Secretary	Ministry of Lands and Regional Government
9)	Permanent Secretary	Personnel Management Office

The Experts and Advisory Group shall comprise the following membership:

NO	Members
1)	Director of agricultural services
2)	Director of livestock
3)	Head of the ICT Agency
4)	Director for ICTs at MOICI
5)	Head of the NGO Affairs Agency
6)	Head of Department of Forestry
7)	Director of Lands
8)	Head of Department of Water Resources
9)	Head Gambia Chamber of Commerce
10)	Head of Gambia Bureau of Statistics
11)	Gambia Investment Export Promotion Agency
12)	Head of National Disaster Management Agency
13)	Head of National Environment Agency
14)	Head of National Food and Nutritional Security
15)	Head of Agric Department of the University of The Gambia

The e-Agriculture Steering Committee can amend the membership of the Experts and Advisory Group as and when considered necessary.

The e-Agriculture Steering Committee or its chairman can nominate and or appoint an expert with a specific speciality or group of special experts to work for the Experts and Advisory Group for a fix period and on an identified subject.

16.5 Planned Actions and Implementation Tables

16.5.1 Climate-smart Agriculture to Increase Productivity and Resilience		
No	*Parameter*	*Remark/Comment*
1	*Planned Action Type*	*Policy / Regulation*
2	*Background to Planned action*	*Climate change can disrupt food availability, reduce access to food, and affect food quality. As the country's population increase our agricultural production will have to increase to satisfy the expected demands for food and feed. Agriculture must therefore transform itself if it is to feed a growing population and provide the basis for economic growth and poverty reduction. Climate change will make this task more difficult under a business-as-usual scenario, due to adverse impacts on agriculture, requiring spiralling adaptation and related costs.. Countries adopt measures for using ICTs to develop and modernise agriculture.*
3	*Description of Planned Action*	*This is to use ICTs to scale-up climate-smart agriculture and increase productivity and resilience.*
4	*Planned Action Implementation Rationale*	*To have improved technologies and approaches for a sustainable agriculture and farm management with the right enabling frameworks.*
5	*Planned Action Specific Goals/Objective*	
	i. Promoting the deployment and exploitation of ICTs to support and enhance production, processing, marketing and distribution of agriculture products and services; {framework] *ii. The identification and adoption of e-solutions for improving water management and increasing irrigated area in order to achieve the targeted outcomes; {framework]*	
	iii. Ensuring the availability and accuracy of agricultural information and innovation system by creating, updating, analysing and linking critical databases by taking advantage of digital technologies; o *Develop technical guidelines and appropriate institutional framework for interoperability, privacy and security of connected databases and network infrastructure; {Guidelines]* o *Develop guidelines for data sharing amongst stakeholders particularly government, LGAs, private sector and academia; {Guidelines]* o *Creating and updating of various government and private databases for e- agriculture services; [Management Report]* o *Ensuring the linkage and integration of databases as well as the integration of databases with application platform to unleash the growth of government and third-party services; [Ecosystem]* o *Align the e-agriculture services with the e-Government services; [Framework]*	

	iv. Creating accessible, affordable and secure ICT platforms, networks and devices that enhance quality inputs with enhanced sensing, hosting, analytical, identification, tracking and communicating features; o *Establish an agriculture information system including Geographical Information Systems (GIS) to provide support for the planning, production, storage, monitoring sustainable environment usage in areas like land and water management, offshore resource exploitation, yield assessment and livestock management as well as the distribution of related products (horticultural crops, livestock, fisheries etc.); [Ecosystem]* o *Ensure universal access to affordable broadband and low-cost smartphones as per the broadband policy and strategy; [Framework]* o *Putting in place a secure digital application platform for e-agriculture for delivery of services and sharing of information with government and non-government entities; [Framework]* o *Adopting smart sensing technologies and integration of required databases in order to make accurate information available in real time or near real time for the sector; [Framework]* o *Enhance the sensing capabilities of agriculture and associated services using modern technologies (e.g. satellite, drones, Internet of Things (IOTs)) and systematically integrate into database; [Framework]* o *Put in place a framework for the effective monitoring of agriculture sector using ICTs with capability to track and trace issues within the sector nationwide; [Framework]* o *To deploy effective and efficient analytics systems and capabilities to harness the big data generated in the agriculture sector; [Ecosystem]* o *Create and strengthen the call centres for agriculture services in terms of capabilities in scope and quality; [Management Planning]* o *Having improved certified seed and mineral and organic fertilizers for integrated soil fertility management; [Framework]* o *Integrated pest-management practices with improved technologies; [Framework]* o *Encouraging the professional seed cooperatives to apply the use of ICTs; [Framework]*
	v. Putting in place an expanded and improved water management systems facilitated by ICTs; o *having strong and well-organized water user associations to efficiently operate and maintain irrigation infrastructure through ICTs; [Ecosystem]* o *The adoption of simple, efficient, and labour-saving water management technologies (use of solar pumping systems and efficient irrigation*

	technologies that conserve water and save time); [Framework]	
	vi. Encouraging and ensuring risk management of all projects; o *Bridging the information gap and improving the efficiency of risk management tools and procedures using ICTs; [Framework]* o *Introduce new risk management services in the form of micro-insurance, government subsidy, etc.; [Framework]* o *Having a platform, preferably a mobile platform, for effective early warning systems and agricultural disaster alerts; [Management Planning]*	
6	*Planned Action Implementation Prerequisites*	• *ICT literacy on the part of farmers;* • *Develop climate change resilience;* • *Increase private investment in the agricultural sector;* • *Decrease dependence on food imports through increased productivity.* • *Expand exports with regional neighbours and European markets;* • *Adaption to changing climate and riverine water availability;* • *Improve professional farmers organizations/cooperatives capacities, better access to communal assets, markets and profitable agricultural value chains;*
7	*Planned Action Time Frame*	*Begin by Q3 of Year One 2021*
8	*Planned Action Deliverables*	*A clearly defined initiatives of the government for agriculture sector development and modernisation.*
9	*Time Bound Measurable Targets*	• *An agriculture sector that is developed and modernised with improved efficiency in its productivity;* • *Developed ICT applications for the sector;* • *Adequate funding for e-Agriculture;* • *Efficient governance framework;*
10	*Implementing Agency*	*MOICI, MOA*
11	*Planned Action Outputs*	*An enabling production climate supporting agriculture though the application of ICTs.*
12	*Anticipated Beneficiaries*	*All stakeholders*
13	*Resource Mobilisation and Costing*	*See Below*
14	*Planned Action Critical Success Factors*	• *An approved road map and framework with detail action plans;* • *Awareness;* • *Having the right ICT physical infrastructure;* • *Digital literacy of the farmers;* • *Access to the ICT tools;* • *Having the right blend of technologies;* • *A holistic and multi-stakeholder approach & partnership;* • *Adequate resources and funding;* • *Strengthened stakeholder Ministries;* • *The youth embracing agriculture through special incentives;*

		• *Open and big data for the farmers;* • *Farmers' access to ICT solutions;* • *Last mile connectivity on broadband;*
15	*Planned Action Implementation Risks*	*a) Availability of funding;* *b) Uncertainties regarding ability of institutions to execute* *c) Delays in completion of targeted programs;* *d) A change in Government policy or regulation;* *e) Economic uncertainty;*
16	*Planned Action Monitoring and Evaluation Indicators*	*See in Annex 15.1*
17	*Planned Action Implementation monitoring and Evaluation Responsibility*	*MOA, the e-Agriculture Steering Committee and Committee of the National Assembly*

16.5.2 Develop Key Agri-food Value Chains & PPPs		
No	*Parameter*	*Remark/Comment*
1	*Planned Action Type*	*Policy*
2	*Background to Planned action*	*In order to have a developed and modernised agriculture, there would be a need to have a vision of a productive, resilient, competitive and market-oriented agri-food sector. The first move in this area is to think through and plan for the existing agriculture food value chain.*
3	*Description of Planned Action*	*There would be review exercises in terms of the institutions and policy framework to be followed by the identification of partnership arrangements that can allow for the optimization of smallholders' and private sector investments along values chains to meet the identified goals.*
4	*Planned Action Implementation Rationale*	*To have an improved food and nutritional security, increased in income and job creation, reduction of poverty, and a holistic inclusive and sustained economic growth.*
5	*Planned Action Specific Goals/Objective*	
	i. The focus is to develop key agri-food value chains and public-private partnerships for more investment in agribusiness with increased access to markets and competitiveness through; [Framework] *ii. Ensuring the existence of a framework for the process of tracing, verifying, certifying, and monitoring in relation to food safety and quality, storage and preservation, wildlife tracking and biosafety, and eliminating agricultural food waste; [Framework]*	
	iii. Carry out awareness campaigns and improving the education and skills levels of farmers, extension workers, livestock herders and other sector end-users; [Wider in scope – D5M per annum]	

	o *Bridging the skills and knowledge gap by using e-learning and networking tools; [As above -iii]* o *Improving the confidence in use of extension and advisory services via ICTs (online knowledge resources); [As above - iii]* o *Facilitate education and better health in agriculture sector through ICT interventions; [As above - iii]*	
	iv. Outline measures to reduce the demand and supply gap, and enhance outreach and profitability of agriculture products and services; o *Create and use ICT tools (applications and solutions) for analysing and linking nationwide demand and supply of agricultural produce; [Framework]* o *Develop a platform to serve as an e-agriculture marketplace for sharing information on supply and demand, product promotion with advices on international trading norms and practices; [Management Planning]* o *Promote e-services that can enhance the efficiency of logistics linked with workforce, transportation, storage, farm machinery etc.; [Wider in scope – D1.5M]* o *Promote greenhouse technologies especially for the horticulture; [Ecosystem]*	
	v. Having more resources for agriculture and more efficiency in their allocation; Adopting 10% of the GDP as budget for the agriculture sector [Policy declaration]	
	vi. Putting in place applications to connect and link smallholders and the private sector to upstream and downstream services and markets in order to meet consumers' quality and price expectations; [Framework]	
	vii. To put in place e-market platforms based on mobile phone applications and using text or voice recordings for informing value chain actors about market prices, linking producers to buyers and other market actors, and fostering more efficient market transactions. [Ecosystem]	
6	*Planned Action* *Implementation Prerequisites*	• *Clear commitment to vision* • *Proper management and implementation framework* • *Increase private investment in the agricultural sector;* • *Decrease dependence on food imports through increased productivity.* • *Expand exports with regional neighbours and European markets;* • *Adaption to changing climate and riverine water availability;* • *Improve professional farmers organizations/cooperatives capacities, better access to communal assets, markets and*

		profitable agricultural value chains;
7	*Planned Action Time Frame*	*Begin by Q4 of Year One 2021*
8	*Planned Action Deliverables*	*A rewarding partnership arrangement r impacting on Agric-food value chain.*
9	*Time Bound Measurable Targets*	• *Identified and reinforced Agric—food value chain;* • *A private sector that is in e-agriculture development and modernisation* • *Developed and modernised agriculture sector;* • *Adequate funding allocated for the agriculture sector;* • *Effective and efficient Governance framework;*
10	*Implementing Agency*	*MOA and MOICI*
11	*Planned Action Outputs*	*Certainty in the Agric food -value chain in The Gambia especially in the relation between the key stakeholders of the sector.*
12	*Anticipated Beneficiaries*	*All stakeholders*
13	*Resource Mobilisation and Costing*	*See Below*
14	*Planned Action Critical Success Factors*	• *An approved road map and framework with detail action plans;* • *Awareness;* • *Having the right ICT physical infrastructure for the value chain;* • *Digital literacy of the farmers;* • *Having the right blend of applications;* • *A holistic and multi-stakeholder approach & partnership;* • *Adequate resources and funding;* • *Strengthened stakeholder Ministries;* • *Open and big data for the farmers;* • *Farmers' access to ICT solutions;* • *Last mile connectivity on broadband;*
15	*Planned Action Implementation Risks*	• *Availability of funding;* • *Uncertainties regarding ability of institutions to execute* • *Delays in completion of targeted programs;* • *A change in Government policy or regulation;* • *Economic uncertainty;*
16	*Planned Action Monitoring and Evaluation Indicators*	*See in Annex 15.1*
17	*Planned Action Implementation monitoring and Evaluation Responsibility*	*MOA, the e-Agriculture Steering Committee and Committee of the National Assembly*

16.5.3 Supporting Key Structural Policy Reforms		
No	*Parameter*	*Remark/Comment*
1	*Planned Action Type*	*Policy*
2	*Background to Planned action*	*Food insecurity and population growth have become serious development challenges. Food insecurity, therefore, results from low productivity and uneven distribution. The Gambia must prepare for a calorific production in order to cater for population growth. This would require series of structural policy reforms.*
3	*Description of Planned Action*	*Under this the support is to have key structural policy reforms to enable agriculture development and modernisation.*
4	*Planned Action Implementation Rationale*	*An increased in production through the use of ICTs in agriculture will improve economic efficiency and environmental performance.*
5	*Planned Action Specific Goals/Objective*	
	i. Establishing an e-Agriculture Steering Committee as in an Annex… to this strategy. [Wider in scope for Committee & Group 4-year budget/allowance – D6M] o *Ensuring inclusiveness and broader representation of all critical stakeholders; [As above - i]* o *Raising awareness and addressing the identified including access and use of ICTs; [As above - i]* o *Ensuring proper coordination and planning to eliminate duplication and the waste of resources; [As above - i]* o *The establishment of an Experts and Advisory Group as in an* **Annex…** *to this strategy [As above - i]*	
	ii. Enhance innovation in e-agriculture services through incentives; o *Establish a dedicated centre for agriculture e-services to focus on;* o *ICT applications development with agriculture given top priority; [policy matter]* o *develop a framework for service delivery by private sector using digital platform; [Framework]* o *providing hosting for private sector application and services and serve as a one stop shop for e-agriculture services; [Management Planning]* o *Managing queries from farmers through mobile and web applications; [As above – ii-0]* o *Serving as a knowledge portal, that is, an online repository of agricultural content that could be accessed through mobile applications; [As above – ii-0]*	

	o *Facilitating e-agricultural training of small and marginal farmers on important aspects of the different farming methods and types via short instructional videos and mobile applications; [As above – ii-0]* o *Having a consumer protection system for confidence building for agriculture e-services; [Framework]* o *An incentive framework for universities and academia to strengthen research and capability to develop applications and services; [Framework]*	
	iii. Identifying policy measures for improving the financing, investing and banking outreach to agriculture sector by leveraging on new technologies; [Review] o *Facilitate the availability of credit and loan through electronic and mobile credit verification systems; [As above - iii]* o *Measures to strengthen mobile payment and special agriculture banking systems for uptake by agriculture sector stakeholders; [As above - iii]*	
	iv. Carry out a review of the existing policies, legislations, regulations and guidelines critical for e-agriculture and ensure their effective implementation; o *Putting in place an e-agriculture steering committee to be part of the implementation of this strategy and spearhead the review works; [policy declaration]* o *input subsidy policy reform for better targeting, transparency and efficiency, and for a functioning input market led by the private sector; [Review]* o *groundnut pricing reform with the removal of groundnut price setting and of the export tax to allow more competitiveness; [Review]* o *policy reform to secure farmers' land property rights while fostering private investments; [Review]* o *Identify gaps within the existing policies or practices and addressing them with clear guidelines; [Guidelines]* o *Putting in place a coordination framework with key stakeholders from agriculture, banking, telecom, IT, governance, insurance, donor agencies etc. to enhance synergy and ensure strategic alignment with other sectoral developments; [Framework]*	
6	*Planned Action Implementation Prerequisites*	• *Clear commitment to vision* • *Fitting ICT Communication infrastructure;* • *Comprehensive review of the existing policies, if any;* • *Develop climate change resilience;* • *Increase private investment in the agricultural sector;*

		• *Adaption to changing climate and riverine water availability;* • *Establishing the baseline of the knowledge and skills in modern farming techniques and optimum methods of management in The Gambia;*
7	*Planned Action Time Frame*	*Begin by Q2 of Year One 2021*
8	*Planned Action Deliverables*	*Approved and adopted revised policies for the agriculture sector that enhance and promote e-ADM strategy implementation.*
9	*Time Bound Measurable Targets*	*A comprehensive and approved national policy framework that promotes the development and modernisation of agriculture and one that is responsive the changing needs of the sector in the face of the technological advancements.*
10	*Implementing Agency*	*MOA and MOICI*
11	*Planned Action Outputs*	• *Certitude and commitment by all stakeholders in executing development activities within the agriculture sector.* • *Increased in agricultural productivity*
12	*Anticipated Beneficiaries*	*All stakeholders*
13	*Resource Mobilisation and Costing*	*See Below*
14	*Planned Action Critical Success Factors*	*a. An approved road map and framework with detail action plans;* *b. Awareness;* *c. Having the right ICT physical infrastructure;* *d. A holistic and multi-stakeholder approach & partnership;* *e. Adequate resources and funding;* *f. Strengthened stakeholder Ministries;*
15	*Planned Action Implementation Risks*	• *Shift in Government priority* • *Availability of funding;* • *Delays in completion of targeted programs;* • *A change in Government policy or regulation;* • *Economic uncertainty;*
16	*Planned Action Monitoring and Evaluation Indicators*	*See in Annex 15.1*
17	*Planned Action Implementation monitoring and Evaluation Responsibility*	*MOA, MOICI and e-Agriculture Steering Committee*

16.5.4 Strengthen the Capacity of Institutions within the Agri-food Sector		
No	*Parameter*	*Remark/Comment*
1	*Planned Action Type*	*Policy*
2	*Background to Planned action*	*The Gambia remains critically fragile due, among other things, to its limited capacity of the public administration and institutions. There are needs to enhance the capacity of the stakeholders to efficiently deliver essential rural services such as extension advice and land registration and management.*
3	*Description of Planned Action*	*The strengthening of the capacity of institutions responsible for the agri-food sector by.*
4	*Planned Action Implementation Rationale*	*A sector with stakeholders that have the right managerial skills to provide better services and to improve the management capacity and inclusiveness of all stakeholders including professional farmers' organizations/cooperatives, and enhance farmers' access to communal assets, markets, and profitable agricultural value chains.*
5	*Planned Action Specific Goals/Objective*	
	i. Improving the research capability, quality and credibility of NARI using ICTs; o *Providing NARI's with modern laboratories by upgrading core research facilities and equipment; [Wider in scope – D5M networks, networking, etc.]* o *Building the capacity of researchers; [Wider in scope – 4-year D20M]* o *Enhanced research funds for funding priority research programs; [Policy Declaration* o *NARI to also partner with the Regional Centers of Excellence that have been established in West Africa and others (the research centers of the Consultative Group on International Agricultural Research, the International Institute of Tropical Agriculture, Africa Rice Center, International Livestock Research Institute, International Rice Research Institute, and International Crops Research Institute for the Semi-Arid Tropics) to take advantage of regional research capacities; [Wider in scope – D1.5M visits, MoUs, etc.]*	
	ii. Improving the links between agricultural research, extension, and producers with the adoption of an e-extension platform to provide agricultural advice to large numbers of farmers and promote large-scale adoption of improved technologies and best practices. [Framework] *iii. Expanding the digitization of agricultural research and extension systems; [Policy declaration]* *iv. Having a coherent ICT human capital development program and capacity building (on-the-job and academic training with short-term technical assistance on ICTs to address immediate capacity constraints; [Framework]*	

	v. *Improving the logistics systems and facilities of those institutions for more efficient working conditions with ICT applications/solutions; [Review]* vi. *Putting in place a farmer management support and information system with different databases that will be used for services ranging from the registration of agricultural lands and farmers, crop cultivation, seed distribution, fertilizer utilization etc.: [Ecosystem]* vii. *Putting in place results management framework with a platform to ensure compliance and achievement of the targets; [Framework]*	
6	*Planned Action Implementation Prerequisites*	• *Clear commitment to vision* • *Proper management and implementation framework;* • *Stakeholder engagement plan;*
7	*Planned Action Time Frame*	*Begin by Q4 of Year One 2021*
8	*Planned Action Deliverables*	*A clear and adopted human capital framework that facilitates the creation of qualified and efficient workforce for agriculture development and modernisation.*
9	*Time Bound Measurable Targets*	• *The realisation of all objective indicators;* • *Identified the ICT capacity and capabilities as resources for use in agriculture;* • *Approved and Adopted ICT applications for e-agriculture;* • *A policy and regulation in place for the adopted applications;*
10	*Implementing Agency*	*MOA and MOICI*
11	*Planned Action Outputs*	*Organised agriculture stakeholders with improved skills to maintain productive infrastructure and equipment, resulting in higher yields, better quality products, and diminished post-harvest losses.*
12	*Anticipated Beneficiaries*	*All stakeholders*
13	*Resource Mobilisation and Costing*	*See Below*
14	*Planned Action Critical Success Factors*	• *An approved road map and framework with detail action plans;* • *Awareness;* • *Having the right ICT physical infrastructure;* • *Digital literacy of the farmers and their access to the ICT tools;* • *Having the right blend of farming solutions on which farmers are trained;* • *Adequate resources and funding;* • *Strengthened stakeholder Ministries;*
15	*Planned Action Implementation Risks*	• *Availability of funding;* • *Uncertainties regarding ability of institutions to execute* • *Delays in completion of targeted programs;* • *A change in Government policy or regulation;* • *Economic uncertainty;*
16	*Planned Action Monitoring and Evaluation Indicators*	*See in Annex 15.1*

17	*Planned Action Implementation monitoring and Evaluation Responsibility*	*The e-Agriculture Steering Committee and the Committee of the National Assembly*