



**Standing Committee
for Economic and Commercial Cooperation
of the Organization of Islamic Cooperation (COMCEC)**

Improving Agricultural Market Performance: Developing Agricultural Market Information Systems



**COMCEC COORDINATION OFFICE
February 2018**



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For further information please contact:

COMCEC Coordination Office

Necatibey Caddesi No: 110/A

06100 Yüce-tepe

Ankara/TURKEY

Phone: 90 312 294 57 10

Fax: 90 312 294 57 77

Web: www.comcec.org

*E-book: <http://ebook.comcec.org>

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TABLE OF CONTENTS

LIST OF FIGURES.....	iv
LIST OF BOXES.....	v
LIST OF TABLES	v
ABBREVIATIONS.....	vi
EXECUTIVE SUMMARY	1
1. INTRODUCTION.....	7
1.1 BACKGROUND OF STUDY ON MIS	7
1.2 RESEARCH OBJECTIVES.....	8
1.3 RESEARCH METHODOLOGY	9
1.4 STRUCTURE OF THE REST OF THE REPORT	12
2. CONCEPTUAL FRAMEWORK FOR REVIEW OF MIS.....	13
2.1 INTRODUCTION.....	13
2.2 DEFINITION AND EARLY EXAMPLES OF MIS.....	13
2.2.1 DEFINITION OF MIS.....	13
2.2.2 EARLY EXAMPLES OF MIS	14
2.3 LIBERALISATION IN DEVELOPING COUNTRIES	14
2.3.1 LIBERALISATION AND AGRICULTURAL MARKETING SYSTEMS IN DEVELOPING COUNTRIES.....	15
2.3.2 LIBERALISATION AND SUPPLY OF AGRICULTURAL FINANCE IN DEVELOPING COUNTRIES.....	17
2.4 OBJECTIVES OF MIS.....	18
2.5 GENERIC MIS PROCESS	19
2.5.1 DATA COLLECTION.....	19
2.5.2 DATA PROCESSING AND ANALYSIS.....	21
2.5.3 INFORMATION PACKAGING AND DISSEMINATION	21
2.5.4 MANAGING FEEDBACK AND OTHER ISSUES	22
2.6 MIS TYPOLOGIES.....	23
2.6.1 MIS TYPOLOGIES BASED ON HOST/SERVICE PROVIDERS	23
2.6.2 FIRST GENERATION MIS IN DEVELOPING COUNTRIES	24
2.6.3 SECOND GENERATION MIS IN DEVELOPING COUNTRIES	26
2.7 BEYOND 2GMIS: FURTHER EVOLUTION OF MIS IN DEVELOPING COUNTRIES.....	28
2.8 CONCLUSION: EVIDENCE ON EVOLUTION OF MIS IN DEVELOPING COUNTRIES.....	29
3. OVERVIEW OF MIS IN NON-OIC COUNTRIES	30
3.1 INTRODUCTION.....	30
3.2 ZAMIS: TYPICAL EXAMPLE OF FIRST GENERATION MIS (1GMIS) MODEL	30

3.3 PUBLIC 2GMIS MODELS: EXAMPLES FROM ETHIOPIA.....	32
3.3.1 ETHIOPIA'S MIS FOR STAPLE CEREALS.....	33
3.3.2 ETHIOPIA'S EXCHANGE-LINKED MIS FOR EXPORT CROPS.....	34
3.4 QUASI-PUBLIC INTERNATIONAL/REGIONAL MIS MODELS.....	36
3.4.1 INTERNATIONAL QUASI-PUBLIC 2GMIS MODEL: AMIS.....	36
3.4.2 INTERNATIONAL QUASI-PUBLIC 2GMIS MODEL: RESIMAO.....	39
3.5 2GMIS MODELS RUN BY PROFESSIONAL ORGANISATIONS/NGOS.....	41
3.5.1 2GMIS MODEL RUN BY FARMERS' ORGANISATION.....	41
3.6 PRIVATE 2GMIS MODELS.....	44
3.6.1 INDEPENDENT PRIVATE 2GMIS MODELS	44
3.6.2 2GMIS MODELS LINKED TO COMMODITY EXCHANGES.....	45
3.7 LESSONS FROM MIS MODELS IN NON-OIC COUNTRIES	48
4. OVERVIEW OF MIS IN THE OIC MEMBER COUNTRIES	49
4.1 INTRODUCTION.....	49
4.2 OVERVIEW OF MIS IN ARAB GROUP MEMBER COUNTRIES OF OIC	50
4.2.1 NATIONAL 2GMIS IN MOROCCO: ASAAR.....	50
4.2.2 OTHER NATIONAL MIS IN ARAB GROUP.....	52
4.2.3 MED-AMIN: AN EXAMPLE OF A REGIONAL MIS IN ARAB GROUP	52
4.3 MIS IN ASIAN GROUP OIC MEMBER COUNTRIES	55
4.3.1 MALAYSIA'S MIS FOR VEGETABLES	55
4.3.2 MALAYSIA'S BURSA-LINKED MIS FOR OIL PALM PRODUCTS.....	56
4.3.3 EXCHANGE-LINKED MIS IN TURKEY.....	58
4.3.4 INNOVATIONS IN 2GMIS IN TURKEY	59
4.4 MIS IN AFRICAN GROUP OF OIC MEMBER COUNTRIES	60
4.4.1 BURKINA FASO: LEVERAGING SUB-REGIONAL 2GMIS FOR BENEFIT OF FARMERS.....	61
4.4.2 REGIONAL-LEVEL INNOVATIONS IN 2GMIS IN WEST AFRICA: MANOBI	62
4.5 RESULTS OF ONLINE SURVEY ON MIS	64
4.6 CONCLUSIONS ON REVIEW OF MIS IN THE OIC COUNTRIES AND ONLINE SURVEY REPORT	67
5. EGYPT CASE STUDY	69
5.1 INTRODUCTION AND BACKGROUND.....	69
5.2 MAPPING EXISTING MIS IN EGYPT	72
5.3 PRIVATE MIS INITIATIVES IN EGYPT	74
5.4 ASSESSMENT OF EXISTING MIS IN EGYPT	75

6. INDONESIA CASE STUDY.....	78
6.1 INTRODUCTION AND BACKGROUND.....	78
6.2 MAPPING EXISTING MIS IN INDONESIA.....	79
6.2.1 GOVERNMENT-RUN MIS IN INDONESIA.....	79
6.2.2 PRIVATE MIS: EVOLUTION BEYOND 2GMIS INTO E-COMMERCE IN INDONESIA	87
6.3 PROMOTING WRS AND TRADING OF COMMODITY FUTURES IN INDONESIA.....	88
6.4 ASSESSMENT OF EXISTING MIS IN INDONESIA	88
7. UGANDA CASE STUDY.....	90
7.1 INTRODUCTION AND BACKGROUND.....	90
7.1.1 LIBERALISATION: NEW OPPORTUNITIES BUT ALSO CHALLENGES IN AGRICULTURAL MARKETS.....	90
7.1.2 MIS PERCEIVED AS IMPORTANT IN IMPROVING AGRICULTURAL MARKETING IN UGANDA	92
7.1.3 HISTORY OF MIS IN UGANDA.....	92
7.2 MAPPING EXISTING MIS IN UGANDA: NATIONAL SYSTEMS.....	94
7.2.1 FARMGAIN: NATIONAL PRIVATE PROVIDER.....	94
7.2.2 AGRINET: NATIONAL PRIVATE PROVIDER.....	96
7.2.3 INFOTRADE: NATIONAL PRIVATE PROVIDER.....	97
7.2.4 UCDA MIS FOR COFFEE: NATIONAL GOVERNMENT PROVIDER.....	99
7.3 MAPPING EXISTING MIS IN UGANDA: REGIONAL/INTERNATIONAL SYSTEMS.....	99
7.3.1 RATIN: A REGIONAL MIS ACCESSIBLE IN UGANDA	99
7.3.2 FEWSNET: AN INTERNATIONAL INFORMATION SYSTEM USED IN UGANDA.....	100
7.4 FURTHER EVOLUTION OF 2GMIS IN UGANDA.....	103
7.5 ASSESSMENT OF EXISTING MIS IN UGANDA	104
8. CONCLUSIONS AND POLICY RECOMMENDATIONS.....	108
8.1 MAPPING OF MIS: GLOBAL CASES AND IN OIC MEMBER COUNTRIES.....	109
8.2 EVIDENCE AND LESSONS FROM CASES FROM OIC MEMBER COUNTRIES.....	110
8.3 RECOMMENDATIONS TO IMPROVE MIS IN OIC MEMBER COUNTRIES.....	112
8.4 RECOMMENDATIONS ON MIS MONITORING INDICATORS	113
REFERENCES	115
APPENDIX 1: LIST OF STAKEHOLDERS CONSULTED DURING COUNTRY VISITS.....	123
APPENDIX 2: ONLINE SURVEY QUESTIONNAIRE	126
APPENDIX 3: PROFILE OF ONLINE SURVEY RESPONDENTS	129

LIST OF FIGURES

Figure 1: Framework for Analysis of Agricultural MIS in Selected Countries	10
Figure 2: MIS Generic Process	19
Figure 3: Iterative Price Data Collection Process for MIS.....	20
Figure 4: Report on Staple Cereals Wholesale Prices in Selected Markets in Ethiopia.....	34
Figure 5: Coffee Price Trends Reported by ECX.....	35
Figure 6: AMIS Member Countries	36
Figure 7: GEOGLAM Crop Monitor for Early Warning (December 2017)	37
Figure 8: AMIS Market Monitor Report on Maize, February 2018	38
Figure 9: AMIS Market Report on Grains and Oilseeds Index by Year (2017/2018)	39
Figure 10: Food Security Overview in Democratic Republic of Congo (June-December 2017)	40
Figure 11: Notice Board for Grain Price Information at Kibaigwa Market in Tanzania	43
Figure 12: ESOKO Partner Rural Farm Inputs Distributor in Ghana	44
Figure 13: JSE Electronic Notice Displaying Commodity Prices	46
Figure 14: Supply Estimates for Cereals in South Africa by Crop and by Province.....	47
Figure 15: Daily Prices for Horticultural Produce in Different Markets in Morocco.....	51
Figure 16: Description of MED-AMIN Crop Monitoring System	53
Figure 17: Wheat Production Outlook for some MED-AMIN Countries (2017)	53
Figure 18: MED-AMIN's Report on Global Wheat Outlook (2017)	54
Figure 19: FAMA, Malaysia MIS	56
Figure 20: Crude Palm Oil Futures (FCPO) Prices Reported on Bursa Malaysia	57
Figure 21: Wheat Prices from Commodity Exchanges in Turkey – Reported by TOBB	58
Figure 22: Denizbank Mobile Platform for Farmers.....	60
Figure 23: MANOBI Market Information Collection and Dissemination Process.....	62
Figure 24: MANOBI's Target Stakeholders.....	63
Figure 25: Type of Market Information Required by Respondents.....	65
Figure 26: Satisfaction with Provision of Market Information	66
Figure 27: Challenges Facing MIS Providers	67
Figure 28: Map of Agricultural Land in Egypt	69
Figure 29: Source of Market and Price Information for Horticulture by Governate	71
Figure 30: Examples of Information Provided by Bashaier	74
Figure 31: Diagram of Data Flow in Pusdatin.....	80
Figure 32: Access to Daily Report on Agricultural Commodity Prices in Indonesia	81
Figure 33: Examples of Sinartani Agricultural Newspaper in Indonesia	81
Figure 34: Food Price Statistics by Ministry of Trade, Republic of Indonesia	83
Figure 35: Information on Price and Stocks of Staple Food Commodities on BULOG Website.....	84
Figure 36: Front Page of WFP's Food Security Monitoring Bulletin in Indonesia	85
Figure 37: Retail Price Trends for Selected Products during Ramadan in Indonesia	86
Figure 38: Map of Uganda and Border Countries.....	91
Figure 39: Locations of Agrinet Field Coordination Offices in Uganda	96
Figure 40: Cover Page of WFP Uganda Monthly Market Monitor (August 2017)	102
Figure 41: MIS/Payment System for Newly-Established Uganda National Commodity Exchange..	104

LIST OF BOXES

Box 1: Typology of First Generation MIS in Developing Countries	24
Box 2: Zambia Agricultural Market Information System (Zamis).....	30
Box 3: Lessons from 2GMIS in Tanzania and Zambia	42
Box 4: ICT and Precision Farming	45
Box 5: Challenges Facing MED-AMIN.....	54
Box 6: Aquaculture Price Information in Egypt.....	72
Box 7: Example of WFP's Key Messages from Food Affordability Report.....	86
Box 8: FOODNET in Uganda	92
Box 9: FARMGRAIN Crop Bulletin (Maize and Coffee) Published on 30 th September 2017	96
Box 10: Provision of Agricultural Price Information via Mobile Phone by Infotrade, Uganda	97
Box 11: Highlights of UCDA Monthly Report for August 2017.....	99
Box 12: FEWSNET Reports: Maize Supply and Weather Update in East Africa in Sept 2017	101

LIST OF TABLES

Table 1: Typologies of Second Generation (2GMIS) Models	27
Table 2: Coffee Prices Reported in Daily Market Bulletin by ECX.....	35
Table 3: Top Five Food Crops and Growth Cereal Consumption in Selected West African Countries	40
Table 4: MIS in the OIC Member Countries Rated by Agricultural Statistics Capacity	49
Table 5: List of Member Countries of MED-AMIN	52
Table 6: Output of Selected Major Egyptian Agricultural Crops (Tonnes).....	70
Table 7: An Overview of MIS in Egypt – Some Examples Identified During the Case Study	76
Table 8: Indonesian/World Agricultural Production, Selected Commodities	78
Table 9: Uganda Agricultural Products in 2013.....	90
Table 10: Existing MIS in Uganda (2016)	95
Table 11: Infotrade Average Wholesale Prices For Agricultural Produce In Uganda	98
Table 12: RATIN Maize Prices in Eastern African Cities (KES/90kg) on 18 th December 2017	100

ABBREVIATIONS

ASAAR	Système d'Information Des Prix Agricoles au Maroc
ACE, Malawi	Agricultural Commodity Exchange
ALCOTEXA	Alexandria Cotton Export Association, Egypt
AMIS (Europe)	Agricultural Market Information System
APIs	Application Programming Interfaces
APPs	Applications (on smartphones)
ASEAN	Association of Southeast Asian Nations
ATUP, Egypt	Agricultural Transfer and Utilisation Project
BMKG	Indonesian Agency for Meteorology, Climatology and Geophysics
BNPB	National Disaster Management Authority, Indonesia
BPS	Badan Pusat Statistik (or National Office of Statistics), Indonesia
BULOG	Bureau of Logistics (Badan Urusan Logistik), Indonesia
CADIS	Centre for Agricultural Data and Information Systems, Indonesia
CIF	Cost, insurance and freight
CIHEAM	International Centre for Advanced Mediterranean Agronomic Studies
COMCEC	Committee for Economic and Commercial Cooperation of the Organisation for Islamic Cooperation
CSPP, Egypt	Cotton Sector Promotion Programme
CPF	Confédération Paysanne du Faso
CTA	Technical Centre for Agricultural and Rural Cooperation
DRC	Democratic Republic of Congo
DRMFSS	Disaster Risk Management and Food Security Sector, Ethiopia
EBRD	European Bank for Reconstruction and Development
ECX	Ethiopia Agricultural Exchange
ECOWAS	Economic Community of West African States
EFSSRA	Ethiopian Food Security Reserve Agency
EGTE	Ethiopia Grain Trade Enterprise
ESOKO	MIS provider in West and Central Africa
GPS	Global Positioning Systems
FAO	Food and Agriculture Organisation of the United Nations
FAOSTATS	FAO Statistics

FAMA	Federal Agricultural Marketing Authority, Indonesia
FARMAF	Farm Risk Management for Africa
FCPO	Crude Palm Oil Futures
FELDA	Federal Land Development Authority, Indonesia
FOB	Free on board
GAIN	Global Agricultural Information Network
GDP	Gross Domestic Product
GFARD, Egypt	General Authority for Fish Resource Development
KEF	Knowledge Economy Foundation
HEIA	Horticulture Export Improvement Association
ICT	Information and communications technology
IVR	Interactive voice response
JSE	Johannesburg Stock Exchange
KES	Kenya Shilling
LAPAN	National Institute of Aeronautics and Space, Indonesia
MACE	Malawi Agricultural Commodity Exchange
MALR	Ministry of Agriculture and Land Reclamation, Egypt
MANOBI	Name of MIS service provider in West Africa
MED-AMIN	Mediterranean Agriculture Market Information Network
MIP, Egypt	Market Information Project
MIS	Market Information System
1GMIS	First Generation Market Information System
2GMIS	Second Generation Market Information System
MAMIS	MVIWATA Agricultural Market Information System
MoA, Indonesia	Ministry of Agriculture, Indonesia
MoD, Turkey	Ministry of Development, Turkey
MoT, Indonesia	Ministry of Trade, Indonesia
MPESA	M for mobile and PESA (Swahili for money)
NAADS, Uganda	National Agricultural Advisory Service
NAMBOARD, Zambia	National Agricultural Marketing Board
OdR	Rice Observatory
OIC	Organisation for Islamic Cooperation
OMA, Mali	Agricultural Markets Observatory

PORLA	Palm Oil Registration and Licensing Authority
RATIN	Regional Agricultural Trade Intelligence Network
RESIMAO	Réseau des Systèmes d'Information des Marchés en Afrique de l'Ouest
RML India	Reuters Market Light, India
SAFEX	South Africa Futures Exchange
SAGIS	South Africa Grain Information Service
SSA	Sub-Saharan Africa
SHFs	Smallholder farmers
SIF	Système d'Information des Filières
SIMA, Mozambique	Information System for Agricultural Markets
SIEL, Madagascar	Vegetable Market Information Service
SMS	Short message service
TOBB	Türkiye Odalar ve Borsalar Birliği
UGX	Uganda Shilling
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
USSD	Unstructured supplementary service data
WAMIS-NET	Network of Market Information Systems in West Africa
WFP	World Food Programme
WRS	Warehouse Receipt System
WTO	World Trade Organisation
ZAMIS	Zambia Agricultural Market Information System
ZNFU	Zambia National Farmers Union

EXECUTIVE SUMMARY

Scope and Justification of Study

This study was commissioned to assess the extent to which MIS in member countries of OIC have achieved set objectives such as facilitating trade decisions by players in agricultural value chains; improving market transparency; enhancing the bargaining power of, especially, farmers; and providing policymakers and researchers with valuable material. The study aimed to provide an overview and mapping of current MIS in OIC member countries; identify and elaborate options for policy recommendations to improve agricultural market performance through the use of MIS; and to recommend suitable indicators to allow policymakers to monitor MIS and its use in decision-making support for agricultural and trade policies. The methodology adopted included a review of the literature on MIS; an online survey targeting users and providers of MIS services across the globe; and three cases studies involving field visits to Egypt, Indonesia and Uganda.

Based on the basic definitions by CTA (2012) and others such as Staatz et al., (2014), agricultural Market Information Systems (MIS) is defined in the study as systems which have been set up for gathering (or collecting), processing (including analysing) and disseminating market-related information to various actors in agricultural value chains. The primary expectation is that the information provided to value chain actors such as farmers (producing various crops and livestock), traders and processors will inform their investment, marketing and other enterprise-related decisions. It is different from marketing information which, as defined by (Shepherd 1997), provides details on potential market channels and information which enables sellers and buyers to access them including payments systems, packaging and quality requirements. It is also not the same as Market Information Service, which can be described as the service of providing market information, with emphasis on the delivery of information to target stakeholders (CTA 2015).

The main justification for the study is the fact that agriculture is of strategic importance in the economies of most members of the Organisation for Islamic Cooperation (OIC). According to a recent report, total agricultural output by OIC member countries in 2015 represented 21% of the world's agricultural production and the sector employed 23% of the global agricultural labour force (COMCEC, 2017). The contribution of agriculture to GDP varies across the major regional groups. The Asian Group lead the rest of the OIC member countries in terms of agricultural output. In 2015 total agricultural output from the Asian Group was valued at 363 US Dollars and represented over 50% of total production by the member countries. The share of agriculture in the GDP of Pakistan was about 24%, whilst that of Nigeria was 20.6% and contribution to GDP in Turkey and Mali were 7.6% and 8.5% respectively.

Conclusions from Evidence Generated

Evidence from the mapping of MIS in developing countries shows that the systems in both non-OIC and OIC member countries have followed a similar trajectory of advancing from the mainly government-run First Generation MIS (1GMIS) to the more ICT-intensive Second Generation (2GMIS). This evolution was driven partly to reduce the cost of service delivery, especially in the dissemination of information; improve the timeliness of delivery; and also enhance the accuracy of reported data by minimising human intervention in data entry and processing. Advances in

ICT contributed to the evolution, in particular, it made it possible to transition from the publication of price information through national radio, television and newspapers to the more cost-effective vehicles of websites, emails and mobile telephony. ICT also made it possible to undertake and report on trend analysis and present in more user-friendly formats than the long price lists which were reported under the 1GMIS.

Though the improvements in MIS have been beneficial, especially for governments in terms of policy actions and plans to manage food security, the anticipated benefits to private sector stakeholders, especially farmers and traders, appears to be less tangible. This is attributable, in part, the focus of most MIS continues to be on collecting and disseminating price information, with little or no investment in trend analysis. Other identified gaps in the information provided include lack of output forecasts and stock monitoring data which are critical in assessing the supply situation and projecting future prices. This information is particularly important when market actors have to decide on delaying the sale of commodities or where lenders are evaluating the request to finance inventories which are to be sold or used at a future date.

The online survey was undertaken as part of the study also revealed that the advance from 1GMIS to 2GMIS models has broadened the range of crops and livestock covered; diversified service providers to include not only governments as was the case with 1GMIS, but also provision by private sector players and NGOs. However, adopting ICT has not addressed some of the challenges which have stymied uptake of information services by market players (especially farmers and traders). Improving the content of the information provided is one of the areas which emerged as critical from the online survey. This should include aligning price information to opportunities for producers and traders to sell into formal market segments where trade is set around standardised weights and quality. It is apparent that respondents are not strongly advocating regulatory framework for MIS but rather that policy actions foster the development of formal structured trading systems.

Differences exist in the MIS landscape in the three countries studied. MIS in Egypt is dominated by government-based providers partly because of government control of markets for strategic commodities such as wheat, where it dominates domestic procurement and imports and therefore determines. This has affected other subsectors such as tomato, where opportunities exist for producers to adopt production and marketing strategies which ease entry into the large and lucrative European Union market. There is no evidence from Egypt to suggest that the existing MIS are linked to initiatives to promote the development of market institutions such as WRS and commodity exchanges or even to sustainable agricultural credit delivery system. It was noted that, as was concluded by Christiansen et al. (2011) over six years ago, smallholder farmers in Egypt continue to be held back by limited access to reliable market information.

Indonesia has a predominantly government-run system, which is regulated by specific legislation and a regulatory framework with clearly defined roles for various providers: the Ministry of Agriculture focuses on collecting and disseminating wholesale prices for agricultural produce; the remit of the Ministry of Trade on retail prices; and the Badan Pusat Statistik (BPS or National Office of Statistics) has statutory authority to regulate information collection and dissemination, including assuring quality of information disseminated. Government funds MIS operations, in part through utilising part of the staff time of personnel at relevant district, provincial and national levels. The information collected is shared with major players such as WFP, which monitors the food supply situation principally for food security reasons. Despite being well-structured and generating information which is valuable to policymakers, evidence

obtained from this study shows that farmers and other market actors are not accessing the MIS and using the information provided as a basis for their marketing strategies and investment decisions. They use the mobile phones to access information from their peers and other actors.

Uganda has advanced from being one of the pioneers of 1GMIS in the 1990s (with FOODNET) to a landscape populated by a wide range 2GMIS platforms provided by the government and private organisations as well as by NGOs. The diversity of existing MIS platforms is further shown by the fact that whilst some were limited to national coverage, especially the private ones, others covered regional and international market information. However, most of the stakeholders consulted reported not being aware of and/or not accessing existing MIS. The stakeholders include farmers, traders (both small-scale rural traders and large-scale ones), warehouse operators and bankers. Even among policymakers, several did not consult the existing MIS. The only exceptions are policymakers working on food security and agricultural extension issues such as NAADS, and development practitioners whose remit includes interventions to mitigate food crisis (e.g. officials of WFP and USAID).

Among the factors identified as limiting uptake of existing MIS by key market actors in the case study countries is an apparent disconnect between the information stakeholders perceive as crucial to their trade and investment decisions and what is offered on the MIS platforms. Trend analysis is often missing and the price information provided tends to be de-linked from quality standards which are enforced in the formal segments of the markets. Reliable output forecasts and data on available stocks within the country are often not reported. Also missing, as is the case in Uganda, is information on prices and availability of quality inputs. The price data reported also does not reflect actual transactions with auditable trail but rather information obtained by phoning or interviewing traders. Farmers and traders in both Indonesia and Uganda find it quicker and more reliable to phone their peers and other traders directly rather than consult MIS.

Developing market institutions such as agricultural commodity exchanges and WRS, which foster structured trading based on standardised weights, measures and quality can generate transparent prices which can increase uptake of MIS. At the same time, such systems can enhance agricultural marketing and finance, thereby creating incentives for increased investment in raising farm productivity and output. However, cases of success in developing such systems especially in Africa, are rare largely because of lack of robust systems which guarantee delivery of quality products as well as the settlement of trade obligations by buyers. Policy actions which are supportive of the development of such market institutions and which avoid restrictions on trade within and between countries can also contribute to more effective MIS which also drive improvements in agricultural markets. These are discussed further in the next subsection.

Recommendations

Based on the foregoing we propose the following recommendations:

- a. **Designing MIS should specifically take into account the needs of target stakeholders:** In designing MIS the focus should be on improving the content of the information provided. The basic aim should be to align information provided to the identified needs of target stakeholders, especially farmers, traders, financial intermediaries and other private actors in the agricultural value chains. Hence, an assessment of the needs of the target stakeholders as well as audience satisfaction reviews should be regularly undertaken by providers. This is missing in all the cases reviewed but is crucial going forward.
- b. **MIS should go beyond price information to include trend analysis and forecasting:** Based on evidence found on the expectations of market players, it is clear that the content of MIS should go beyond price information and include reporting trend analysis which can signal supply and demand conditions and allow market players to take positions regarding immediate and future price levels. To achieve this, there needs to be an investment in building output forecasting capacity, which is becoming increasingly more feasible with advances in ICT. It will also require promoting stock monitoring systems which can be built, for example, around well-regulated WRS.
- c. **Linking MIS to other market-supporting institutions and/or other risk-management tools to increase their mutual benefits:** Indeed linking the development of MIS to that of other market-supporting institutions such as WRS and agricultural commodity exchanges can lead to mutual benefits. On one hand, such institutional innovations will ensure that price discovery is more transparent and therefore worth accessing. On the other hand, effective and reliable MIS is an important prerequisite in successfully developing these market institutions.
- d. **Government support ranging from cross-subsidisation to direct external support can sustain MIS:** Sustainability of MIS remains a challenge as we found no single case in the reviews where an existing platform has achieved financial sustainability. Internal cross-subsidisation by private and government providers, arising from linkages to core functions appear to reduce the scale of dependence on external agencies such as donors. It appears, however, that if uptake is enhanced and benefits in terms of improvements in agricultural production, marketing and finance are more tangible then external support may be more justifiably advocated on the grounds of the 'public good' characteristics of market information.
- e. **Formal or informal institutional setting can improve coordination among the key stakeholders:** Though the specific case of Indonesia indicates potential benefits from instituting a formal legislative or regulatory framework to underpin MIS, there does not appear to be strong demand for replicating this in other countries. Despite that, the Indonesia case offers important lessons in terms of governance of MIS, which other countries can learn from, especially where there is a proliferation of platforms with many of them being dependent to some degree on external funding support. Key among the governance systems we recommend is setting up specific working groups with representation from government, providers, key stakeholders and donors. The working

groups should coordinate and rationalise the information collection and dissemination process in order to optimise efficiency. Furthermore, the quality of information provided and its relevance to target users should be regularly reviewed.

- f. **Aligning agricultural trade, market development and food security policies and implementation can optimise the benefits from MIS:** Pursuit of food security objectives aimed at moderating short-term food price shocks tends to lead to marginalisation of long-term agricultural market development goals. Efforts are then concentrated in promoting MIS and allied public institutions which facilitate governments' respond to food supply and price shocks. The downside is marginalisation of actions to develop MIS which meets the needs of market actors including producers, traders and financiers. Furthermore, complementary market institutions are underdeveloped, the exception often being in value chains for strategic agricultural exports. The consequence is inefficient domestic markets for agricultural produce which lead to dampening of producer incentives and therefore cannot catalyse sustained output growth in agriculture. This leads to dependence on imports even if favourable agro-climatic conditions exist as is the case in many of the African and Asian Groups of OIC member countries. Vulnerability to food supply and price shocks is deepened, further reinforcing the cycle of short-term market interventions which stifle domestic market development. A major policy shift, which ensures that food security objectives and long-term market development goals are properly aligned will allow MIS to become more effective in driving sector performance and reducing national vulnerability to food insecurity. This option is highly recommended to governments and other stakeholders.

Further to the above and to enhance monitoring and evaluation of MIS by policymakers, we recommend the following:

- (i) **User satisfaction with the information provided should be regularly assessed.** User surveys represent one means in carrying out this assessment. It can be done at relatively low-cost if users who access information via mobile phones are tracked (this methodology was used in the case reported in Box 3). However, for most market players the surveys conducted should not only rely on a quantitative methodology using a structured questionnaire but also a more qualitative approach using semi-structured questions. The experience from this study, especially the low but not unusually low response rate informs this recommendation.
- (ii) **The quality, relevance and timeliness of information provided should be particularly assessed.** This may involve triangulating information provided by the MIS platforms with available data and information from other sources. In particular, assessing the relevance of the information need to be underpinned by baseline surveys on the needs of the target stakeholders, allowing reviews to be properly benchmarked.
- (iii) **Cost-efficiency of service provision along with the effectiveness of governance systems for MIS should be assessed:** Cost-efficiency is critical, especially where external funding is needed to sustain the MIS operation. A review of the information/data collection, analysis and dissemination process can reveal opportunities where, for instance, collaboration rather than duplication, can reduce the overall cost to the economy of running MIS. In addition, the governance systems of the

MIS platforms need to be assessed, in particular, to ensure effective coordination which can reduce costly duplication.

- (iv) **Impact of MIS on overall development of agricultural markets needs to be assessed:** Though this assessment poses major attribution challenges it is important and has been advocated by many of the online survey respondents. Collaboration with academic institutions (local and international) can contribute to a more cost-effective monitoring and evaluation process. For this purpose, maintaining an easy-to-access archive of data will offer a means to attract researchers who are studying various sector-related issues and can shed some light on the contribution of MIS to its development.

1. INTRODUCTION

This study has been commissioned by the Standing Committee for Economic and Commercial Cooperation of the Organisation for Islamic Cooperation (COMCEC) as part of evidence generation for implementation of a four-part strategy which focuses on “increasing the productivity of the agricultural sector and sustaining food security in the COMCEC Region”. The study is intended to be the second contribution to fourth Output Area of the COMCEC strategy, which is “Improving agricultural market performance: creation and development of market institutions”. The rest of this introductory chapter consists of an overview of the background and objectives of the study; the conceptual framework methodology adopted for the research; and an outline of the structure of the rest of the report.

1.1 BACKGROUND OF STUDY ON MIS

Agriculture is of strategic importance in the economies of most members of the Organisation for Islamic Cooperation (OIC). According to a recent official COMCEC Report, total agricultural output by OIC member countries in 2015 represented 21% of the world’s agricultural production and the sector employed 23% of the global agricultural labour force (COMCEC, 2017). The contribution of agriculture to GDP varies across the major regional groups. The Asian Group lead the rest of the OIC member countries in terms of agricultural output. In 2015 total agricultural output from the Asian Group was valued at 363 US Dollars and represented over 50% of total production by the member countries. The share of agriculture in the GDP of Pakistan was about 24%, whilst that of Nigeria was 20.6% and contribution to GDP in Turkey and Mali were 7.6% and 8.5% respectively.

Though agriculture has been overtaken by the services sector in terms of contribution to GDP in most OIC member countries, it remains of strategic importance in efforts to promote economic growth and poverty reduction as noted in a number of studies. For instance, Hazell (2006) cites econometric studies which generally find high poverty reduction elasticities for agricultural productivity growth. Thirtle et al. (2005) also estimate that a one percent increase in crop productivity reduces the number of poor people by 0.72 percent in Africa and 0.48 percent in Asia. Despite this, the sector has been out-performed by other sectors in most OIC member countries. As noted in the COMCEC Outlook 2017, growth rate in the sector in the past two decades averaged 3.51% compared with 4.25% overall growth in the OIC economies, an indication that the other sectors contributed more to growth.

Furthermore, most OIC members recorded trade deficits in agriculture and the total deficit amounted to about 63.3 billion US Dollars in 2016. This does not only put a strain on foreign exchange resources of the affected countries but also makes them highly vulnerable to global food price shocks. Increasing domestic agricultural output and productivity is, therefore, critical in assuring greater social and economic stability. It is within this context that agriculture was prioritized as one of the most important areas of cooperation by COMCEC at its Economic Summit held in November 2009 in İstanbul.

The 1980s saw a shift in economic development paradigm in most developing countries, including OIC member countries. The shift involved liberalisation of agricultural and other sectors of the economies of developing countries, with policies which emphasised the primacy of markets and prices in resource allocation being at the core (Akiyama et al. 2001). As a result,

governments had to rely less on direct interventions and more on institutional levers to create an enabling environment to catalyse growth and development.

Following liberalisation, market-supporting institutions became critical in ensuring that agricultural markets function efficiently and are transparent. Some government-run market institutions were reformed and/or retained including the following: state-owned economic enterprises in the agricultural sector, commodity marketing boards and commodity market regulatory authorities (COMCEC, 2017). The role of cooperatives in the marketing of agricultural inputs and outputs was also affected by liberalisation, which also involved the development of new market institutions such as market information systems (MIS), warehouse receipt systems (WRS) and agricultural commodity exchanges (Coulter and Onumah 2002; and COMCEC, 2017). Advocates of MIS argued that it will ensure that all parties have access to correct information on market conditions and are, therefore, able to transact on an informed basis (Shepherd 1997).

More than three decades on, a reasonably rich literature on MIS exists, which demonstrates that some stakeholders, including smallholder farmers (SHFs), have benefited from the dissemination of *ex-post* price data. For instance, evidence discussed in this report shows that relatively new forms of trading can emerge or scaled up in agricultural output markets as a result of the dissemination of market information and, especially where it includes reliable forecasts of supply and demand of agricultural commodities. Such systems have also enabled government and donors to better anticipate and implement actions to mitigate national food crisis as exemplified by the case in Ethiopia. The recent proliferation of ICT solutions has also opened up opportunities for new ways to manage MIS, including increased involvement by the private-sector.

However, it is also evident that major challenges exist, which negatively impact on the utility of agricultural MIS to many stakeholders. The issues include the divergence between the type of information provided and what farmers and other stakeholders actually want. The capacity of farmers, for example, to interpret data provided is often limited and the quality, as well as timeliness of data dissemination, are cited among factors limiting uptake of the information provided. Furthermore, sustainability remains a major challenge for most MIS and effective governance of the systems is often overlooked in its design and application. These observations are consistent with conclusions from similar studies, for example, by Galtier et al. (2014).

1.2 RESEARCH OBJECTIVES

The main objectives of the study are:

- i. To provide an overview and mapping of current MIS in OIC member countries;
- ii. To help identify and elaborate options for policy recommendations to improve agricultural market performance through the use of MIS; and
- iii. Provide suitable indicators to allow policymakers to monitor MIS and its use in decision-making support for agricultural and trade policies.

1.3 RESEARCH METHODOLOGY

As demonstrated in discussions in Part 1 of this report, agricultural MIS in developing countries has been evolving. For instance, advances in information and communications technology (ICT) contributed to the leap from what is described as First Generation MIS (1GMIS) to Second Generation MIS (2GMIS). The expectation has been that the introduction of ICT will improve the quality and timeliness of information provided, thereby triggering increased uptake by users. Furthermore, it emerges from the discussions that, in many countries, a range of multiple providers became engaged in providing information targeting a similar audience, mainly smallholder farmers and traders.

The basic hypothesis in this study is that though technology and type of provider are important, they are not sufficient in ensuring that an existing MIS can meet the fundamental expectations of the target audience as well as contribute significantly to required improvements in agricultural marketing systems in developing countries. Based on this hypothesis, the study seeks not only to map out existing MIS in OIC and non-OIC countries but also to identify success factors on the basis of which we can outline policy recommendations related to existing MIS as well as broader linkages with the development of efficient and transparent agricultural markets in the OIC member countries. The framework for analysis applied in the study is depicted in Figure 1. It includes reviewing the existing sources of market information and the characteristics of the information provided. These are subsequently assessed against the backdrop of the type of information that key stakeholders require.

Figure 1: Framework for Analysis of Agricultural MIS in Selected Countries

Information systems available in country	
Characteristics of available information sources	Characteristics of information provided
Institution hosting <ul style="list-style-type: none"> Government statistical agencies Meteorological agencies and services Animal / plant / human health organizations Research and academic databases Farmers or households surveys (e.g. LSMS) from international organization research or other Private services and platforms collecting and offering information Farmers or professional organizations 	Type of information <ul style="list-style-type: none"> Agro-meteo Satellite images Markets and price Production level and yields Breeding and pastoralism Animal health Policy
Sustainability of source <ul style="list-style-type: none"> Source of funding Business models Commitments Future developments 	Level of aggregation <ul style="list-style-type: none"> Regional Country Market Region District Household Individual
Dissemination methods <ul style="list-style-type: none"> Channels utilised Frequency of dissemination (Additional) info provided 	Category of information <ul style="list-style-type: none"> Quantitative Qualitative
Cost of access <ul style="list-style-type: none"> Free Paid 	Level of observation <ul style="list-style-type: none"> Primary Secondary Tertiary
	Reliability of information <ul style="list-style-type: none"> Collection/acquisition methods Frequency updated Timeliness
	Level of processing and analysis <ul style="list-style-type: none"> Aggregation Contextualisation Modelling

The review includes an inventory of existing MIS in non-OIC countries and in the OIC member states and the main methodological cluster of activities included the following:

- Desk-based literature review.
- Key expert surveys – based on a questionnaire which was developed by the NRI team. Analysis of the outcome of the survey included statistical analysis of the data generated as well as a qualitative analysis of some of the responses provided, especially in response to open-ended questions.

- Case studies involving mapping of national and regional systems; as well as an assessment of the performance of the existing MIS against the expectations of various stakeholders, including producers, traders, warehouse operators, banks, donor/development agencies, governments and other actors. Evidence from the selected case countries is to be collected through field visits to the countries. The country visits lasted between 5 to 7 days. The selection of case study countries was intended to optimise the likelihood of gaining knowledge of best practices, including prior information on a history of MIS in the target countries. The selection was also done in a way as to ensure representativeness of the regional groupings of OIC member countries, in particular ensuring that there are cases from the following countries: Arab, Asia and Sub-Saharan Africa. The selected case countries are below:
 - **Egypt:** Egypt has a public sector-based MIS and others which emerged from donor initiatives in developing such systems in the country. There is particular interest in exploring how the system enables policymakers to manage the country's reliance on wheat imports. Egypt is also part of a global MIS run by the FAO and is a member of the Mediterranean Agricultural Markets Information Network (MED-AMIN). The MED-AMIN was set up to promote co-operation and experience sharing between national agricultural information systems of the CIHEAM member states (i.e. the International Centre for Advanced Mediterranean Agronomic Studies). CIHEAM is an inter-governmental organisation which has been in existence since the early 1960s to promote sustainable agriculture, fisheries and food security.
 - **Indonesia:** Indonesia was considered one of the early leaders in best practices in MIS as noted by Giovannucci (2001). The country has MIS for various commodities, most notable for horticultural produce.
 - **Uganda:** The country has a long history of MIS for a range of crops, including especially maize, which is an important staple crop in Eastern and Southern Africa. It also has MIS operated by the private sector, often with funding by donor agencies and sometimes linked to public sector players. Market players can also access a range of regional MIS covering not only price information but also weather information and regional trade flows in agricultural commodities.

1.4 STRUCTURE OF THE REST OF THE REPORT

The rest of this report is divided into four parts, set out as follows:

- Part I consists of Chapter 2, which outlines the conceptual framework for the study including the definition of MIS used; a brief history of the genesis of MIS, especially in developing countries; the purpose and generic processes in MIS (from collection to dissemination of information); and the methodology adopted. It also includes, in Chapter 3, mapping of some best-practice cases of MIS in the world, highlighting the evolution of these systems from 1GMIS to 2GMIS.
- In Part II a similar mapping of MIS in OIC member countries is reported in Chapter 4, which also includes reporting on the online survey which was undertaken as part of the study.
- Part III focuses on reports on the three case study countries as follows: In Chapter 5 on Egypt, Chapter 6 on Indonesia and Chapter 7 covering Uganda.
- Part IV which consists of only Chapter 8 summarises the main conclusions from all aspects of the study including the literature review, online survey and the three case studies. Recommendations to improve MIS in OIC countries as well as enhance monitoring are also outlined in Chapter 6.

2. CONCEPTUAL FRAMEWORK FOR REVIEW OF MIS

2.1 INTRODUCTION

As noted in Chapter 1, the development of agricultural MIS gained prominence in most developing countries in the 1980-90s after liberalisation of the agricultural and other sectors of the economies. The aim, as stressed by advocates, was to ensure efficiency and transparency in the agricultural marketing systems. In this chapter, we begin to review what has occurred over the past three decades and whether MIS has achieved the set objectives, especially in OIC member countries. The discussions in the chapter include definition and early global examples. This is followed by a discussion of the factors which drove the development of MIS in developing countries, noting, in particular, the role of liberalisation in the agricultural sector, and how it shaped the objectives of MIS. The generic processes involved in the generation and dissemination of market information are also discussed in this chapter, which also covers a brief overview of the typologies of existing MIS.

2.2 DEFINITION AND EARLY EXAMPLES OF MIS

2.2.1 DEFINITION OF MIS

Agricultural marketing Based on the basic definitions by CTA (2012) and others such as Staatz et al., (2014), we describe agricultural Market Information Systems (MIS) as systems which have been set up for gathering (or collecting), processing (including analysing) and disseminating market-related information to various actors in agricultural value chains. The primary expectation is that the information provided to value chain actors such as farmers (producing various crops and livestock), traders and processors will inform their investment, marketing and other enterprise-related decisions. For instance, farmers are expected to use the information provided to guide decisions on: what to produce; how much of their surplus to sell, into which markets and when to sell. Traders and processors are also expected to use such information in formulating their procurement and marketing strategies. It is therefore apparent that, though most MIS focus on dissemination of price information, the market actors require much more than that. Evidence from a number of reviews, including a recent one by NRI (2017), indicates that market actors are broadly interested in data and information on the following: prices, quantities of available stocks of a commodity or produce (including forecasts on availability), quality (especially as it relates to prices prevailing in specific markets), market analytic reports¹ and, where possible, information which enables stakeholders to identify potential partners with whom they can trade or transact (CTA, 2015).

Agricultural MIS differs from **marketing information** which, as defined by (Shepherd 1997), provides details on potential market channels and information which enables sellers and buyers to access them including payments systems, packaging and quality requirements. That is a much broader concept but may not be directly linked to transaction-related decisions by market actors. MIS is also not the same as **Market Information Services**, which can be described as the service of providing market information, with emphasis on the delivery of information to target

¹Kzito (2011) defines market analytic reports as 'reports that analyse factors that cause changes in market conditions and their effects on stakeholders, including policy analysis.'

stakeholders (CTA 2015). Furthermore, MIS has to be distinguished from **agricultural statistics**, which includes production and price data. These statistics are often used by policymakers to inform actions taken by governments, for instance in informing the design as well as monitoring implementation of projects and programmes to promote growth in the sector. At the macroeconomic level, food price data provides an important means to monitor and control economy-wide inflation. This is because food prices represent a much higher share of the consumption basket in developing countries than in the more advanced (or wealthier) economies². Data from MIS may be included in national agricultural statistics but the distinction is nonetheless important.

2.2.2 EARLY EXAMPLES OF MIS

Whilst price information systems have been in existence for hundreds of years, dating back to Roman times and the Muslim Caliphate during the 9th Century (Islam et al., 2010). One of the first institutionalised MIS providers is the Office of Markets, which was set up in the United States (US) in 1913 (Nikolov et al., 2000). Its main function, however, involves analysis of issues relating to the structure and regulation of various financial and commodities markets in the US. Other MIS followed in the US during the 1920's, primarily to support price transparency and curtail market concentration in the agro-industry (Bowbrick, 1988). The **Public Ledger** in the United Kingdom is also one of the early forms of MIS, providing information which enabled trade counterparties to engage in some form of arbitrage. Many of these systems were replicated in Europe in the 1930's and later extended to Africa and other developing countries in the 80's (Zoltner and Steffen, 2013).

During the 1980-90s a wide variety of MISs were created in developing countries, largely at the behest of the public sector and which focussed mainly on products related to food security. These were driven in part due to the prevailing market liberalisation policies (post-Washington Consensus) and in particular the push for the liberalisation of agricultural markets (Zoltner and Steffen, 2013). As Marketing Boards were dissolved after the introduction of price liberalisation many saw their residual function as data collection and dissemination and so developed MIS. Therefore, many of the existing MIS are either hosted by Government agriculture statistics departments or by former Agriculture marketing boards, some of which have been privatised.

2.3 LIBERALISATION IN DEVELOPING COUNTRIES: PRIME DRIVER OF DEVELOPMENT OF MIS

In the 1970-80s many developing countries liberalised the agricultural sector as part of broader economic reforms. As noted by Rodrik (2006) and other authors, the reforms essentially aimed at reducing the role of the public sector in the economy in order to create space for market forces to drive the efficient allocation of resources and therefore catalyse sustained growth. The reforms in the agricultural sector greater flexibility in pricing of export commodities, partly because exchange rate controls were eased in order to minimise overvaluation of national currencies. Marketing of agricultural inputs and outputs was also transformed, resulting in increased role of the private sector, as further discussed below. Governments also scaled back from the supply of subsidised credit to farmers, with the expectation that microfinance

² For example, Fawley and Juvenal (2011) note that whilst food accounts for only 15% of the U.S. consumer price index (CPI) basket, the share in the CPI basket in the Philippines, which is classified as a lower-middle income country, is 50%.

institutions and other non-government suppliers will fill the financing gap. These measures created and/or accentuated risks faced by farmers and other players in agricultural value chains. As demonstrated in discussions below managing the risks which emerged or increased following liberalisation required better access to market information.

2.3.1 LIBERALISATION AND AGRICULTURAL MARKETING SYSTEMS IN DEVELOPING COUNTRIES

Akiyama et al (2001) note that agricultural inputs and outputs marketing systems in most developing countries changed following liberalisation of the sector. The reforms implied that the policy and institutional levers employed by governments in promoting the production and marketing of strategic food staples and export crops had to change. According to Varangis and Schreiber (2001) the reforms included abandoning or significantly scaling down the following policies:

- a. Pan-territorial and pan-seasonal pricing policies, which involved setting the same producer price for agricultural produce regardless of the cost of assembling from particular regions. This policy action had been instituted to mitigate price risks, especially in agricultural output markets.
- b. Restrictions on the role of the private sector in produce marketing, largely because of perceptions that private traders engage in speculation and tend to cheat SHFs.
- c. Dominant role of government in the distribution of subsidised inputs to producers and often on credit in order to minimise inputs access and affordability challenges.
- d. Promotion of cooperatives as the critical intermediaries in the marketing chain, with responsibility for distributing inputs, aggregating crops and trading with the marketing boards.

During the pre-reform era, the policies mentioned above were underpinned by public sector-oriented market institutions as commodity marketing boards, state-owned agricultural enterprises and commodity regulatory agencies (COMCEC, 2017). By the late 1970s, these policies and institutions had become an unsustainable fiscal burden, contributed to the real decline in producer prices as producers bore the cost of such programmes, and failed to produce any significant increase in per capita output in food and cash crops (Hubbard, 2003). As a result, many countries in Asia, South America and Sub-Saharan Africa (SSA) undertook major reforms in agricultural input and output markets.

Domestic marketing systems for export crops underwent considerable change in the 1980-90s, coinciding with a period during which international stocks and price management mechanisms were also dismantled (Shepherd and Onumah 2003). Similar reforms occurred in marketing systems for major food staples in developing countries with the role of government in the marketing of agricultural inputs and output being scaled back significantly as is its role in setting domestic producer prices for various commodities. Efforts were made to increase the role of the private sector in agricultural markets (Greenhalgh and Kleih, 2000). It was for this reason that governments in many developing countries restructured the public market institutions mentioned above and initiated new, more market-oriented institutions such as MIS, WRS, agricultural commodity exchanges and trade-friendly commodity standards (Coulter and

Onumah 2002; and COMCEC, 2017). The overall impact of the reforms on producers was rather mixed and include the following negative effects (summarised by Onumah et al., 2007):

- Producer margins were squeezed because of supply chains became elongated as a result of entry by large numbers of small-scale traders as assemblers. The cost of assembling produce in rural areas was also transferred from the parastatal marketing boards to producers.
- Produce quality became rather uncertain and variable due, in part, to weak enforcement of commodity standards by assemblers, who tended to trade in volumes rather than quality. The consequent loss of quality premiums often implied lower household income for producers.
- Access to markets became increasingly uncertain, especially because most of the small-scale assemblers lacked trade finance and were unable to absorb large volumes at the peak of the harvest. Farmers were therefore exposed to high levels of price variation, both within seasons and from year-to-year, when guaranteed minimum prices were abolished by governments.

This outcome is attributable in part to the fact that the neo-classical market model, which underpinned reforms, had a major theoretical lacuna. The model presumed that market actors generally trade on a voluntary and equal basis and are as well fully informed (Harris-White 1995). Poulton et al. (1997) clarify this further by stating that it is presumed that all economic actors (in this model) have complete information about all aspects of a transaction (or business), including all costs facing their competitors. North (1995) adds that it is possible to market actors to know in full the intentions of fellow actors and to anticipate the future with complete certainty.

It is, however, evident that this idealised market model does not exist in any developing country nor even in the most advanced free market economies. Indeed, transactors in most agricultural markets face uncertainties in commodity trading due to lack of reliable information about the volumes and/or quality of available commodities as well as the intentions of parties with whom they have to transact (Hubbard 2003). North (1995) and others, therefore, argue that fluid market transactions occur only when there are effective market-supporting institutions to reduce uncertainty as well as transaction costs. Similar conclusions are reached in the recent study on the role of institutions in improving market performance by COMCEC (2017). It is within this context that the role of MIS in fostering efficient agricultural marketing is perceived in this study. MIS is seen as a crucial institutional solution in addressing information asymmetry and other related problems which create uncertainty and raise the cost of transacting in agricultural value chains.

2.3.2 LIBERALISATION AND SUPPLY OF AGRICULTURAL FINANCE IN DEVELOPING COUNTRIES

Scaling down of governments' inputs credit programmes in most developing countries tended to compound the problem of limited access to finance by players in the agricultural sector. For instance, a study undertaken by NRI in 2014³, involving seven focal countries in Africa, showed a significant mismatch between the contribution of the sector to GDP and its share of the supply of finance to the private sector. In general, the share of total formal credit allocated to agriculture in Africa is under 5%, whereas the contribution of the sector to GDP ranges from about 15% to over 47% (NRI, 2014). As observed by Dalberg (2012), the situation in Africa mirrors what exists in developing countries in general – their study revealed that formal lenders “*have only scratched the surface of total SHF finance demand*” – because they supply less than 15% of the estimated global demand of over US\$ 200 billion. The main reasons cited in the NRI (op. cit.) study by the formal lenders for the limited supply of finance to smallholder farmers include the following:

- **Production risks:** which arise from a variety of factors, such as problems with input supplies (inadequate or late supply), weather risks (including droughts, floods etc), crop diseases and pests which can reduce the volume and quality of output farmers.
- **Postharvest management risks:** including poor postharvest management practices which compromise the quality of the product as well as storage in inefficient facilities and improper packaging which lead to losses and affect the volume and value of farmers' marketable surplus.
- **Marketing risk:** these relate to the inability of farmers (and also traders at different levels in the chain) to sell at the right time; in the right quantities/volumes; and at acceptable quality standard. Contracting may be a way of reducing this problem but is often hampered by weak enforcement of contracts as the risk of non-performance by farmers and other counterparties tends to be high.
- **Price risk:** arise from fluctuations in market prices during the marketing season, implying uncertainty of the price at future delivery dates when contracts are being negotiated. These risks are borne by producers/farmers, traders and buyers.

These risks tend not only to be high but are also covariant, implying that lenders can be exposed to very high levels of default if they have a high concentration of their loan portfolio in agriculture. To compound these problems, high levels of illiteracy among smallholder farmers, the informality of rural exchange transactions and a poor record-keeping culture in rural communities accentuate information asymmetry in the rural economy. As such not only is it difficult to maintain credible track records on borrowers' transactions (to aid screening), but contracting and its enforcement is weakened.

³ The study was undertaken on behalf of the Alliance for a Green Revolution in Africa (AGRA) and the Rockefeller Foundation in 2014.

2.4 OBJECTIVES OF MIS

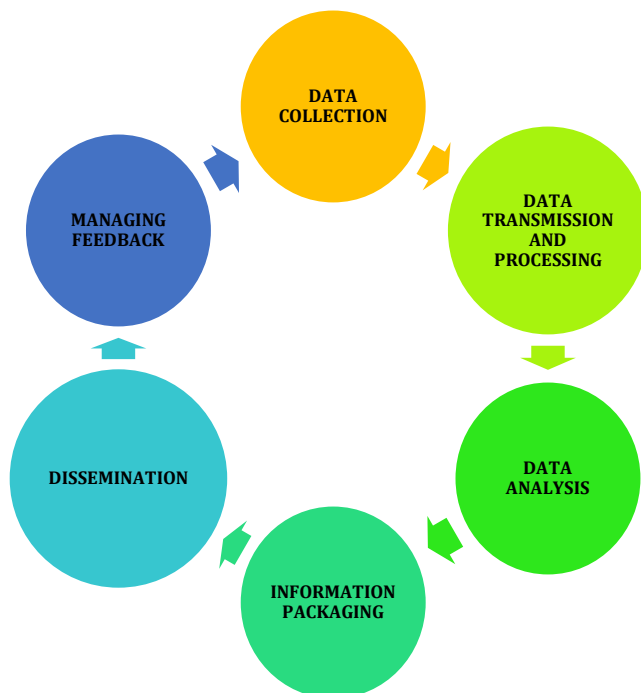
Based on the foregoing discussions, MIS is often perceived as an institutional mechanism which can fill information gaps and therefore ensure that parties which transact in agricultural markets do so on a well-informed basis. Arising from this, the consensus among several authors, including David-Benz et al. (2012), Galtier et al. (2014) and (Staatz et al., 2014), is that the primary objectives for which many developing countries set up MIS after liberalising agricultural markets include those identified below:

- a) To facilitate trade decisions for buying, selling and investing – this is relevant for farmers as well as traders, processors and financiers who have to take decisions regarding timing of transactions based on information on market trends.
- b) Improve market transparency – engendering trust in the information provided and encouraging use by actors because there is no perception about manipulation of the information by particularly interested parties.
- c) Minimise information asymmetry, thereby reducing uncertainties which stymie fluid transactions between market actors. This is important not only to trade counterparties (e.g. buyers and sellers who are negotiating a sale) but also to lenders who provide the liquidity (finance) needed to implement marketing and/or procurement strategies of these parties.
- d) Enhance the bargaining power of smallholder farmers in selling their marketable surplus, especially because they often have limited information about price levels and trends as well as the market fundamentals which affect them. Hence, smallholder farmers may be cheated when transacting with better-informed parties or the perception of being cheated may affect their involvement in trading.
- e) Provide policymakers with reliable evidence-basis to guide agriculture and trade policy decisions, especially with regards to food security.
- f) Assist in the conduct of agricultural research, especially in areas related to promotion of productivity-enhancement, food trade policies and food security.

2.5 GENERIC MIS PROCESS

Figure 2 outlines the main processes involved in generating and disseminating agricultural market information. The process involves collection and transmission of data; analysis of the data; packaging of the information generated; dissemination of the data; and managing feedback. These details are discussed below.

Figure 2: MIS Generic Process



Sources: FAO 2017; based on David-Benz, et al. (2011), Galtier, et al. (2014) and Shepherd, (1997)

2.5.1 DATA COLLECTION

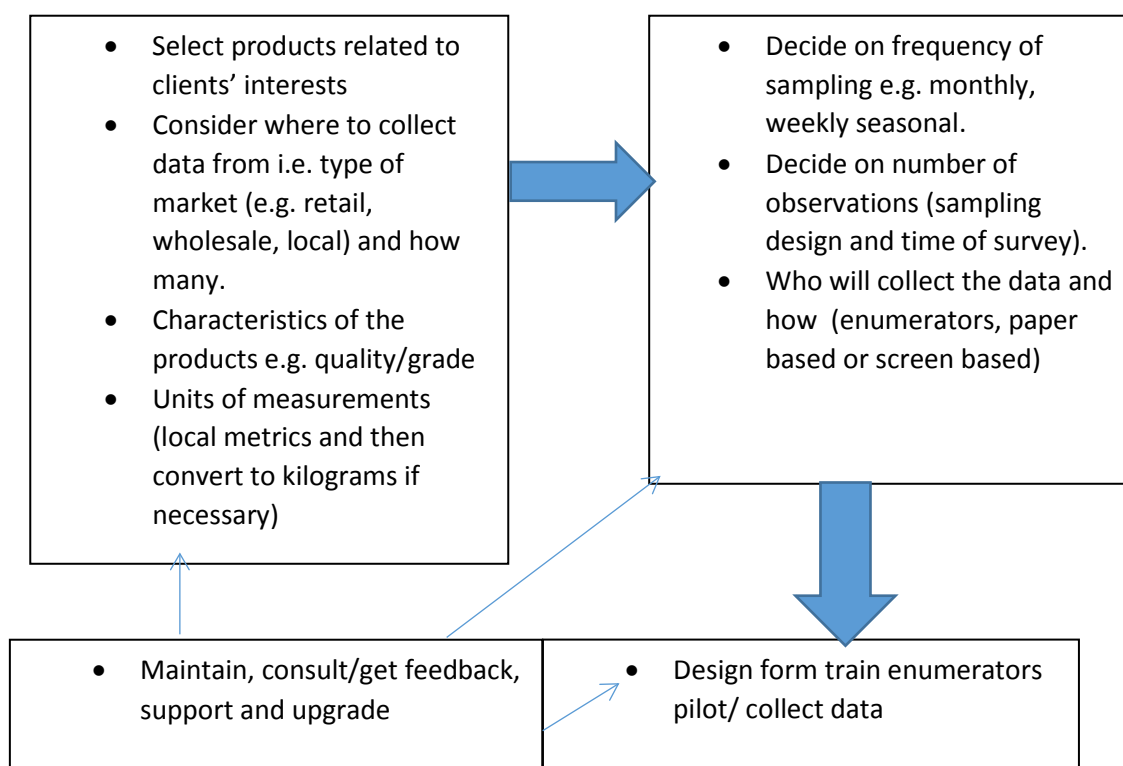
As noted by the FAO (2017), the value or quality of an agricultural MIS depends, to a great extent, on the following regarding the information disseminated:

- (i) Timeliness;
- (ii) Accuracy;
- (iii) Reliability; and
- (iv) Relevance.

In this regard data collection procedures and processes are an important part of the iterative process illustrated in Figure 3. Shepherd (1997) observed through a review of MIS in several developing countries that information provided is valuable to farmers and other users only if it is accurate and is delivered on time. However, there are significant challenges in collecting data including the fact that there are different metrics to consider (i.e. weights/measures – products

are often sold by non-standardised volumes rather than by weight) and prices can vary significantly in a single day in the same market (FAO, 2017). Many of the methods used to collect the prices are still traditional, that involves paper-based market surveys before the data is transferred to a computer, a process which has been identified as a source of human error (Galtier et al., 2014). In addition, reported prices often vary from actual prices for various reasons, including exaggerated reporting, under-reporting of 'extra' values that come from the buyer's relationship with the seller (e.g., credit, extra 'gifting' to regular customers etc).

Figure 3: Iterative Price Data Collection Process for MIS



Source: Adapted from CTA, (2015b)/FAO, (2017)

In contrast, digital data collection is more reliable and economical; enabling processing and dissemination of data to be much faster compared to traditional forms of data collection. Using a variety of sources is also recommended for MIS (primary and secondary which depend on the purpose of the MIS (i.e. clientele and what information is being provided)). For example, primary data collection through observation or survey and the use of secondary sources such as government statistics/FAO statistics. Online databases providing application programming interfaces (APIs) with which third parties extract data using programming provides an opportunity for MIS to aggregate data from a variety of online sources on a continuous basis with little or no manual work required (CTA, 2015).

With the proliferation of accessible communication technologies and related infrastructure and online platforms, methods for collecting data digitally have expanded considerably. Digital tools have the potential to considerably reduce the work and lead times involved in collecting, transferring and aggregating MIS data. In these cases, enumerators can conduct surveys using pre-programmed questionnaires on smartphone applications (APPs) that populate data directly to a shared database. In contexts where smartphones aren't appropriate (due to cost, limited connectivity, or lacking skills) short message services (SMS), interactive voice response (IVR) or unstructured supplementary service data (USSD) can be used to create similar data collection platforms. The proliferation of these technologies among agricultural stakeholders are also opening up the potential to crowdsource market information. Crowdsourcing would involve polling large numbers of respondents (farmers, traders, processors) via APPs, IVR, SMS on the prices they have paid/received on agricultural commodities and aggregating these over location and time.

Data collection is an iterative process involving the entire information chain of supply, thus adaptations will need to take place in order for the MIS to be responsive and relevant. For example, adjusting what commodities are covered, location and types of information which clients might need/prefer (CTA, 2015). It is also suggested that an overall marketing strategy which involves e.g. defining the product, researching the market/competitors and creating a budget and brand are important and often overlooked (FAO, 2017).

2.5.2 DATA PROCESSING AND ANALYSIS

Reducing errors at the data processing stage is essential in providing accurate information to clients. Timely transmission is also imperative thus a system which effectively screens incoming data is suggested. Training enumerators in how to spot mistakes will, of course, reduce errors but appropriate software can also reduce this. For example, there are programmes that are able to spot unrealistic prices. Software programmes can be programmed to identify elements such as unrealistic prices; fabrication or typographical errors (CTA, 2015). Data that is disseminated to end users as quickly as possible can also be used for the preparation of monthly, quarterly or annual reports that present time series and also provide analysis. The CTA (ibid) suggests it is important then to provide not only the information but interpretation/analysis which is meaningful for the user. This may be through comparing prices of commodities, highlighting trends etc.

2.5.3 INFORMATION PACKAGING AND DISSEMINATION

The main challenge associated with dissemination is the ability of the intended audience to access the information affectively (FAO, 2017). Table 1 highlights that there are a number of methods used to disseminate information to users including traditional approaches such as through notice boards bulletins and radio. Other methods more commonly used by 2GMIS systems include internet (many MIS have their own portal or website) and the use of SMS/smartphones. Depending on the location, the purpose of the MIS/intended user different modes of dissemination are likely to be needed.

Recent advancements in mobile phone technology have seen the explosion of 'push' and 'pull' systems. A pull systems work through a method of user engagement whereby the user sends a query by SMS and then provided with a response (e.g. related to a price in a certain location). In

contrast, a push system provides generic information automatically to the mobile phone (CTA, 2012). An example of an established push service is RML in India, which is operated by Thomson Reuters and provides price information on 800 agricultural products (FAO, 2017). Bulk standardised SMS messages i.e. push methods are much cheaper than pulled methods per message though overall push methods might be more expensive due to the volume (ibid).

The main drawback is that information provided through these channels (i.e. push and pull) is limited compared to radio, for instance, which is cheaper and potentially also enables the very poor in marginalised communities to access information (David-Benz et al., 2016). Furthermore, valuable information related to the types of queries users' have which could help improve the MIS service is held by the mobile phone provider and therefore restricts vital feedback (ibid). However, useful information could still be garnered using other metrics e.g. number of requests/downloads (ibid). More recently, Interactive Voice Response (IVR) is being used as a method to pull information which could reduce the potential inequalities in access i.e. those that illiterate unable to read SMS messages, however, farmers would have to rely on the memory of the interaction and would not be able to record the information provided (Galtier et al., 2014). The Indians have had some success with forming mobile farmer groups who share information among themselves. This may be a way forward. Radio in contrast though requires users to phone-in (which could exclude some) may be able to provide more useful feedback. In addition, the numbers of people likely to receive information by mobile phone are far fewer than by radio (e.g. 10 times fewer people in Kenya and in Zambia 100 times fewer people receive information by mobile phone). There are drawbacks to the radio too (especially in developing countries) which should be mentioned including information being broadcasted may not be considered impartial and the one-way nature may limit interaction/useful information being shared (CTA, 2006). This being said it should not be discounted as a complementary tool in many countries where there is limited access for the very poor to access/use mobile phones/smartphones (David-Benz et al., 2012).

2.5.4 MANAGING FEEDBACK AND OTHER ISSUES

The developments in ICT have now enabled MIS to integrate other information alongside prices such as agricultural extension advice, weather and linking buyers and sellers (FAO, 2017). Moreover, some systems also allow for users to select what information is of most interest which allows the MIS to understand the needs of the user (CTA, 2012). A recent review by FAO found that many difficulties found in previous models (i.e. first generation) still remain under the 2GMIS, especially with regards to data accuracy and sustainability of systems (FAO, 2017).

However, in reality, this feature is still limited as the majority MIS either do not have it or are unable to analyse the information/feedback from users and thereby provide a better, more tailored service (Galtier et al., 2014). In addition, though many MIS platforms provide a wide array of information, it is often difficult for decision-makers to obtain reliable and timely information on, for example, on stocks levels and transport costs (Galtier et al., ibid).

The sustainability of MIS is often an overlooked issue also and needs equal attention. Zhang et al., (2016) highlighted the success of MIS in China (in terms of usability/sustainability) has been due to the strong public driven support (i.e. state funding) and the fact that information provided by various MIS is freely available and there are no fees levied. Funding and financial sustainability have also been cited as a major issue for MIS in many Sub-Saharan African (SSA) countries (Chiatoh, and Gyau, 2016).

2.6 MIS TYPOLOGIES

The main basis used for categorising MIS is the type of host organisation/service provider or the type of technology used in collecting and disseminating market information. CTA (2015) uses the type of host/service provider to distinguish one system from the other. Three main types of MIS are identified based on this criterion. These are Government MIS; Commercial or private MIS; and Project-based or donor-funded MIS.

On the other hand, David-Benz et al. (2012) use the type of technology adopted in collecting and disseminating market information as the basis for delineating different types of MIS. Under this, two main types of MIS are identified: First and Second Generation MIS. The First Generation MIS (1GMIS) are mainly government-hosted services, which operate as described in Section 2.6.1 below. The Second Generation MIS (2GMIS) was developed to address identified challenges associated with the 1GMIS, including delays in dissemination of information. The main distinguishing feature is that in the development of 2GMIS advantage was taken of advances in information and communications technology (ICT), including especially the use of internet in transmitting data collected as well as the use of mobile telephones in disseminating price information.

2.6.1 MIS TYPOLOGIES BASED ON HOST/SERVICE PROVIDERS

The three types of MIS classified on the basis of the type of host/service provider are briefly described below.

- a. **Government MIS:** these are hosted by government institutions and provide information on prices for a range of commodities. Collection of primary data is usually by the staff of Ministries of Agriculture and dissemination is often via state-owned media (radio, television and print media). The service is usually free as information is perceived as a public good. Whilst price information may be collected to support market actors, it also tends to serve other purposes such as enabling the government to monitor price instability for appropriate actions to control economy-wide inflation by the monetary authorities such as the central banks. Examples of this type of MIS exist in several developing countries and are discussed in Chapters 3 and 4.
- b. **Commercial or private MIS:** these may be run as for-profit services for which users pay a fee, either in the form of subscription fees or charges for accessing the data. In some cases, information provision is linked to primary commercial services provided by the host, which can, for instance, be a large-scale trading company or a commodity exchange. In cases where the information is provided as a bespoke service, quite often commercial sustainability is difficult to achieve and providers end up relying on donor or government support.
- c. **Project-based or donor-funded MIS:** these are usually set up as part of specific programmes to promote target crop and/or livestock subsectors or as part of broader initiatives to develop modern agricultural marketing systems and/or market-supporting institutions.

2.6.2 FIRST GENERATION MIS IN DEVELOPING COUNTRIES

The main features of the 1GMIS models are summarised in Box 1. Most of these systems were set up in developing countries in the 1980s and 1990s as government-run initiatives, focused predominantly on a few strategic crops (mainly the key staple crops such as maize and rice), which were prioritised on food security grounds (CTA, 2008). Livestock was also covered in economies where the livestock sector is sizeable. The main emphasis was on providing price data on a daily basis though some added information on volumes of sold in the major wholesale markets. For example, the Philippines had a system in the 1990s which published prices and volume delivered specified commodities in rural market nodes.

Box 1: Typology of First Generation MIS in Developing Countries

Product coverage and information disseminated:

Major staple grains (e.g. maize and rice)

Focus mainly on average prices in many markets (rural and urban) but volumes may be added.

Area covered:

National, including a collection of primary data from all major rural and urban markets.

Institutional home:

Government (especially the Ministry of Agriculture).

Data collection and processing:

Data collected by the field staff of government agency and processing by head office personnel.

Technology used:

Data transmission is paper-based; processing involves data entry by head office staff using basic statistical software e.g. Excel spreadsheets. Dissemination via radio and/or sometimes television broadcasts by government-owned stations; newspaper publications and postings on billboards.

Target users and funding sources:

Target farmers and traders but often used more by public policy agencies; funding is mainly from government and donors (through projects)

Source: Adapted from Galtier et al. (2014); David-Benz et al. (2015); Chitoah and Gyau (2016); Zhang et al, (2016); and Staatz et al, (2014).

Typically, the 1GMIS were largely centrally managed by government bodies, especially Ministries of Agriculture – a typical example in a non-OIC country is the Zambia Agricultural Market Information System (ZAMIS) discussed in Chapter 3. Field staff of Ministries of Agriculture, including extension personnel, are often deployed to collect data on prices and sometimes on volumes traded through designated markets. It is often the practice that a large number of markets are covered and the price data is collected through asking traders in the markets.

Data processing is usually centralised in the head offices of the responsible Ministry or public agency and transmission of data collected may involve a paper-based reporting system which delays processing and reporting. In some cases, data analysis is complicated by the fact that the analysis and dissemination are in standard weights whilst trading in the markets involve the use of a range of informal volumes which make conversion difficult. Dissemination was mainly through radio broadcasts at specified times and in official and local languages. Newspapers also

published the price data, usually without any trend analysis. In addition, 'bulletin boards' were sometimes mounted in some markets and prices in those as well as other major markets recorded for the information of market players (CTA, 2012).

Though the stated objective in most cases is to assist market participants such as farmers and traders, policymakers usually became the primary beneficiaries as they used the information for monitoring and in initiating policy actions in response emergency situations (Galtier et al., 2014). Central statistical authorities use the information in computing price inflation whilst central banks similarly used such information in determining monetary policy actions aimed at ensuring price stability at the macroeconomic level.

Despite these benefits, it is apparent from several reviews that market players, including farmers, find these systems of little value as they are unable to convert the information provided into tangible market decisions (Shepherd, 1997; Chiatoh, and Gyau, 2016). Factors which account for this include long lag-times between collection and dissemination of prices, implying that reported prices are often of little relevance by the time they are published (Robbins, 2000; Tollens, 2002; Galtier and Egg, 2003). Reliability of the published data is another problem and so also is the issue of the extent to which the information shared meets the needs of target stakeholders. A review conducted by the FAO of 120 1GMIS platforms in developing countries revealed that only 53 fulfilled the basic operations criteria, such as providing reliable price information to decision-makers (CTA, 2008).

The limitations were not merely technical but also extended to the institutional sphere, including lack of innovation due to weak institutional structures and financial, time-bound project funding (Galtier et al., 2014). Galtier and Egg (2003) further argue that these shortcomings were due in part to the absence of a mechanism to adjust information with respect to the needs of market players. The non-interactive dissemination platform such as radio and billboards limited feedback from market players/producers in terms of the ability to understand their requirements and failed to explain to users the context of the information provided or suggest how they might use it. In the 1990's several interventions tried to solve this by linking MIS to emerging Farmer Field School approaches. Although promising, these models proved expensive and unsustainable (Bennett and Layola, 1996).

These outcomes, in part, provided the impetus for the second generation MIS models which emerged towards the end of the 1990s and early 2000s with the hope of better meeting the needs of market players. These were either created through modifying earlier MIS systems or the development of new ones. Moreover, the technical developments in information and communication technologies (ICT) largely supported this endeavour. Other innovations which catalysed the development of the second generation MIS included the emergence of regional marketing systems as a result of sub-regional efforts to promote regional integration (David-Benz et al., 2012). Furthermore, the rise of professional organizations e.g. farmers' organisations contributed to this development (Galtier et al., 2014; David-Benz et al., 2012).

2.6.3 SECOND GENERATION MIS IN DEVELOPING COUNTRIES

The Second Generation MIS (2GMIS) emerged in response to identified weaknesses with the 1GMIS. For instance, a key feature is reliance on internet and mobile phone applications in order to provide “real time” information (Chiatoh and Gyau, 2016). This was intended to address the problem time lag between collection and dissemination of information associated with the 1GMIS. Collection and transmission of prices from markets to a central unit, which used to take several days, was reduced to only a few hours (ibid). The risk of human error in data entry was also reduced through avoiding multiple data entries and the use of automated processing (Galtier et al., 2014).

Field survey staff continue to be used to collect data from a range of national markets (urban and rural). However, the technology used allows for fast transmission and automated processing of the data. The information is obtained through interviewing traders in the major rural and urban markets as well as through telephoning major processing and commodity trading companies to ask about average prices for the day or week. The only exception is the providers which are commodity exchanges, which report prices discovered through trading on the exchange floors. These and other formal commodity trading boards which regulate the export of agricultural commodities also tend to report international market prices as well as relevant export parity prices to guide exporters and suppliers. Where regional-level information is disseminated, this does not always entail the use of own staff but collection of information through data sharing with various partners.

As shown in Table 1, the range of information was also expanded beyond prices for the major staple crops and livestock to include other products. Different types of providers have also emerged in addition to public and include private companies which may be involved in commodity trading and/or may be supported by donors; MIS linked to NGOs and professional/representative organisations such as farmers’ organisations; and MIS linked to commodity exchanges.

Table 1: Typologies of Second Generation (2GMIS) Models

Type of provider	Product coverage	Area covered	Institutional home	Data collection	Technology used	Type of information	Users of the information	Funding
Public	Strategic dependent on country e.g. food security related/ foreign exchange related	Regional/National/ to match geography of trade	Public institutions	Interviews, observation by reporters	Radio, email, website, bulletins, notice board,	Prices, availability, product flow/quantities transport costs,	farmers, traders, government	Government donors
Private	Cereals, fish, fruits, poultry products and pulses. Fertilisers.	Regional/ national	Private enterprises	Survey staff/ operators (including market players)	Market information point and centres, website, SMS, Interactive video response (IVR), notice boards and email	Price and availability, quality/quantities, inputs, weather forecasts, data/record management.	Farmers, market players/ traders	Donors and user fees, shareholders
Professional organisations/ NGOs	Cereals vegetables and livestock	National/ Sub-National/ regional	NGO/farmers' organisations/ private organisations	Interviews, observation by reporters, Telephone interviews	SMS, website, radio, magazine, notice board, billboards.	Prices, quantities exchange, quality/quantity, market trends.	farmers/ market players e.g. traders	Government donors/ users' subscription/ members' contribution
Commodity exchange	Traded commodities e.g. maize, wheat, pulses, coffee/ staple foods	National/ sub-national/ regional	Private enterprise	By product transactions on the exchange.	TV, electronic ticker board, print media, SMS, toll-free phone	exchange rate, CIF/FOB prices, grade, date/time, volume traded	traders/buyers and smallholder farmers/ farmer groups e.g. cooperatives.	member contribution (e.g. ECX in Ethiopia) and government funding

Source: Adapted from Galtier et al. (2014); David-Benz et al. (2015); Chitoah and Gyau (2016); Zhang et al. (2016); and Staatz et al. (2014)

A more mixed range of funding has emerged for agricultural MIS. The public agencies continue to rely primarily on government funding. The exchanges also tend to fund MIS as part of overall corporate recurrent expenditure since the service is seen as important in maintaining participation by market players. Most of the professional organisations and NGOs involved in providing market information depend on donors or specific project-tied support. Even with private providers, donor funding is usually critical in sustaining the activity even where internal cross-subsidisation is pursued.

Impact and Lessons from 2GMIS

A review of selected cases of 2GMIS in non-OIC countries, some of which are reported in Chapter 3, shows that though it is difficult to ascertain whether MIS impacts on specific policies, it is possible to link MIS to improved decision making with respect to certain issues (Galtier et al., 2014). In Madagascar, for example, MIS data helped public policymakers to take actions which moderated the impact of soaring market prices during the food price crisis in 2008 (ibid). In particular, MIS helped to trigger an emergency response in times of crisis (ibid).

Staatz et al. (2014) have argued though that there are numerous difficulties in trying to measure the impact of MIS due in part to the wide variety of dissemination techniques used. With respect to reducing information asymmetries, however, most studies have explored the use of ICT technology (rather than the MIS as a whole) in understanding whether these tools have been

helpful focusing on indicators such as selling price and quantity sold (David-Benz et al., 2016). A survey found that 84 percent of listeners of a radio-based MIS campaign provided to a number of countries in Sub-Saharan Africa based on their local/regional markets considered the programmes to be “very useful”, though there was no analysis done on how this translated to welfare indicators such as farm incomes (quoted in FAO 2007; Farm Radio International, 2011). It has been suggested that the attraction of private sector sponsorship because of the success/reach of the programme could be part of the future business model to ensure sustainability (FAO, 2017).

Aker (2010) found the use of cell phones in Niger significantly reduced price variability across markets though more recently Aker and Fafchamps (2014) have concluded that while mobile phone coverage reduced spatial producer price dispersion by for a semi-perishable commodity no effects were found for those with a longer shelf life which were stored by farmers i.e. millet and sorghum.

More advanced econometric studies (e.g. panel data studies) and the use of randomised control trials⁴ have been conducted in recent years. Kizito (2011) and Kizito et al. (2012) found using panel dataset for households in Mozambique that there were significant gains for those that were provided with information. For example, the mean price difference for those with information was 12 percent higher for maize compared to the control group. Courtois and Subervie (2014) showed that farmers benefiting from an MIS programme received, for example, a 10 percent price increase for maize and a 7 percent price increase for groundnuts, compared to the price they would have received if they had not participated in the programme. Likewise, benefits were found by Nakasone (2013) in a randomized control trial set up in Peru. Price information related the most common crops were provided over several months by SMS. Farmers receiving this information were found to have benefited from higher sales prices compared to those in the control group.

Despite these gains, it is evident from cases discussed in Chapters 3 and 4 that major challenges remain to be addressed in enhancing the utility of MIS to market players in particular. For instance, it is apparent that farmers and traders do not only require accurate price information on a timely basis but also need information such as forecast output as well as stock levels which can influence perceptions on future prices and therefore inform the marketing strategies which they adopt. Trade facilitation is another area which has emerged as an unmet need.

2.7 BEYOND 2GMIS: FURTHER EVOLUTION OF MIS IN DEVELOPING COUNTRIES

Further advances in MIS have continued beyond the typical 2GMIS, most of them focusing on deploying technology to address some of its identified challenges. The main distinguishing advance is the development of a database of farmers, traders and other key actors as part of the MIS platform. This makes it possible to monitor output by and available marketable surplus from producers. It also allows traders and processors to post demand and attempts to facilitate

⁴ A randomised control trial in this instance is where farmers are randomly selected and provided with information through their mobile phone (treatment group) compared to another randomly selected group that are not provided with any information (control group) (FAO, 2017).

trade between different parties in what is sometimes termed as e-commerce. This system aims at shortening the supply chain by providing an outlet for farmers without middlemen.

Some of the platforms have additional features so as the inclusion of GPS coordinates of farmers' plots, which makes it possible to monitor output and forecast production for groups of farmers or as individuals. By monitoring output by farmers such platforms make it possible for them to enter into credible forward contracts with major buyers. It is also possible to monitor their performance on behalf of lenders, thereby mitigating the asymmetric information problem which often hampers the supply of finance by formal lenders to smallholder farmers.

2.8 CONCLUSION: EVIDENCE ON EVOLUTION OF MIS IN DEVELOPING COUNTRIES

In this chapter we have defined agricultural MIS as systems set up to gather/collect, process and disseminate market-related information to various actors in agricultural value chains – the generic process that this entails is also discussed. Liberalisation of the agricultural sector clearly emerges as a primary catalyst for the development and evolution of MIS in most developing countries. It is apparent that the promotion of MIS occurred as most developing countries were creating and/or strengthening market institutions to underpin the performance of post-liberalisation agricultural marketing systems as well as enhance government actions to mitigate volatility in the markets.

Based on the classification by David-Benz et al. (2015) we identify two main typologies of MIS, namely: 1GMIS and 2GMIS. From the discussions in this chapter, it is apparent that the emergence of 2GMIS addressed some of the weaknesses of the first generation systems (1GMIS), including speeding up processing and dissemination of information. In addition, some of the systems make it possible for users to select what information is of most interest to them. However, a number of unaddressed issues remain including data accuracy; facilitation of trade among counterparties; and sustainability of the systems. Another issue is the need to adjust information provided to match the needs of target market players and not focus principally on policymakers.

Cases of 1GMIS and 2GMIS, as well as the more recently-developed improved platforms, will be discussed in Chapter 3 (from non-OIC countries) and Chapter 4 (from OIC member countries).

3. OVERVIEW OF MIS IN NON-OIC COUNTRIES

3.1 INTRODUCTION

In the preceding chapter, we traced the evolution of agricultural MIS in many developing countries from the first to second generations. In this chapter, we review examples of MIS from non-OIC countries including 1GMIS as well as 2GMIS and recent enhanced versions. The impact and important lessons from the reviewed cases are summarised in the concluding section of the chapter.

3.2 ZAMIS: TYPICAL EXAMPLE OF FIRST GENERATION MIS (1GMIS) MODEL

The Zambia Agricultural Market Information System (ZAMIS) is an example of an MIS which was set up following the liberalisation of the agricultural sector. As briefly reported in Box 2, Zambia liberalised its agricultural sector, including abolishing the parastatal grain marketing company – the National Agricultural Marketing Board (NAMBOARD) – in 1989. ZAMIS was subsequently set up in 1993 as part of measures to promote transparent private trade in agricultural commodities, especially maize which is the most important staple grain in the country.

As was typical of such systems during the 1980-90s, the Ministry of Agriculture run ZAMIS. Wholesale and retail prices, as well as information on volumes traded, were collected by the field staff of the Ministry from major urban and rural markets. The staff involved were not solely dedicated to this function but usually undertook core functions such as the provision of farm extension services. The price data was collected mainly through visiting markets and asking the traders.

Box 2: Zambia Agricultural Market Information System (Zamis)

Zambia begun implementation of major reforms in the agricultural sector in the late 1980s, including abolishing the National Agricultural Marketing Board (NAMBOARD) in 1989. Prior to its abolition NAMBOARD controlled the marketing of especially maize, the principal staple grain in the country. To foster active involvement of private traders in the maize trade, the government set up ZAMIS to provide market information in 1993. The service was coordinated by the Ministry of Agriculture and involved collection of wholesale and retail prices from major urban markets, covering maize, mealie meal (processed maize flour), other crops, fertiliser and seeds by Provincial Marketing officers. The information was collated and processed by staff at the head office of the Ministry in Lusaka. Dissemination, which was free, was through three channels: weekly radio broadcasts by a government-owned broadcaster, twice-weekly market bulletins published in government-owned newspapers, and postings on price boards in rural markets.

Accumulated debts led to the cancellation of broadcasts; rising postal charges hampered transmission of price data to the central processing unit, resulting in the price information being outdated. and publication of bulletins. Very few farmers were reported to have consulted the price bulletin boards for a number of reasons including the following: the farmers had difficulty interpreting the reported price data, which was also out of date. Sustainability of ZAMIS was also an issue, even though at a point a local bank co-sponsored the radio and print media publications.

Source: Shepherd (1997)

The prices, which are transmitted to a central unit at the head office of the Ministry in Lusaka⁵, are reported in Zambia Kwacha⁶ per kilogramme. This is despite the fact that trade in the predominantly informal markets is volume-based, for example in bags or “bowls” of different sizes and non-standardised weight. A similar situation occurs across most African countries. Usually, a conversion factor is applied but in order to determine the fact that weight per specific volume is not standardised introduces a significant error factor. For example, in Ghana, wholesale prices are reported on per bag basis though average weight per bag differs depending on the location – one bag of maize on the average weighs 145 kilos at the farmgate compared to 135 kilos in urban wholesale markets and 125 kilos in urban retail markets (Onumah and Aning, 2009).

In Zambia as in most developing countries, quality standards for agricultural commodities are only enforced for export crops such as coffee. As a result, though wholesale and retail prices often differ depending on the quality, even in the rather dominant informal markets, the reported prices do not reflect quality differences. For instance, deliveries from small-scale farmers to medium to large-scale grain milling companies in Zambia tend to suffer a quality discount of 10-15% but this is not reflected in reported maize prices, which give the impression of a single price the crop no matter the quality (NRI 2002).

Shepherd (1997) identified other operational problems encountered in the collection of data under ZAMIS, including difficulties in funding transport costs for visits to the markets. The fact that the data collectors only “asked for prices but didn’t buy” was a source of frustration for traders and sometimes hindered cooperation in providing accurate information. This again is a common problem and in Sierra Leone and Ghana, for instance, the data collectors were sometimes provided with funds to actually buy from the retailers. This proved unsustainable. In Mongolia, where toll collectors working for local government authorities were deployed in collecting price data, traders’ reportedly under-reported retail prices in order to avoid paying higher market tolls (Shepherd, *ibid.*).

Transmission of data to the central processing units often encountered problems, leading to delays in publication of information generated and, thereby, making it less relevant to market participants. Dissemination of information was mainly through radio broadcasts by the state-owned broadcaster. This was done in both English (the official language) as well as in local languages such as *Bemba* which is spoken by a large section of the population. Newspapers as well as ‘bulletin boards’ mounted in some markets were also used to disseminate price information.

The price data tended to be broadcast in nominal terms without any significant trend analysis. The reports usually covered a large number of rural and urban markets, making broadcasts difficult to follow for most of the audience. Hence, commercial broadcasting was only undertaken on payment of fees by the government. In other countries, even the timing of the broadcast posed challenges in terms of attracting the primary target audience – farmers and small to medium-scale traders. For instance, in Ghana, the price bulletins were broadcast late afternoon at a time when most of the target audience were on their way home and had no access to radios (Onumah and Aning, 2009). Shepherd (1997) also cites similar poor timing in broadcasts in Benin in West Africa and in the Dominican Republic in the Caribbean. He further

⁵ Capital of Zambia.

⁶ The national currency of the Republic of Zambia.

cites the case Guinea Bissau, where prices are broadcast in Portuguese though most of the farmers speak a local language (*Creole*). He adds that in Malaysia, publishing prices on bulletin boards failed to attract uptake mainly because farmers and traders needed more than price information.

The limitations of the 1GMIS noted above appeared to stymie uptake and utilisation by market actors such as farmers and traders in trade transactions. The high cost of running the systems also created major sustainability challenges (Bennett and Layola, 1996). It is therefore not surprising that in Zambia, as in many other developing countries, there has been further advances in MIS, evolving from the 1GMIS to 2GMIS and beyond in order to better serve market players (see Section 3.5.1 below for further discussion of changes which have occurred in Zambia). There is no doubt, however, that the data generated was used by policymakers in tracking food price trends and inform interventions to moderate shocks in the domestic grain markets, especially for maize for human consumption and uptake by, for example, the poultry industry.

3.3 PUBLIC 2GMIS MODELS: EXAMPLES FROM ETHIOPIA

Public 2GMIS models are mostly based on the first generation models but with definitive enhancements in the form of inclusion of recent ICT technologies. They are operated based on the principle that market information is a public good⁷. The focus remains on national level systems which are hosted by public institutions, especially the Ministries of Agriculture and with funding provided mainly by the government. Though most of the new 2GMIS continue to focus on staple cereals and livestock, the range of products/commodities covered has increased. Price is still the primary information type which is disseminated but the use of the internet and mobile telephony has become prominent. Despite targeting market players, the primary objective of these systems remains that of informing public policy actions.

Examples of such models in non-OIC countries include the Systeme d'Information des Filieres (SIF) in Cameroon and Mozambique's Information System for Agricultural Markets (SIMA). Zhang et al. (2016) report that the Government of China has, in the past two decades, promoted improved agricultural market information services by investing in centres at regional/provincial levels which are well equipped with computers and other ICT facilities to serve farmers 'free of charge'. The illustrative case we discuss, however, is that of Ethiopia.

The agricultural sector is of immense importance to the economy of Ethiopia. The sector contributes an estimated 43.0% of GDP in 2013⁸. The sector also made a significant contribution to the impressive economic growth record posted by the country in recent times. Between 2003 and 2013, average GDP growth rate was 10.8% and 31% of this growth was attributable to the sector⁹. Cereals, especially teff, wheat and maize are important strategic staples whilst coffee and pulses are key export crops. The existing MIS are therefore set around these groups of commodities and are characterised by significant differences as discussed below.

⁷ A public good is defined as something which exhibits non-rivalry and non-excludability i.e. someone's use of a good does not exclude another from using it. For example, street lighting.

⁸ Source: UNDP Country Economic Brief – Analysis Issue No. 1/Feb.2014 and the Economist Intelligence Unit.

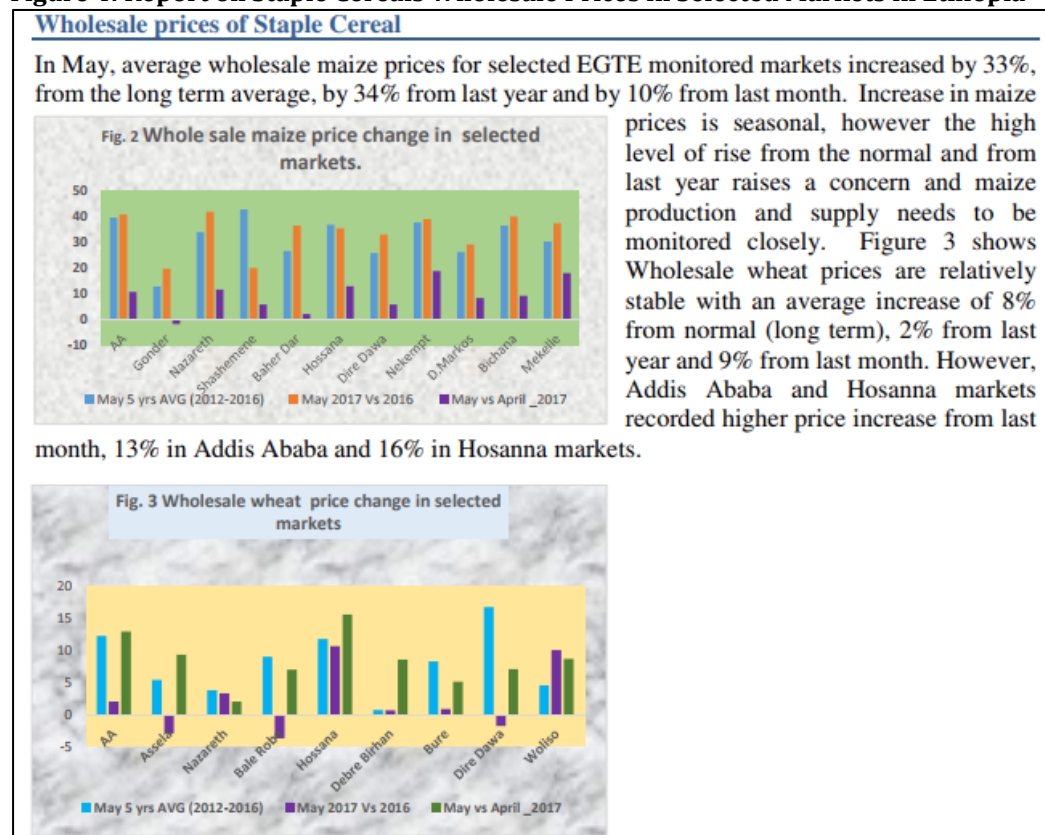
⁹ Source: IMF Press Release No. 15/286 June 19, 2015.

3.3.1 ETHIOPIA'S MIS FOR STAPLE CEREALS

It is quite evident that the MIS for the staple cereals is being run primarily to enable policymakers to effectively manage food security. Prioritisation of this objective by the Government of Ethiopia has to be viewed within the context of the country's historical vulnerability to the risk of famine. According to a report by IFAD (2016) drought, which often causes significant food shortages, ranks as the highest risk in Ethiopia and leads to loss of lives as well as economic losses, which in extreme cases can exceed US\$ 920 million. Hence, a number of public and donor agencies collaborate actively in generating and utilising information for managing major food supply shocks in the country, as demonstrated below:

- ❖ The Ethiopia Grain Trade Enterprise (EGTE) – which is a government-owned grain trading company is the source of primary price data. This data is generated from its own wholesale trading activities in urban markets as well as collection of price data from rural markets. One of its main function is to contribute to the stabilisation of domestic grain prices through buying and holding stocks which is released as and when necessary. It owns the bulk of storage facilities in the grain sector with a total storage capacity of over 800,000 tonnes. The price information is disseminated via its website as well as through electronic price tickers in rural areas. The information is also shared with other collaborating partners listed below:
 - Ministry of Agriculture, which has policy oversight of the agricultural sector and has over 40,000 field staff nationwide who assist in the collection of market information in rural areas.
 - Ministry of Trade (MoT) which has a Directorate of Crop Marketing which monitors and supports the development of output markets for strategic.
 - The Ethiopian Food Security Reserve Agency (EFSRA), which manages strategic food reserves. Unlike similar agencies in Africa, the EFSRA does not directly procure and store food stocks – a responsibility which is assigned to ETGE – but is responsible for decisions regarding withdrawal and distribution of relief food stocks in response to early warning assessments.
 - Donor agencies such as WFP, USAID and FAO. The WFP, in particular, uses the price data generated by ETGE and early warning information produced by USAID-funded the Famine Early Warning Systems Network (FEWSNET) to publish the Ethiopia Monthly Market Watch, which reports on developments in markets for the major staple grains (see Figure 4). FEWSNET relies on weather reports from the Ethiopia National Meteorological Agency to forecast output of food crops.
- ❖ All the above agencies are represented on the Disaster Risk Management and Food Security Sector (DRMFSS) integrates early warning and response coordination, culminating in national action plans to respond to the impending food crisis, including volumes of stocks which the EFSRA can authorise EGTE to release for distribution by relief agencies including the WFP.

Figure 4: Report on Staple Cereals Wholesale Prices in Selected Markets in Ethiopia



Source: WFP Ethiopia Monthly Market Watch, May 2017

According to Rashid and Lemma (2010), this coordinated approach has enhanced the capacity of the Government of Ethiopia in managing food supply and price shocks. However, a brief review of the existing MIS by Wolday Amha (2014) shows that utilisation of the information by farmers, traders and other market actors is rather marginal. This is partly because the main trend analysis which is reported (as in Figure 4 above) is aimed at an assessment of the food situation by policymakers and appropriate policy-level response in case a food crisis is imminent. The report is not tailored to transactions-related needs of market players and being a monthly makes it also less relevant for such a purpose in terms of timing.

3.3.2 ETHIOPIA'S EXCHANGE-LINKED MIS FOR EXPORT CROPS

In contrast to the above, the principal aim of the MIS run by the Ethiopia Commodity Exchange (ECX) is to provide up-to-date information to the market players. The ECX, which was set up with contributions from members as well as public funding, has mainly been trading export crops such as coffee, sesame and pulses. The price information it disseminates are mainly the prices which are transparently discovered during the trading activities on its floor (illustrated in Table 2). The ECX also publishes price trends (Figure 5) as well as prices in the major terminal markets for commodities such as coffee. It must be noted that ECX only trades spot contracts and does not offer any futures contracts for trading on its floors.

Table 2: Coffee Prices Reported in Daily Market Bulletin by ECX

ECX Washed Coffee Volume & Value Performance							
Traded Product	Today Weighted Average Price*	Previous Day Weighted Average price	Change %	Volume in ton	Value in ETB	Market Share in %	
						Volume	Value
Washed Index	146.00	127.00	14.96				
Sidama	853.77	-	-	10.80	542,395.00	100	100
Total				10.80	542,395.00	100	100

ECX Unwashed Export Coffee Volume & Value Performance							
Traded Product	Today Weighted Average Price*	Previous Day Weighted Average price	Change %	Volume in ton	Value in ETB	Market Share in %	
						Volume	Value
Unwashed Index	166.00	174.00	-4.60				
Forest	758.12	775.00	-2.18	47.62	2,123,740.00	12	11
Harar	855.43	886.09	-3.46	58.65	2,951,250.00	15	15
Jimma	835.37	885.68	-5.68	129.90	6,383,160.00	32	33
Keffa	694.13	-	-	3.84	156,700.00	1	1
Lekempti	852.74	895.00	-4.72	25.22	1,264,965.00	6	7
Sidama	817.66	804.69	1.61	55.74	2,681,145.00	14	14
Yirgacheffe	807.19	810.25	-0.38	81.60	3,874,500.00	20	20
Total for the day				402.57	19,435,460.00	100	100

*The Weighted Average Price for each traded coffee type is calculated dividing the total transaction value by total transaction volume

Source: Website of Ethiopia Commodity Exchange (ECX): www.ecx.com.et/

Figure 5: Coffee Price Trends Reported by ECX



Source: Website of Ethiopia Commodity Exchange (ECX): www.ecx.com.et/

Beyond its website, ECX also publishes prices on notice boards at its certified warehouses and in rural markets. Usually, individual farmers do not sell directly through the exchange but cooperatives aggregate produce, deposit into ECX-certified warehouses and initiate sale by instructing their brokers. For coffee, all export-linked trade is required by legislation to go through the ECX.

The more structured marketing system which has been developed around ECX appears to have impacted positively on farmers' vulnerability to marketing risks. Market access channels are clearly structured and quality standards are defined. So also are payments systems for sellers. Of particular interest is the observation by IFAD (2016) that the export crops marketed through the ECX are exposed to significantly far less price risks than food crops which are traded in the predominantly informal domestic marketing system. This is not only due to dissemination of prices but also the available structures which enable farmers to better manage transactions.

3.4 QUASI-PUBLIC INTERNATIONAL/REGIONAL MIS MODELS

MIS platforms classified in this study as quasi-public are market-monitoring initiatives launched and funded by multilateral organisations. These have gained prominence especially after the global food crisis in 2007/08. Two examples of this type of MIS are discussed in this section.

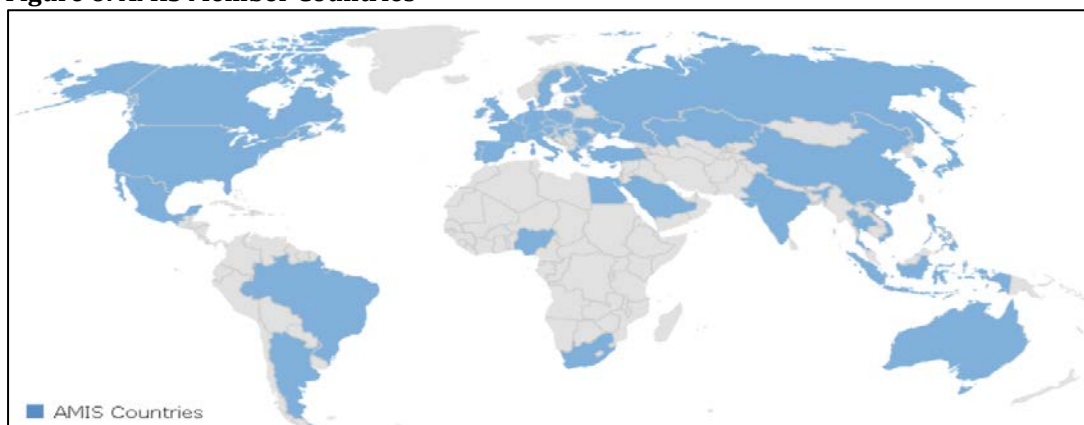
3.4.1 INTERNATIONAL QUASI-PUBLIC 2GMIS MODEL: AMIS

An example of an international publicly-funded 2GMIS model is the Agricultural Market Information System (AMIS), which was launched in September 2011 by the G20 Ministers of Agriculture. It was developed in response to the global food crisis which occurred in 2007/08 with the aim of assessing global food supplies, focusing on four main crops, namely: wheat, maize, rice and soybeans. The specific objectives for which AMIS was set up include to:

- Improve agricultural market information analysis as well as short-term supply and demand forecasts at both national and international levels.
- Collect and analyze policy information affecting global commodity markets.
- Report on conditions in international food markets, including structural weaknesses.
- Strengthen global early warning and data collection capacity in participating countries by promoting best practices, providing training and facilitating lesson-sharing.

AMIS membership consists of the G20 countries as well as major grain exporting or importing countries such as Egypt, Kazakhstan, Nigeria, Thailand, Ukraine and Vietnam (Figure 6).

Figure 6: AMIS Member Countries



Source: <http://statistics.amis-outlook.org/data/index.html>

The main functions of AMIS are implemented by a Secretariat housed in the Rome headquarters of the FAO. The AMIS Secretariat consists of the following international organizations: the FAO, the Group on Earth Observations Global Agricultural Monitoring (GEOGLAM), IFPRI, IFAD, the International Grain Council (IGC), the OECD, UNCTAD, the UN High Level Task Force (UN-HLTF), the World Bank Group, WFP, and the WTO. Contributions from these organisations to the fulfilment of the functions of the Secretariat reflect their comparative advantage and expertise. For example, GEOGLAM provides AMIS with monthly updates about crop supply in major producer countries as well as early warning reports on the supply situation in food-importing countries based on data from satellite monitoring observation systems (e.g. Figure 7).

Figure 7: GEOGLAM Crop Monitor for Early Warning (December 2017)



Source: <https://cropmonitor.org/index.php/2017/12/07/crop-monitor-for-early-warning-november-2017/>

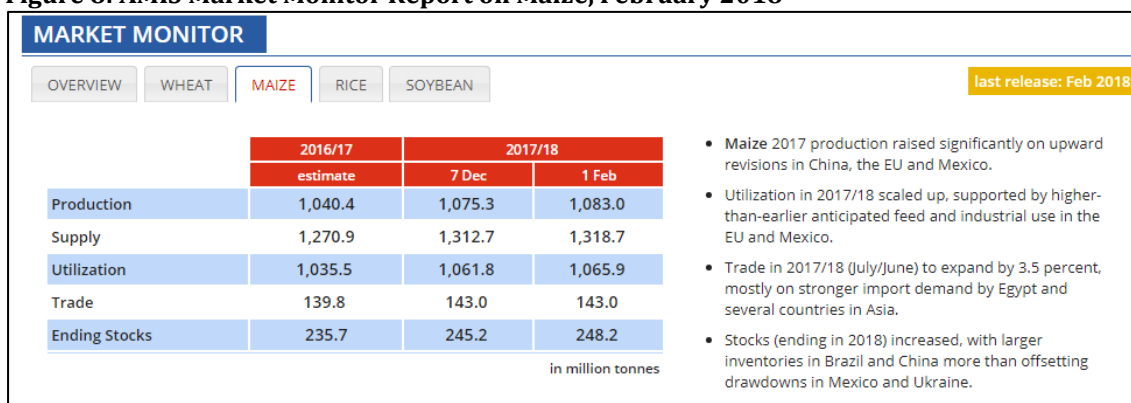
AMIS has a *Global Food Market Information Group*, which provides market information, which it publishes on its website¹⁰ and covers global data on production, supply, utilisation, trade and ending stocks on its four focal crops (Figure 8 and 9 below). It also has a *Rapid Response Forum (RRF of AMIS)*, which promotes early discussions about critical market conditions among policymakers and encourages coordination of common strategies to manage impending food crisis. Though the Forum ordinarily meets once a year, meetings can be called at short notice if

¹⁰ AMIS official website is: www.amis-outlook.org

global market conditions warrant policy action. Discussions during meetings of the RRF of AMIS, the latest developments in global wheat, maize, rice and soybean markets, are reviewed, including possible threats to global food trade flows. Specific actions needed to unblock potential bottlenecks in supply are explored to determine actions to be carried out by the Secretariat and by member countries.

An example of the capacity building support provided under AMIS is a statistical capacity building project implemented in the Philippines between 2013 and 2016 by the FAO and funded by the Government of Japan. The project was intended to strengthen national capacity to produce and use accurate statistics and, more specifically, to effectively monitor rice markets for food security purposes. Achievements of the project at its completion the design of a new methodology for a *crop-cutting rice yield survey*, which was successfully field-tested. Workshops were also organised for training on rice data collection, analysis and dissemination. In addition, a delegation from Thai was able to visit the Philippines to learn lessons on survey quality control systems. Bangladesh was similarly supported under AMIS to improve its agricultural market information systems through adoption of innovative methods and digital technology under a project funded by the Bill & Melinda Gates Foundation and implemented by the FAO.

Figure 8: AMIS Market Monitor Report on Maize, February 2018



Source: www.amis-outlook.org (February 2018)

Figure 9: AMIS Market Report on Grains and Oilseeds Index by Year (2017/2018)



Source: www.amis-outlook.org (February 2018)

3.4.2 INTERNATIONAL QUASI-PUBLIC 2GMIS MODEL: RESIMAO

A number of regional MIS networks which are funded by multilateral donors have emerged across various regions in especially Asia and Africa. Among these is the Réseau des Systèmes d'Information des Marchés en Afrique de l'Ouest (RESIMAO), otherwise known as the Network of Market Information Systems in West Africa (WAMIS-NET). The network collects data, provides information on rural and urban agricultural commodity markets and publishes statistics and reports. All the member countries of the Economic Community of West African States (ECOWAS) are part of the network¹¹. As depicted in Table 3, the food systems in these countries are dominated by staple cereals such as maize, rice, millet and sorghum and root crops, especially cassava and yams. RESIMAO reports market information on these crops as well as for fruits and vegetables. It also publishes price data for livestock and agricultural inputs, mainly via its website¹².

The third column of Table 3 also shows that per capita consumption of cereals in West Africa is generally rising, at a pace which is higher than the rate for Sub-Saharan Africa (SSA), which is estimated rate 4.9% between the 1960s and 2001-07. Most of the countries in the region depend on imports, especially of rice and maize, to meet domestic demand for human consumption. This is due partly to growth in national populations outstripping growth in output of the staple cereals as yields tend to be generally below achievable potential levels (Chauvin et al., 2012).

¹¹ The countries covered include: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

¹² Website: www.resimao.net

Table 3: Top Five Food Crops and Growth Cereal Consumption in Selected West African Countries

Country	Top 5 cereals and root crops produced	Growth in per capita cereal consumption from 1961-71 to 2001-07 (%)
Benin	Cassava, yams, maize, sorghum and rice	29.9
Burkina Faso	Sorghum, millet, rice, maize and pulses	54.7
Cote d'Ivoire	Yams, cassava, rice, plantains and corn,	-2.5
The Gambia	Groundnuts, millet, cassava, corn and beans	-0.3
Guinea Bissau	Rice, corn, millet, and sorghum	26.2
Nigeria	Cassava, yams, maize, sorghum and rice	38.8

Source: Chauvin N.P., F. Mulangu and G. Porto (2012)

The market information disseminated covers major urban and rural markets in the participating countries, sourced mainly from national MIS providers. The prices are reported in tonnes or kilogrammes per local currency though transactions in the domestic and cross-border markets are based on volumetric measures (e.g. in bags of variable weight). The information provided does not appear to impact significantly on trade but has proved beneficial in fostering regional policy integration (Galtier et al., 2014).

Figure 10: Food Security Overview in Democratic Republic of Congo (June-December 2017)



Source: www.resimao.net

In fulfilment of its objective of enhancing capacity to respond to food crisis at national and regional levels, RESIMAO collaborates with the **Food Security Information Network (FSIN)**, which is a global initiative co-sponsored by the FAO, WFP and IFPRI to produce and publish information on the food supply situation in member countries as well as neighbouring countries such as the Democratic Republic of Congo (DRC) (see Figure 10).

3.5 2GMIS MODELS RUN BY PROFESSIONAL ORGANISATIONS/NGOS

The third category of MIS platforms usually aims to provide information to smallholder farmers, enabling them to negotiate for better prices. The platforms are also intended to provide traders with information on available supplies as well as prevailing prices in major rural markets, thereby facilitating trade. The host organisations for these MIS may differ. For instance, the Rice Observatory (OdR) was set up and run by a consultative group of actors in the rice value chain in Madagascar. It was established in 2004 as part of efforts to manage instability in the price of rice, a strategic cereal in the country. In addition to providing price information and trends in the rice subsector, the OdR offered a platform for consultation among the different actors in the rice value chain and provided evidence for policy advocacy by the players. It has been noted that the consultative platform and the evidence generated through the OdR made it possible for the government to respond more effectively to soaring global food prices in 2007/08 (CTA, 2012).

3.5.1 2GMIS MODEL RUN BY FARMERS' ORGANISATION

Some 2GMIS are hosted and run by farmers' organisations, though often supported by donor funding. Chiatoh and Gyau (2016) cite examples of these including the Malian Agricultural Markets Observatory (OMA) and Madagascar Vegetable Market Information Service (SIEL). In general, these platforms collect price information from major rural and urban through interviewing or phoning up traders. The data collected is processed by units in the head offices of the farmers' organisations and disseminated via television/radio broadcasts as well as through the print media and traditional noticeboards mounted in rural markets. They also use SMS messaging to disseminate market information (Staatz et al., 2014). The main sources of funding range from subscription fees from mobile messaging and donor funding alongside internal cross-subsidies from other income-generating activities undertaken by the farmers' organisations (Chiatoh, and Gyau, 2016).

Other examples include the MVIWATA Agricultural Market Information System (MAMIS) and the ZNFU's MIS. MVIWATA is a national farmers' organisation in Tanzania whilst ZNFU is the lead representative organisation of farmers in Zambia. The methodology applied in collecting price information by both MIS relies on interviewing of traders by field officers of the farmers' organisations. Dissemination is also mainly by mobile telephones and through publication journals covering analytics on market developments as well as via television and radio broadcasts. Among the factors which optimised benefits to farmers and other actors from these two MIS platforms are the content of information provided; linkage of MIS to other marketing and finance initiatives targeting farmers; and the dissemination strategy adopted.

In Box 3 is a summary of how these outcomes were achieved partly because the two farmers' organisations participated in the EU-funded Farm Risk Management (FARMAF) Project which supported actions to improve existing MIS. In addition, FARMAF supported actions to improve the overall performance of agricultural output markets by strengthening and/or scaling up access to market institutions such as WRS, commodity exchanges as well as forward contracting

in commodity trade. In addition, the participating farmers' organisations were supported to invest in aggregation centres, which facilitate direct trade with large-scale buyers whilst reducing the involvement of multiple layers of middlemen. Collective marketing was also encouraged as a means of enabling SHFs to meet the minimum volume requirements of large-scale buyers. Farmers also had their capacity enhanced in order to enable them to comply with trade-friendly commodity standards which prevail in the formal marketing system.

Box 3: Lessons from 2GMIS in Tanzania and Zambia

Under a project titled Farm Risk Management for Africa (FARMAF), which was funded by the European Union, support was provided to enhance MIS accessible smallholder farmers (SHFs). The support provided included investment in computing technology, training of requisite staff, and fostering collaboration to allow for effective crop forecasting. In addition, specific efforts were made to link the MIS to commodity trading systems, especially with the aim of promoting access to remunerative markets for SHFs. A review of the systems which was undertaken towards the end of the project showed that farmers can gain from accessing reliable market information – the gains could exceed 25% of household income obtained from alternative crop marketing systems at the farmgate. However, it emerged from the review that the gains did not emerge from just reporting *ex-post* price data, but also including reliable forecasts of supply and demand, which in Zambia, for example, made it possible for farmers to enter into credible forward contracts for the sale of their crops. The forecasts provided also proved highly beneficial to policymakers, especially in formulating and implementing food security interventions.

The review also highlighted major challenges in running an effective and accessible MIS, including the following: standardisation of weights and quality helps to set the reported prices in context, allowing farmers to determine not only what to grow but also the type of quality products they intend to market and the buyers to target. Also noteworthy from the review is evidence indicating that MIS is not only important for bargaining by farmers and traders but also crucial in developing efficient structured trading systems and in fostering innovations in agricultural finance. Furthermore, it emerged that developing MIS as bespoke actions is likely to produce suboptimal outcomes unless linked with the development of other markets (e.g. reliable inputs distribution networks, transparent output markets as well as accessible credit markets). Sustainability remains a major challenge, especially where quality and reliability of the content, as well as the timeliness of dissemination, hinder the build-up of commercial demand for information.

Source: NRI (2017) "FARMAF Final Narrative Report", October 2017.

In the specific case of MVIWATA in Tanzania, the MIS was directly linked to the promotion of structured marketing involving investment in physical infrastructure for drying, cleaning, weighing and grading which contributes to transparent trading in grains. The grain price information notice board (Figure 11) is sited at a rural grain assembly market which is also equipped with drying, cleaning, weighing and grading facilities and attracts traders from major urban markets in Tanzania as well as others from neighbouring Kenya.

In terms of content, the MIS run by the ZNFU includes crop forecasts generated through a pilot scheme involving the application of remote-sensing technology to monitor crop performance *in situ* and without the traditional *crop cut* survey. Forecasting through this process was more timely and allowed farmers and major buyers to negotiate credible forward sales contracts. The MIS run by ZNFU is also linked to a financing programme for farmers with a package including crop insurance; direct access to farm inputs funded with commercial credit at highly competitive interest rates; and assured crop marketing arrangements including forward contracting.

Figure 11: Notice Board for Grain Price Information at Kibaigwa Market in Tanzania



MAZAO	TSHS	KILO.1
MAHINDI SAFI	1800	1800
MAHINDI	1600	1600
MBAZI	1600	1600
MTAMA MWEKUMBU	1600	1600
MTAMA MWEUPE	1600	1600
UFUTA	1600	1600
ALIZETI	1600	1600
KUNDE	1600	1600
CHOROKO	1600	1600
KARANGA	1600	1600

Tel: 0784-375 249

Source: NRI (2017) "FARMAF Final Narrative Report", October 2017

The information dissemination strategy adopted by ZNFU, which is contributing to the financial sustainability of the MIS, includes the following:

- Mobile phone-based dissemination of price information entails revenue-sharing with the service providers.
- Publication of a monthly journal, which covers analysis of market developments as well as other important extension information and sector policy advocacy issues, attracts a wide readership. The farmers' union also runs a television discussion programme covering similar topics. That programme has very high audience ratings.
- It has therefore been possible for the ZNFU to leverage commercial sponsorship from the two sources, which it uses to also partly cross-subsidise radio broadcasts in rural communities.

To complement efforts made under FARMAF to improve output market performance, specific attention was paid to the need to create and maintain an enabling policy and regulatory environment. This is because of evidence showing that disabling actions by governments can undermine the development of the market institutions and reduce the utility of MIS (Coulter and Onumah 2002).

3.6 PRIVATE 2GMIS MODELS

Two types of private 2GMIS platforms are discussed in this section: independent, private providers and commodity exchange-based MIS.

3.6.1 INDEPENDENT PRIVATE 2GMIS MODELS

Private MIS are usually set up by private enterprises which are profit orientated and usually cover both regional/national levels (Galtier et al., 2014). Their aim is to improve market efficiency by improving information flows that allow for better production/trade decisions (ibid). Most private MIS platforms collect and disseminate information on a wide range of commodities and products including cereals, pulses, fish, fruits, poultry and livestock products. An example is ESOKO which operates in several countries in West and Central Africa.

ESOKO collects and disseminates price data for over 60 commodities and products. The price data is collected mainly through market-level interviews and observations by its enumerators, who also provide additional advisory services, usually by telephone to farmers and other parties. These platforms are reported to be by far the most advanced in terms of uptake of innovative technology, typically relying on mobile telephony and the internet for dissemination of information (Chiatoh and Gyau, 2016). In Ghana and Kenya, ESOKO has broadened its services into providing a platform for agriculture-related commerce, targeting especially producers in rural areas. This service includes maintaining a database of producers and rural inputs distributors. This makes it possible to link these players and facilitate inputs trade beyond dissemination of prices. Figure 12, for instance, shows a rural farm inputs distributor who is part of the ESOKO network in Ghana. Through the network inputs distributors are able to offer discounts when they sell in bulk to groups of farmer with their details in the ESOKO database.

Figure 12: ESOKO Partner Rural Farm Inputs Distributor in Ghana



Source: www.tulaa.io

ESOKO maintains a similar database of produce aggregators and major buyers. This provides a means to facilitate output trade. The company, with support from donor-funded organisations such as AGRA, organises trade forums close to the harvest season. During such forums, informal

forward supply contracts are negotiated with prices being agreed based on market information provided by ESOKO.

As is the case with other private MIS providers, the ESOKO business model targets financial sustainability with revenues generated through fees charged for accessing information via mobile telephones as well as subscriptions paid by registered inputs and output traders. They also generate revenue through providing training services for implementers of various government and donor-funded agricultural development programmes. In recent times they have begun providing ICT support for monitoring smallholder farmers who are financed by formal lenders. Despite these efforts, ESOKO as is the case for most private MIS providers, generate only a small proportion of their overall income stream from user fees/subscriptions but remain significantly dependent on donor support (Galtier et al., 2014).

One of the main factors constraining the supply of finance to farmers is the limited capacity of formal lenders to monitor activities on-farm in order to assure compliance with loan repayment terms and conditions. Some of the 2GMIS providers are moving to fill this gap by deploying ICT not only to monitor crop performance but also to offer tailored extension advice which can help farmers act timeously to reverse on-farm developments which can lead to significant reduction in output. The technology being deployed involves remote-sensing and provision of tailored remedial actions and is sometimes termed as “Precision farming” (illustrated in Box 4).

Box 4: ICT and Precision Farming

Precision farming (also known as Prescriptive or Satellite farming) uses ICT in the on-field monitoring of the development crops during gestation in order to respond as precisely as possible to variations in sections of the field in a manner which optimises yield. It includes deploying Global Positioning Systems (GPS) i.e. space-based satellite navigation systems which provide location and time information in all weather conditions. The technology is being used in large-scale commercial agriculture in the US and also in South Africa. For example, Monsanto is reported to be using remote sensing and other cartographic techniques to map farms in the US and superimposing climate information on the maps in order to determine types of seed suitable for specific farms. Farmers using its FieldScripts system reportedly made yield gains of over 5%. In November 2013, Du Pont Pioneer (seed producer) teamed up with John Deere to deploy similar technology to provide advice on seeds and fertilizer to farmers in the field. Land O'Lakes (a farm-supply co-operative in the US) bought Geosys (a satellite-imaging company) in December 2013 to boost its farm-data business. Though none of these cases directly involve farm insurance, they point to the potential to monitor on-farm activities, including precipitation and soil moisture, with a level of precision which can reduce basis risk in index-linked insurance. It is an area which is therefore worth exploring.

Source: NRI (2014)

3.6.2 2GMIS MODELS LINKED TO COMMODITY EXCHANGES

One of the features of successful agricultural commodity exchanges is the maintenance of a reliable MIS (Onumah and Aning, 2009). Commodity exchanges provide a venue, which may be physical or virtual (electronic), at which buyers and sellers are brought together to trade in physical commodities and/or in derivatives, which are financial contracts/instruments, whose values are derived from the value of an underlying asset. The underlying assets may be commodities, equities/stocks, mortgages, bonds, interest rates and exchange rates or indices such as stock market and consumer price indices. Exchanges which trade only physical commodities for immediate delivery (i.e. delivery is made within three days) are described as spot markets. The ones trading standardised contracts against which delivery may be made in

the future are described as futures markets. Futures Contracts have a future expiry date and counterparties have an obligation to honour the position at the traded price. These trade contracts tend to be used to manage price risk (i.e. the risk that the value of the underlying asset will change unexpectedly in the future).

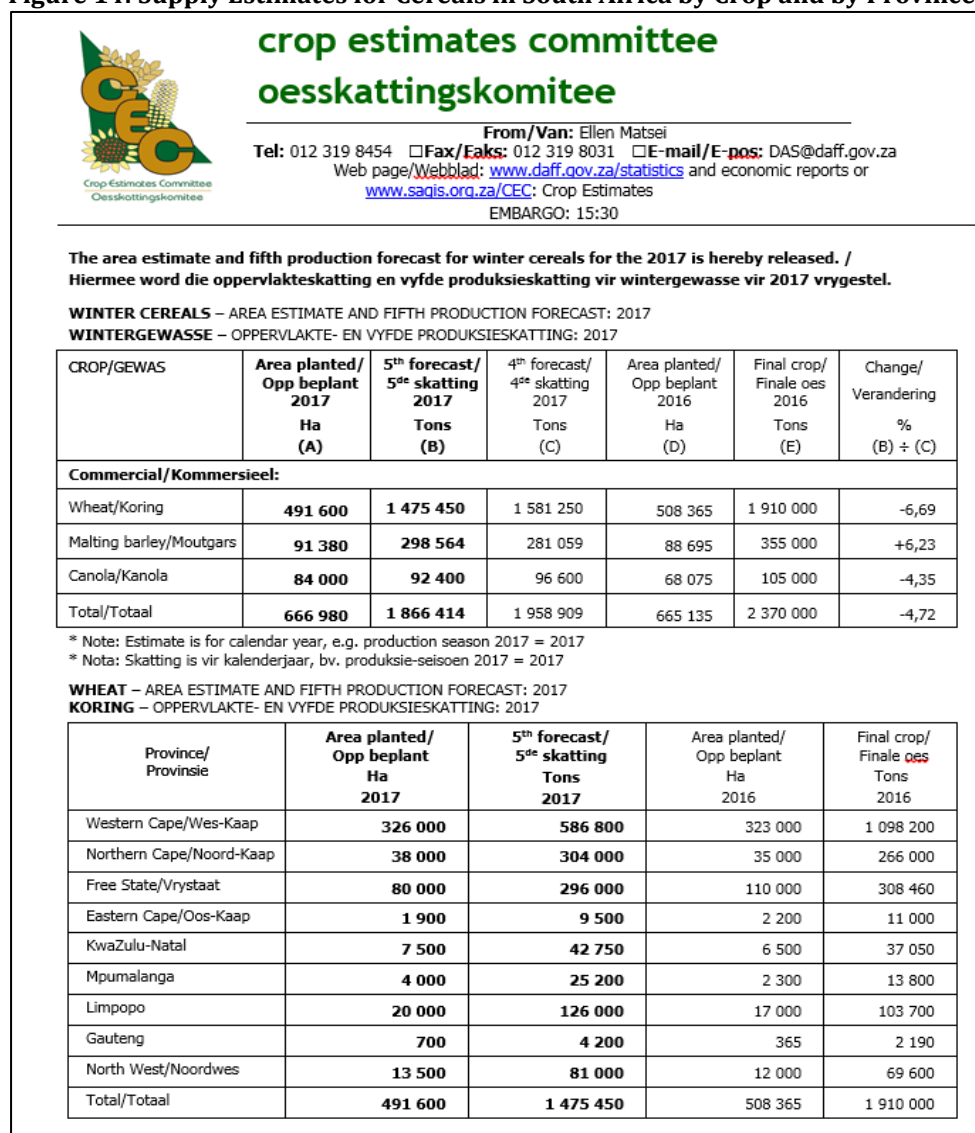
Figure 13: JSE Electronic Notice Displaying Commodity Prices



Source: Onumah and Aning (2009)

Dissemination of reliable market information is critical to the operations of the exchange. This includes publishing price data through electronic notice boards as shown in Figure 13. The information is also disseminated via the JSE website and email alerts to registered parties. This type of price information published by exchanges such as JSE differs significantly from what the other MIS platforms report. Whereas in the case of the latter the price information is based on interviewing market actors who may be biased in reporting, exchanges report actual transparently-discovered prices on a real-time basis. Sometimes exchanges also report on prices in major terminal markets for the commodities they trade, for instance, parallel prices on the Chicago Board of Trade. This enables market players to analyse relevant trends. It should be noted that market players do not rely exclusively on reported price information in making market decisions. They tend to consult other sources of information and data which can influence market developments, including reports published by the south Africa Grain Information System or SAGIS (Figure 14).

Figure 14: Supply Estimates for Cereals in South Africa by Crop and by Province



Source: www.sagis.org.za/CEC

SAGIS, which is hosted by the Ministry of Agriculture, Forestry and Fisheries, publishes regularly updated monthly information on crop output forecasts, imports, utilisation (domestic consumption and exports) as well as end-stock levels. In Figure 14 is an illustration of reports on crop output forecasts at different times during the season and also for the different provinces. A network of registered brokers who trade on the exchange employ professionals who analyse trends in price and other market-sensitive information and offer relevant advice to buyers, sellers and other investors. This is among the structures instituted by SAFEX/JSE to ensure integrity and transparency of trading activities. In addition, the exchange also has a well-managed Silo Certificate System which guarantees the quality and quantity of traded commodities. It also has a very reliable clearing and settlement system which assures payment for commodities sold. Hence, the price is the only issue settled during trading and the existence of an integrated information system is helpful to the market players.

3.7 LESSONS FROM MIS MODELS IN NON-OIC COUNTRIES

The discussions global best-practices in MIS in this chapter have shown that agricultural MIS have generally evolved from the 1GMIS to the more technology-intensive 2GMIS. The 2GMIS includes public MIS platforms, consisting of national platforms run by governments as well as international/regional platforms run and/or funded by multilateral donor agencies. Also available are private 2GMIS platforms including those which are run by independent private providers as well as those linked directly to commodity exchanges and associated market-supporting institutions such as WRS.

It is evident that the 1GMIS platforms contributed to the better management of sector policy, especially in relation to mitigation of imminent food crisis. The progression to 2GMIS run by public agencies has further enhanced international, regional and national capacity to respond to the food crisis. This is partly because the regional and international MIS go beyond disseminating price data and provide critically-needed information on output forecasts and stock monitoring which can signal imminence of significant supply shortfalls. A notable example of such an international platform is AMIS, the membership of which includes some OIC member countries. Another example, which is a sub-regional platform in West Africa and is discussed in this chapter is RESIMAO.

However, in terms of contributing to improvements in agricultural input and output marketing systems, progression to 2GMIS is yet to produce the expected results despite tangible evidence of progress in addressing some of the weaknesses of the 1GMIS, including speeding up processing and dissemination of information. Data accuracy is one such persisting challenge and is attributable to the continued reliance of most platforms on the collection of price data from interviewing traders, who often have an apparent conflict of interest. Most of the existing 2GMIS also tend to focus on publishing nominal price data with little or no analysis of trends to guide marketing and investment decisions by players in agricultural value chains. Furthermore, there are significant information gaps, including lack of reliable information output forecast and stock levels at national and individual farmers' levels. The former is critical in determining the direction of movement of future prices whilst the latter can enable lenders and trade counterparties to determine and monitor the risk of non-performance by borrowers and signatories to forward contracts. Unsurprisingly, these factors have hampered the uptake of MIS even where dissemination is via mobile telephones.

The prospects going forward appear bright in terms of addressing some of these shortcomings of the 2GMIS partly because of the potential to take advantage of advances in ICT to reduce the identified information gaps. Lessons from African countries, such as Zambia and South Africa, also demonstrate that where MIS has been linked directly to the development market institutions such as WRS and commodity exchanges, the outcome has been mutually beneficial.

In the next chapter, we review MIS in OIC member countries to assess the extent to which their experiences are consistent with or diverge from what has been observed in the non-OIC countries.

4. OVERVIEW OF MIS IN THE OIC MEMBER COUNTRIES

4.1 INTRODUCTION

In this chapter, we review existing MIS in some OIC member countries using the conceptual framework outlined in Chapter 1. Table 4 below provides a functional representation of the current capacity of OIC member countries with respect to agricultural statistics. This highlights that there exists a high-level capacity in a number of countries, especially among the Arab and African group. However, there is also a large disparity within regions as many of the lowest ranked countries are in the Arab group.

The focus of the review in this chapter is, however, on identifying important cross-cutting lessons and issues which need to be taken into account in fostering further advances in MIS in the OIC countries. The review is therefore on a selection of countries from each of the three main groupings rather than detailed country-specific assessments. There is no doubt however that the generic lessons and issues which emerge would have country-specific relevance.

Table 4: MIS in the OIC Member Countries Rated by Agricultural Statistics Capacity

	Lowest	Low	High	Highest
African group	Côte d'Ivoire, Gabon, Gambia, Senegal	Benin, Chad, Guinea, Guinea-Bissau, Sierra Leone, Uganda	Mali, Niger, Nigeria	Mozambique, Burkina Faso, Togo, Cameroon
Arab group	Algeria, Comoros, Djibouti, Kuwait, Libya, Oman, Qatar, Somalia, Sudan, United Arab Emirates, Yemen	Bahrain, Lebanon, Mauritania, Palestine, Syria	Iraq, Jordan, Saudi Arabia, Tunisia	Egypt, Morocco
Asian group	Afghanistan, Brunei, Kyrgyzstan, Turkmenistan, Guyana	Indonesia, Kazakhstan, Malaysia, Pakistan, Uzbekistan, Suriname	Albania, Azerbaijan, Maldives, Tajikistan	Bangladesh, Turkey, Iran

Source: COMCEC (2014)

4.2 OVERVIEW OF MIS IN ARAB GROUP MEMBER COUNTRIES OF OIC

According to COMCEC (2017), the size of agriculture relative to the rest of the economy in the Arab Group of OIC countries is relatively smaller than it is in the Asian and African Groups. Largely because of this, the Arab Group countries, comprising mainly the Middle East and North Africa (MENA) countries, rely on food imports. The Arab Fund for Economic and Social Development (2012) estimates that these countries import more than 50% of grain (especially wheat), 72% of sugar, 68% of vegetable oil, 31% of dairy products and 14% of meat products. Thus, a surge in international food prices is likely to impact negatively on the poor in these countries as they spend about 65% of their income on food (World Bank, 2012). The transmission of global food price increase to domestic consumers tends to be cushioned because governments in many of these countries often regulate prices (ibid.).

Against this background, it is not surprising that MIS in the Arab Group of OIC countries tend to focus on enabling policymakers to manage food security, as illustrated by the case of Morocco which is discussed in this section. To underpin this effort, many of the Arab member countries of the OIC, tend to concentrate on developing institutions which facilitate government actions in the market. Citing the example of Tunisia to buttress this point, COMCEC (2017) notes the existence of a range of institutions for implementation of agricultural price support measures, including direct market interventions. It notes, however, that in recent times some of the Arab OIC countries are increasingly favouring the development of more market-supporting institutions (COMCEC, ibid.). This may be due to the fact that focusing on government actions to regulate food prices has its costs. For example, Ghanem (2012) notes that subsidizing imported food commodities represents a fiscal risk at the country-level and often restricts domestic capacity to increase food production.

4.2.1 NATIONAL 2GMIS IN MOROCCO: ASAAR

One of the reasons for reviewing MIS in Morocco is the fact that it does not only have a national agricultural MIS but is also part of the regional network, the Mediterranean Agriculture Market Information Network (MED-AMIN). Agriculture is an important sector in Morocco. Its contribution to GDP of 13.6% in 2016 is dwarfed by that of services, which accounts for 56.8%, but it employs almost as much of the national workforce as that of the latter – estimated in 2014 at 39.1% compared to 40.5% by services. According to a report in the Grain Agricultural Information Network (GAIN), published in March 2016¹³, a “Green Morocco Plan” was launched by the Government of Morocco in 2008 with the aim of “*turning agriculture into one of the cornerstones of the country’s economic development*”. The plan aims to increase production of strategic grains such as barley and wheat; reduce imports, thereby enhancing grain self-sufficiency; and improving food security.

The GAIN (2016) report also notes that whilst investing in output and productivity growth, the government also initiated actions to improve marketing, especially by smallholder producers. Part of these measures include promoting an agricultural MIS which ensures greater transparency in the market, thereby improving decision-making by economic actors, including enabling them to take advantage of any arbitrage opportunities. The Ministry of Agriculture and Maritime Fisheries hosts the *Système d’Information Des Prix Agricoles au Maroc* (ASAAR). ASAAR

¹³ GAIN is published by the United States Department of Agriculture (USDA) Foreign Agriculture Service

aims to disseminate timely market information to all stakeholders in agricultural value chains, enabling farmers, in particular, to optimize planting and marketing decisions. However, the information generated is also important to the government, enabling it to monitor market conditions for purposes of formulating sector development policies and food security.

Price data is collected by the field staff of the Ministry of Agriculture through the interview. The enumerators visit a range of markets for different crops including fresh produce but the focus is on wholesale market prices in Casablanca, the capital. This is because there is reported a significant correlation between the Casablanca wholesale price and farmgate prices as well as retail prices in other markets in the country. The main target audience for the information disseminated are private market players (farmers, traders and consumers). Information on daily prices is disseminated via mobile phones and the website of the Ministry (Figure 15).

The infrastructure for the ASAAR system consists of a database for the storage and processing of collected prices, with data being transmitted automatically and in real time. This is done via a mobile application embedded on telephones for the collection and transmission of data. ASAAR also has a website which is accessible to the general public and provides daily prices as well as access to historical price data and trend reports on different domestic markets¹⁴.

Figure 15: Daily Prices for Horticultural Produce in Different Markets in Morocco



Source: www.agriculture.gov.ma/en

¹⁴ Source: <http://www.agriculture.gov.ma/>

4.2.2 OTHER NATIONAL MIS IN ARAB GROUP

Whilst the Moroccan system is government-based, Lebanon, in contrast, has price data available through a civil society group *Chamber of Commerce, Industry and Agriculture Zahlé and Bekaa*. The Chamber, in addition to providing market information, also offers training in certification, financial analysis and other services. Market price data is collected and collated 3 times a week from regional markets and disseminated mainly via mobile phones. Also provided to its members is analytical information on trends in the main export commodity market.¹⁵ Sulaiman et al. (2015) reports that Syria maintains a database of daily prices for agricultural commodities but the information is kept in government departments and is only accessible electronically. Qatar also has an accessible statistical page but price information is very difficult to find and not easy to use due mainly to the format in which the information is kept.

4.2.3 MED-AMIN: AN EXAMPLE OF A REGIONAL MIS IN ARAB GROUP

The Mediterranean Agriculture Market Information Network (MED-AMIN) was launched in February 2014, with seven of the participating countries being OIC members (Table 5). The network focuses on four strategic crops, namely: wheat, maize, barley and rice. MED-AMIN seeks to promote cooperation and experience-sharing between national MIS in the Mediterranean region as well as collaboration with other international MIS.

Table 5: List of Member Countries of MED-AMIN

Member country	Focal organisation
OIC member countries:	
Albania	Ministry of Agriculture, Rural Development and Water Administration
Algeria	Ministry of Agriculture and Rural Development
Egypt	Agricultural Research Centre (ARC)
Lebanon	Ministry of Agriculture
Morocco	Ministry of Agriculture and Fisheries; Office National Interprofessionnel des Céréales et Légumineuses (ONICL)
Tunisia	Ministry of Agriculture (ONAGRI), Office Tunisien des Céréales
Turkey	Ministry of Food, Agriculture and Livestock; Turkstat
Non-OIC countries:	
France	Ministry of Agriculture, Food and Forests
Greece	Ministry of Production, Reconstruction, Environment and Energy
Italy	Ministry of Agricultural, Food and Forestry Policies
Malta	Ministry for Sustainable Development, Environment and Climate Change
Portugal	National Institute for Agricultural and Veterinary Research (INIAV)
Spain	Ministry of Agriculture, Food and Environment

Source: <https://med-amin.ciheam.org/en/about-us/members>

A key report published by MED-AMIN is information on crop harvest and planting progress in member countries. The information obtained from the national focal organisations (Table 5) is triangulated with reference data on cereals harvest forecasts produced by USDA, AMIS and FAO using the system illustrated in Figure 16. An example of a report on wheat is in Figure 17.

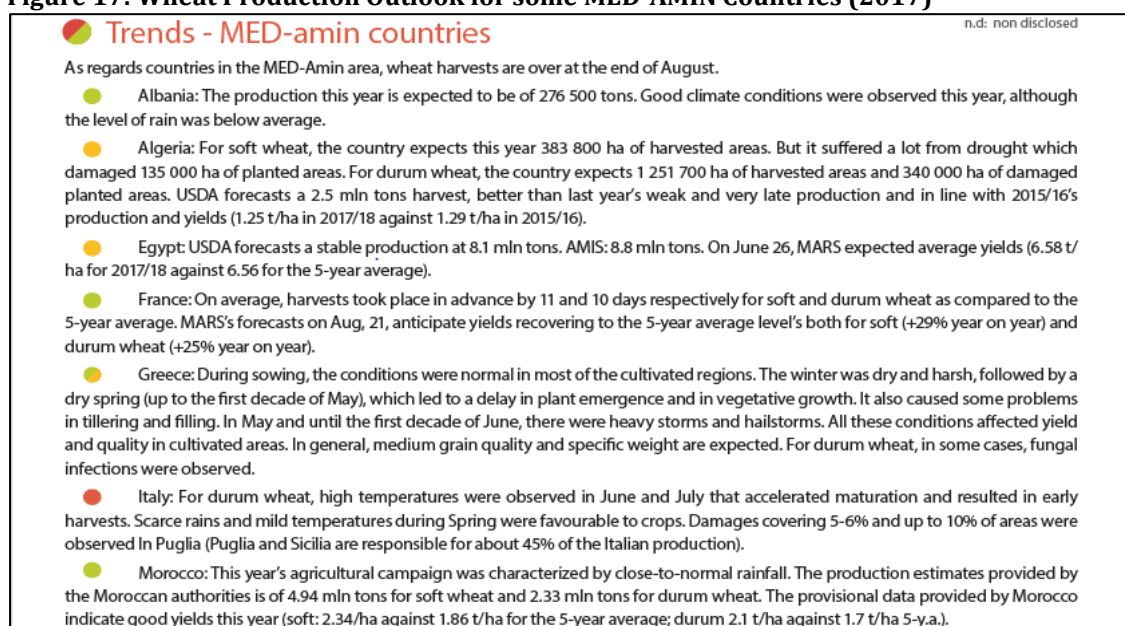
¹⁵ <http://www.cci-az.org.lb/english/static.php?menu=96-local&parent=94-local>

Figure 16: Description of MED-AMIN Crop Monitoring System



Source: MED-AMIN Policy Brief No. 2 (April, 2017)

Figure 17: Wheat Production Outlook for some MED-AMIN Countries (2017)



Source: <http://www.med-amin.org/en/>

Though the outlook data in Figure 17, especially the national-level projections, are important in determining supply situations and potential price levels in domestic markets, it is critical for import-dependent countries to also assess the international supply outlook (Figure 8). Challenges faced by member countries in providing relevant national data is reported to be affecting the quality of the information provided and sustainability of the system (Box 5).

Box 5: Challenges Facing MED-AMIN

This system is centred around government data collection systems in the member states and therefore only works when collaboration is comprehensive and data is available and robust. However, there are difficulties in obtaining data from the member countries. One of the reasons for this situation is that some of the data, for example on grain stocks, is considered politically sensitive. Availability of national-level human resources to support MED-AMIN is also a constraint, leading to most member countries of the MED-AMIN reporting only 50% of the data required. Some MED-AMIN officials are concerned that these challenges can undermine the long term viability of MED-AMIN in the region.

Source: Interviews with Philippe Poquotte, FAO AMIS, 20th September 2017 and Christine Ton Nu, CHEAM, 25th September 2017 both in Egypt

Figure 18: MED-AMIN's Report on Global Wheat Outlook (2017)

● Global trends

It is estimated that, at the end of August, about 80% of wheat in AMIS countries (representing together over 87% of world production) has been harvested. As AMIS does not differentiate soft and durum wheat, we follow its position here in our overview of the global trends regarding wheat.

● World: On August, 10 2017, USDA forecasts a world-production below last year's level (743.8 mln tons against 755 mln tons last year) but still in the range of the previous year's record levels. Among AMIS participants, we observe the following trends:

● European Union (21% of world production): The months of May and June characterized by hot and dry weather created unfavorable conditions for both winter and spring crops (cf. EC's MARS Unit Crop monitoring bulletin). The conditions persisted in large parts of Europe whereas the northern and western part of the region benefitted from milder temperatures and above average rainfall, thus dragging results up, although frequent rains may have hampered harvests and raised quality concerns. The MARS bulletin forecasts yields in line the 5-year average (5.85 t/ha for soft wheat and 3.44 t/ha for durum wheat). This result however tends to hide discrepancies (better than average yields in Romania, Portugal (durum wheat) and Bulgaria, but poor results this year in Spain). USDA forecasts a recovering production at 149.6 mln tons against last year's low 145.7 mln tons. AMIS, for its part, forecasts a 148.5 mln tons harvest (in 2017/18) against 144.5 mln tons (2016/17). The estimates realized by EUROSTAT reveal that, in average, harvests in the European Union are completed at 97% by the end of August.

● China (17%): The country should be reaching the end of the harvest both of winter and spring wheat. USDA forecasts a production at 130 mln tons (same level as 2015/16) against 128.85 mln tons in 2016/17. AMIS gives the following estimates: 129.2 mln tons (2017/18) against 128.85 mln tons (2016/17).

● India (8%): Winter wheat is in since the month of June. USDA forecasts a very good production this year of 96 mln tons against 87 in 2016/17, thus finding its way back to the levels of the 2012-14 average (95 mln tons). AMIS: 97.44 mln tons (2017/18); 92.29 mln tons (2016/17).

● USA (8%): If winter wheat is already off the fields, the spring wheat harvest is on its way (24% harvested, on Aug. 6, in time with the average of previous years' progress). Spring wheat conditions are reportedly poor (only 25% Good and 7% Excellent). Poorer qualities than last year were also reported for winter wheat, although less markedly. Winter and spring wheat are respectively in average 10% and 22% below last year's. USDA forecasts a 47.33 mln tons harvest, down almost 15 mln tons against the 2016/17 harvest. AMIS: 49.67 mln tons (2017/18); 62.85 mln tons (2016/17).

● Russia (8%): The agricultural ministry announced on August 28 that 57.7% of the planted areas have been harvested, with still improving yields as compared to previous years (4.03 t/ha against 3.7 t/ha in 2016). USDA forecasts a strongly improved harvest of 77.5 mln tons against 72.53 mln tons in 2016/17, and 61 mln tons in 2015/16 corresponding to a new record for the post-soviet era. AMIS forecasts for this campaign are more nuanced: 69 mln tons (2017/18) against 73.3 mln tons (2016/17).

Source: <http://www.med-amin.org/en/>

4.3 MIS IN ASIAN GROUP OIC MEMBER COUNTRIES

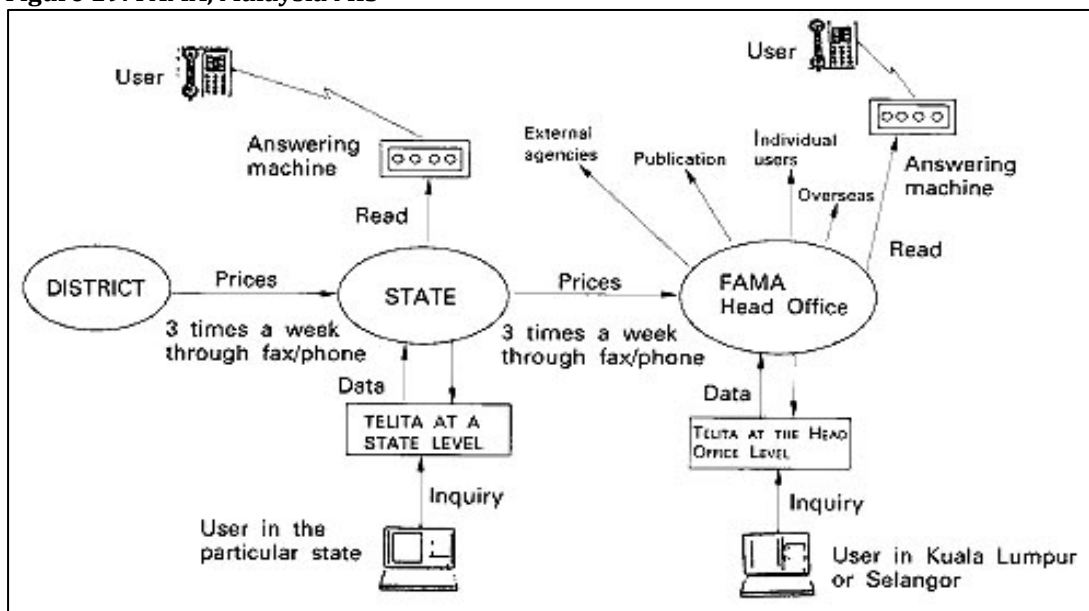
In the Asian Group of OIC countries, MIS in two countries are the focus of the review: Malaysia and Turkey. The size of agriculture relative to the rest of the economy in both countries is rather small. In 2016 it accounted for only 8.7% of GDP and employed 11% of the labour force in Malaysia. In Turkey, the sector contributed only 6.9% of GDP and employed 18.4% of the labour force in 2016. However, there are interesting examples of MIS in both countries. Malaysia, for instance, has two examples of MIS, one for the vegetable subsector (where the bulk of the produce is sold in the open market) and the other for palm oil, which is traded through a commodity exchange – Bursa Malaysia. Whilst the country is a net importer of vegetables, it is a major exporter of palm oil and related products. In the case of Turkey, the example of interest is the evolving system which facilitates financing of the agricultural sector by formal financial intermediaries.

4.3.1 MALAYSIA'S MIS FOR VEGETABLES

Production of vegetables is mainly by smallholder producers with an average farm size of about 1.3 hectares and who use mainly traditional low-technology farming methods as well as large-scale commercial producers located mainly in the highlands (Low 1993). Farmers mainly sell on a consignment basis to rural assemblers or wholesalers and/or their agents. Quite often producer prices are determined only after the sale of the crop in the main urban wholesale markets – which may take between two and three days. This creates considerable uncertainty about producer prices, necessitating the creation of a reliable MIS which can engender trust and foster transactions.

The Ministry of Agriculture in Malaysia is responsible for the MIS, which is hosted in its Macro and Strategic Planning Division. The Division collaborates with about 30 agricultural associations, trade associations and chambers of commerce in Malaysia. These organisations collect primary price data from their members at the district level and from the major wholesale markets. As occurs in many other developing countries, this function tends to be duplicated as other agencies of the government also get involved in collecting primary price data. For instance, the Department of Statistics collects similar data as does the Federal Agricultural Marketing Authority (FAMA). The staff of FAMA at the various branches collect primary price data and transmit to the head office three times in a week. The data is then analysed and disseminated via an automated telephone answering service and through a database accessible via its website. The flow of information is illustrated in Figure 19.

Figure 19: FAMA, Malaysia MIS



Source: <http://www.fama.gov.my/>

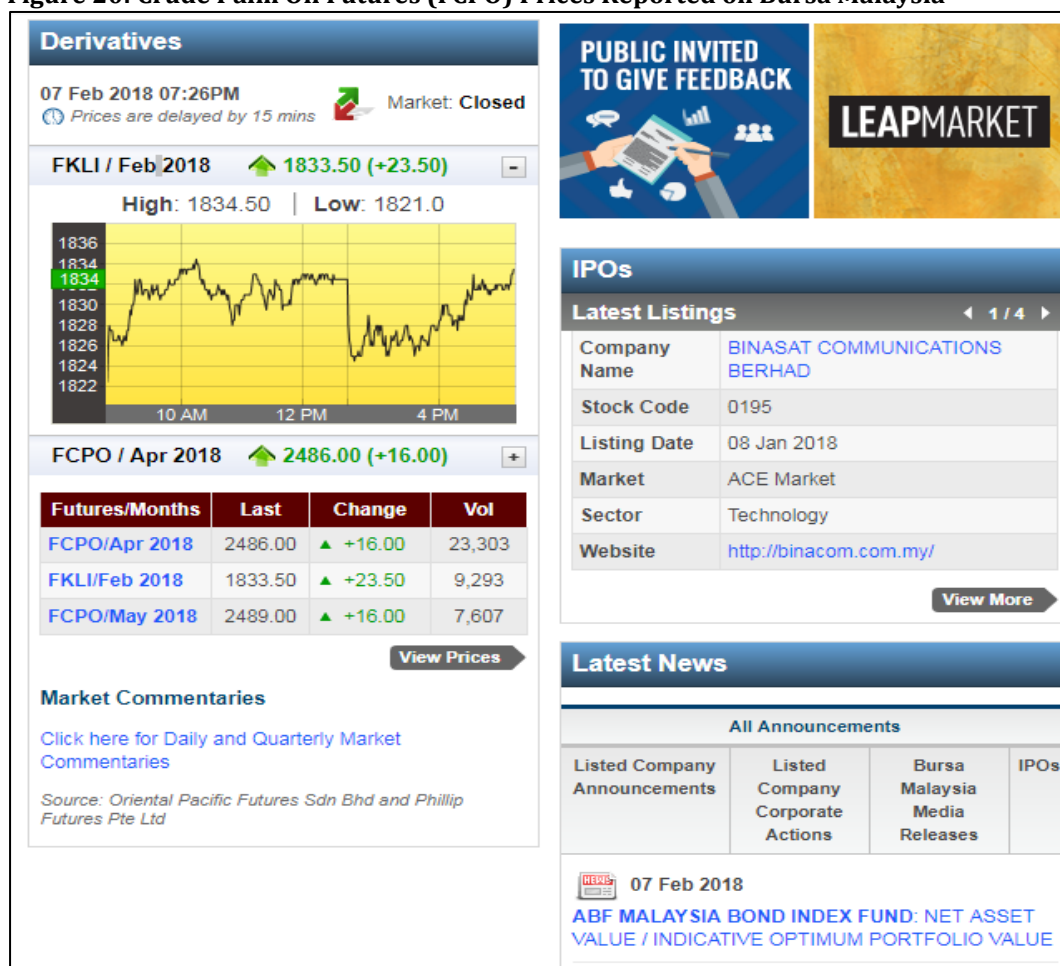
The information generated through this system is used internally by FAMA for purposes of managing its product marketing activities, including setting producer prices as well determining wholesale prices. The data is also disseminated more widely for the benefit of market players.

4.3.2 MALAYSIA'S BURSA-LINKED MIS FOR OIL PALM PRODUCTS

Malaysia is second only to Indonesia in terms of global production of oil palm products. According to Din (2017), Malaysia accounted in 2016 for 30% of global output and 37% of total exports; compared to respective figures of 55% and 53% by Indonesia during that year. Production is dominated by the large-scale private estates, who account for 61.2% of total output in the country and independent smallholders, whose production represent 16.3% of total national output. Landless farmers who participated in a resettlement scheme by the Federal Land Development Authority (FELDA) also contribute another 12.3%.

The marketing system for oil palm products appears segmented. Most of the large-scale producers have highly integrated systems where plantations are linked directly to processing mills and oil refineries (for both palm oil and palm kernel oil), which they sell to domestic end-users and/or export. Most of the smallholders sell fresh fruit bunches at the farmgate to private buyers or to government agencies such as FELDA.

Figure 20: Crude Palm Oil Futures (FCPO) Prices Reported on Bursa Malaysia



Source: <http://www.bursamalaysia.com/market/>

Prices for oil palm products, including fresh fruit bunches, palm oil and palm kernel oil, are benchmarked against the transparently-discovered prices on the commodity exchange – which is Bursa Malaysia (Figure 20). However, even though Bursa Malaysia trades futures contracts, it is not only the price data they publish which informs decisions by market actors. They also consult industry information provided by the Palm Oil Registration and Licensing Authority (PORLA), which is a government regulatory agency. In addition to registering and regulating the activities of market actors PORLA monitors and reports on the market situation, including disseminating information on production forecasts, stock levels and utilisation of fresh fruit bunches, palm oil, palm kernel oil, palm kernel cake and oleochemical products. PORLA is able to carry out this function because it is responsible for registering all palm oil mills, refineries, oleochemical firms, palm kernel cake processing companies and bulk storage firms running tank farms for palm oil. Part of its regulatory function is to set and enforce quality standards for palm oil and other products which are traded on Bursa Malaysia. PORLA also collects and disseminates data on import and export of palm oil products based on information from customs declaration forms.

4.3.3 EXCHANGE-LINKED MIS IN TURKEY

In Turkey, the *Türkiye Odalar ve Borsalar Birliği* (TOBB), which is a confederation of all local chambers of commerce as well as commodity exchanges is a major source of market information. It has an easily accessible website which provides regional level statistics as well as analytic documents, for example, on producer price indices. Daily prices from the commodity exchanges are published on the TOBB website (for example for wheat in Figure 21). As is the case for all functional commodity exchanges, the prices reported are based on standardised contracts traded by the exchanges. The commodities are sold per standard weight and have to comply with clearly-defined grading standards, which make it possible to use the reported prices as reference prices in various transactions.

Figure 21: Wheat Prices from Commodity Exchanges in Turkey – Reported by TOBB

Daily Prices for Products CEREALS - WHEAT /ANATOLIA/WHITE HARD (2rd RANK) - KG							
Please click on the name of Commodity Exchange if you want to see the other prices of products in that Commodity Exchange							
Name of Commodity Exchanges	Last date	Low (YTL)	High (YTL)	Avrg (YTL)	Amount (KG)	Number of Transaction	Total Price (YTL)
AKSEHIR TICARET BORSASI	2009-08-05 16:25	0.45 ▲	0.45 ▲	0.45 ▲	20,960 ▲	1 ▲	9,432.00 ▲
ANKARA TICARET BORSASI	2017-07-16 19:38	0.89 ▲	0.91 ▲	0.89 ▲	127,830 ▲	16 ▲	113,768.00 ▲
BANDIRMA TICARET BORSASI	2018-02-06 10:07	0.944 ▼	0.944 ▼	0.944 ▼	600 ▼	1 ▼	566.40 ▼
BIGA TICARET BORSASI	2017-07-12 11:01	0.803 ▼	0.85 ▼	0.833 ▼	9,000 ▼	2 ▼	7,497.00 ▼
CORUM TICARET BORSASI	2015-10-09 11:56	0.692 ▲	0 ▼	0 ▼	0 ▼	0 ▼	0.00 ▼
EREGLI/KONYA TICARET BORSASI	2013-08-12 11:58	0.72 ▲	0.76 ▲	0.7 ▲	0 ▼	0 ▼	0.00 ▼
ERZİNCAN TICARET BORSASI	2010-03-19 14:53	0.37 ▲	0.45 ▲	0.41 ▲	304,330 ▲	9 ▲	119,009.00 ▲
ESKİSEHIR TICARET BORSASI	2018-01-29 13:37	0.968 ▲	0.968 ▲	0.968 ▲	5,000 ▼	1 ▼	4,840.00 ▲
ILGIN TICARET BORSASI	2008-05-19 14:44	0.74 ▲	0.76 ▲	0.75 ▲	0 ▲	0 ▲	0.00 ▲
KARAMAN TICARET BORSASI	2013-07-09 09:09	0.67 ▼	0.67 ▼	0.67 ▼	5,000 ▼	1 ▼	3,350.00 ▼
KARAPINAR/KONYA TICARET BORSASI	2017-07-09 16:34	0.922 ▼	0.922 ▼	0.922 ▼	14,000 ▲	1 ▼	12,908.00 ▲
KONYA TICARET BORSASI	2017-08-10 14:21	0.966 ▼	0.966 ▼	0.966 ▼	6,000 ▼	1 ▼	5,796.00 ▼
POLATLI TICARET BORSASI	2017-12-13 15:15	1.18 ▼	1.18 ▼	1.18 ▼	22,000 ▲	1 ▼	25,960.00 ▲
SANLIURFA TICARET BORSASI	2009-07-17 12:03	0.44 ▼	0.49 ▼	0.46223 ▼	3,243,010 ▲	5 ▲	1,499,019.30 ▲
SUNGURLU TICARET BORSASI	2016-03-17 10:01	0.85 ▲	0.85 ▲	0.85 ▲	2 ▲	1 ▼	1,700.00 ▲

Source: <https://www.tobb.org.tr/Sayfalar/Eng/isbirilan-en.php>

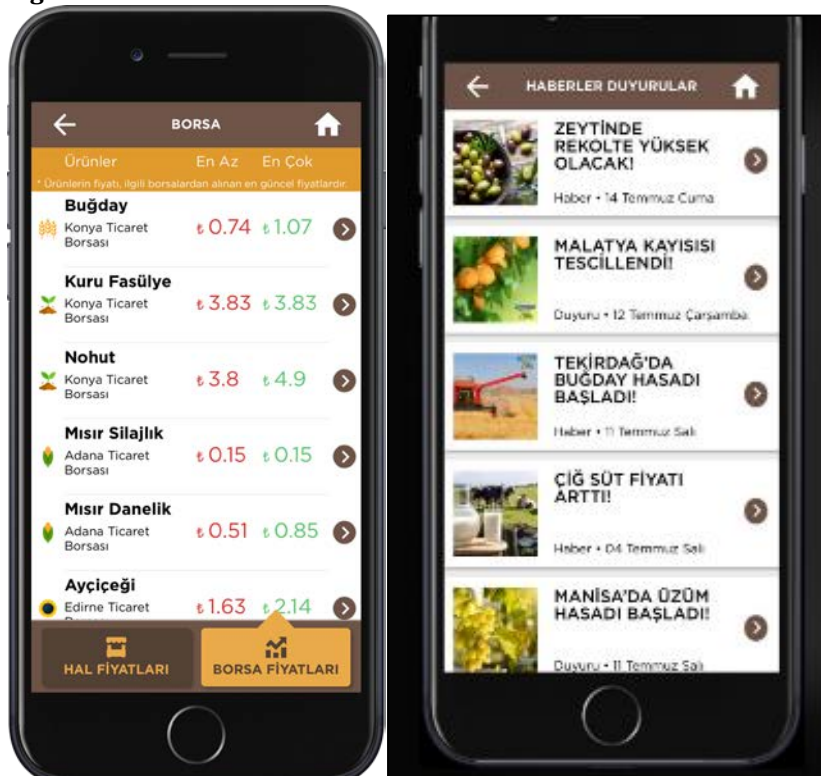
4.3.4 INNOVATIONS IN 2GMIS IN TURKEY

In Section 3.6.1 in Chapter 3, we cited the example of a private MIS platforms which has advanced beyond providing market information and include ICT capabilities which make it possible for producers to access inputs and farm services as well as allow lenders to monitor crop performance during gestation. DenizBank, which is a leading private bank in Turkey, is following this trail. It is a major player in the financial markets in Turkey. DenizBank is actively involved in agricultural finance. The mobile-based applications which it has developed (see Figure 22) allow farmers to access market information and to crucial farm services. The system consists of the following¹⁶:

- **Farm Registration (Tarlalarım):** allows users to register their farms, including details which make it possible to maintain a database on the following: type of product they produce, field location, field size, time of harvest and type/condition of the soil. This data facilitates the provision of extension advice, for example on fertilization, pest control and weather forecast warnings tailored to the needs of the farmers.
- **Advisory requests (Mühendise Sor):** this facility allows farmers to can ask questions about problems they have encountered and to obtain answers from experts, with an alert function to notify users. Based on the questions asked, the experts generate advice simulated according to growth model for the specified crop and send to farmers. There is also a “Message History” facility which allows users to see previous questions, unread and not-yet-answered questions.
- **Price information (Hal ve Borsa Fiyatları):** for accessing up-to-date/real-time information on prices for various agricultural products.
- **Rent a Tractor! (Kiralık Traktör):** makes it relatively easy for farmers to rent tractors from other farmers who are in the database. Farmers can post information on the system on offering or requiring tractor rental while other farmers are able to search for available tractors based on criteria such as model year, location and motor power. Farmers can also check for such details as rental fees, the location of farmer renting out the tractor as well as post any special requirements.
- **News (Haberler Duyrular):** this facility provides news about agribusiness, announcements on grants and incentives by government agencies, bank campaigns and unexpected weather forecast situations. Important news is delivered as notifications.

¹⁶ Source: DenizBank Press Release – 18 October 2017.

Figure 22: Denizbank Mobile Platform for Farmers



Source: Denizbank

It is apparent that, by facilitating access to information and services through the mobile application, DenizBank will be making a valuable contribution to farm management by its clients. It may be worthwhile, however, for the bank to consider other applications as indicated in the case in Section 3.6.1, which will improve its capacity to monitor farm performance and trading. This will reduce information asymmetry between the bank and its borrowers and contribute to the sustained expansion of finance to finance without increasing the risk of loan default to which they are exposed.

4.4 MIS IN AFRICAN GROUP OF OIC MEMBER COUNTRIES

Table 3 (see Subsection 3.4.2) shows a dependence of some OIC countries in West Africa on a few staple cereals and root crops. The table also shows that per capita consumption of cereals is generally rising. A similar situation exists in Central, Eastern and Southern Africa with maize being particularly prominent in the food systems of the latter two regions. Supply variability, usually linked to the vagaries of the weather, tend to create volatility in domestic prices for the staple grains, especially maize, in Eastern and Southern Africa (Corsino, 2016). This situation often puts policymakers under pressure to intervene to moderate price hikes, sometimes with deleterious effects (Porteous, 2017). This is despite the fact that agricultural output markets in these countries have been liberalised to a comparatively greater extent than, especially, the Arab Group of OIC countries (COMCEC, 2017).

Most of these countries have, therefore, piloted various market-supporting institutions including different types of WRS and commodity exchanges (Onumah, 2013). The outcome of the pilots has, however, been variable as progress has been rather slow partly because of disabling policy actions resulting from government interventions to cushion producers and consumers against price shocks (Coulter and Onumah 2002; Myers and Jayne, 2012). Food security objectives are often prioritised relative to the goal of fostering output market development. However, the case of the MIS in Burkina Faso, which is also linked to the development of WRS, shows that these objectives do not necessarily have to be mutually exclusive. That case is reviewed in this section.

4.4.1 BURKINA FASO: LEVERAGING SUB-REGIONAL 2GMIS FOR BENEFIT OF FARMERS

Afrique verte is a sub-regional agricultural MIS which operates in three OIC member countries in West Africa, namely: Burkina, Mali and Niger. It has been active in Burkina Faso since 1990 and disseminates price and other market information through mobile telephones and its website. (David-Benz et al., 2012). In addition, it supports policy advocacy by producer organisations with the aim of improving agricultural marketing systems in the participating countries. Confédération Paysanne du Faso (CPF), a national farmers' organisation is part of the Afrique Verte network. It was also an implementing partner in the EU-funded Farm Risk Management (FARMAF) Project which supported actions to improve and scale up the use of MIS and WRS specifically targeting SHFs. Prior to the launch of FARMAF all the WRS pilots in Burkina Faso focused mainly on assuring food availability during the "hunger season" (Coulter 2012). However, under FARMAF a commodity quality assurance system (QAS) was instituted which allowed farmers to sell to major buyers such as WFP, SONGESS (a government-owned grain trading company) and a large-scale private grain trader. Depositors were also linked to microfinance institutions (MFIs) in order to access inventory finance (NRI, 2017).

Unlike the strategy adopted by MVIWATA in Tanzania and ZNFU in Zambia, which targeted MIS-related investments under FARMAF in proprietary systems (see Section 3.5.1 in Chapter 3), CPF opted to collaborate with Afrique Verte in disseminating information on prices for all major agricultural commodities. The Afrique Verte also offers the following:

- A platform through which various parties can post requests to buy or sell a range of products; and
- Information on stocks available for sale, including details of the geographic locations where they are stored, especially when stored in specified warehouses.

CPF's participation made it possible to specifically link certified warehouses engaged in the WRS pilot to the MIS. It also invested in a switch from the *'Java application'* used by Afrique Verte, which was noted to have hampered access by most smallholder farmers because it was not available on most of the commonly-used mobile phones, to Android mobile telephones. In addition, CPF organised a series of awareness events to enable farmers *"to master the use of the new application on their mobile phones"*.

The results, as reported by NRI (2017), showed that farmers storing grains in the certified warehouses under usually checked prices disseminated via the phones before making

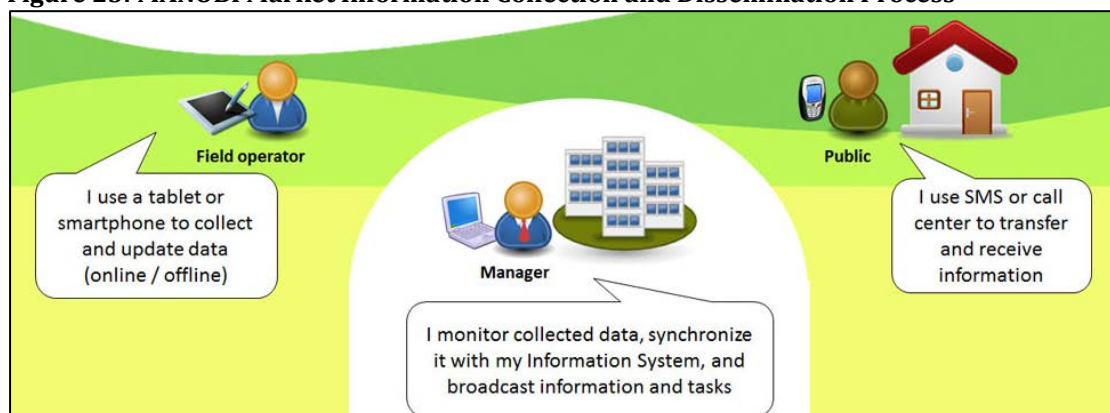
marketing decisions. There was strong evidence of seasonality in the use of MIS, peaking around the harvest season when most farmers consider selling their products but subsequently tailing off (NRI, *ibid*). There was also a high level of concentration of users' interest in a few products, in particular, cereals such as maize, sorghum, millet, cowpea and sesame. This is in contrast with strategies adopted most MIS service providers, who often aim to cover as wide a range of commodities as possible. The following reasons were cited by farmers for using the MIS: broadening the choice of buyers for farmers; facilitating negotiations based on knowledge of prices in relevant markets, and saving time for producers who are interested in selling. For most traders, the system offers choice in terms of who they can buy from; the types of products available in accessible markets, and locations they can sell into¹⁷.

According to the report by NRI (2017), the combined effects of trading using the WRS and taking advantage of available market information was an estimated 20% increase in income per kilogramme of grains sold by farmers. Whilst farmers sold the bulk of the stocks deposited (about 60%), they retained the rest for household consumption. Hence, household food security was not at risk because farmers had new, more remunerative marketing opportunities. MFIs were also able to value grains used as collateral for inventory finance and monitor this value by means of the MIS. Farmers enjoyed a boost in household income because they invested the credit provided in the production of cotton as well as in fattening sheep and goats for the market.

4.4.2 REGIONAL-LEVEL INNOVATIONS IN 2GMIS IN WEST AFRICA: MANOBI

Another example of a regional MIS in West Africa is the Senegal-based MANOBI, which has branches in Benin, Burkina Faso, Cote d'Ivoire, Mali and Niger. It was established in 2001 and, typical of the 2GMIS type, it uses modern ICT in the collection, processing and dissemination of market information as depicted in Figure 23. Its enumerators use tablets or smartphones to transmit field data automatically whilst information dissemination is via mobile SMS facilities and through call centres. To minimise access difficulties for smallholder farmers, it also facilitates information-sharing through a network of village chiefs and teachers.

Figure 23: MANOBI Market Information Collection and Dissemination Process



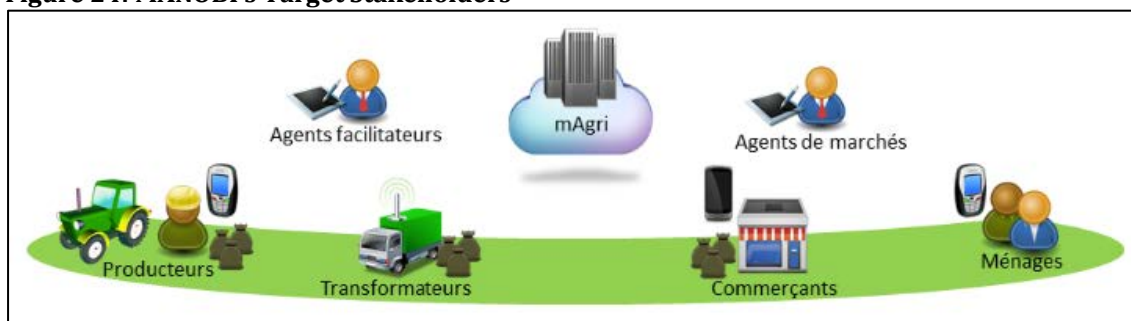
Source: <http://www.manobi.net/>

¹⁷ These emerged through a survey of users as part of an evaluation undertaken under FARMAF (NRI, 2017).

The services provided by MANOBI include the following:

- Database of producers including precise geo-referencing of their plots. MANOBI also maintains a database of seed suppliers, agricultural equipment suppliers, transporters, processors, small traders, wholesalers, exporters and importers.
- Related to the above, monitoring farm operations during the production cycle.
- Price-monitoring providing wholesale and retail prices for a wide range of agricultural products in different markets (urban and rural), including vegetables, grains, livestock, fish products, cocoa, mango, groundnut, coffee, cashew, rubber, seed and agricultural inputs.
- E-commerce facility allowing sellers (including producers of different sizes, i.e. large-scale and small-scale producers) to make offers for the sale of produce; and for aggregators and other traders to submit bids to buy produce. As with most of these platforms which are not linked to commodity exchanges or WRS, the performance against the bids and offers is not guaranteed by the service provider and therefore tends to limit the scale of uptake.
- General agricultural information including epidemic alerts, weather and output forecasts.

Figure 24: MANOBI's Target Stakeholders



Source: <http://www.manobi.net/>

The main beneficiaries of the services provided by MANOBI as illustrated in Figure 24 are: smallholder farmers (considered the primary target beneficiaries) as well as seed and agricultural equipment suppliers, transporters, processors, produce aggregators, traders, wholesalers, exporters and importers. They also share information with government organisations for policymaking purposes and to donors/NGOs working with smallholder farmers on various agricultural development projects. The farm monitoring services are also attracting uptake by banks.

The main benefits for producers using the services of MANOBI include the knowledge of prevailing prices, which enables them to negotiate better terms for the sale of their products. Their bargaining power with suppliers of inputs and other agricultural services was also enhanced as a result of access to information. Also improved is their credibility with banks through the farm monitoring services. The existence of the database on specific farmers, their geographic location and farming practices also eased produce traceability tracked by MANOBI, thereby enhancing eligibility for export, especially into niche markets (e.g. for organic produce and also under fair trade).

The benefits other stakeholders enjoy include the following:

- Banks are able to cost-effectively identify creditworthy farmers who want to access credit and can use the services of MANOBI to monitor borrowers.
- Suppliers can reduce their distribution costs through organising bulk distribution to groups of scattered smallholder farmers who order through the available facilities.
- Traders can also reduce the cost of sourcing produce through benefiting from information on stock availability and shortening the price negotiation process by utilising price information provided by the platform. Exporters can obtain similar benefits.
- Policymakers, donors and NGOs benefit in terms of taking advantage of information provided to devise and monitor implementation of various actions in the sector.

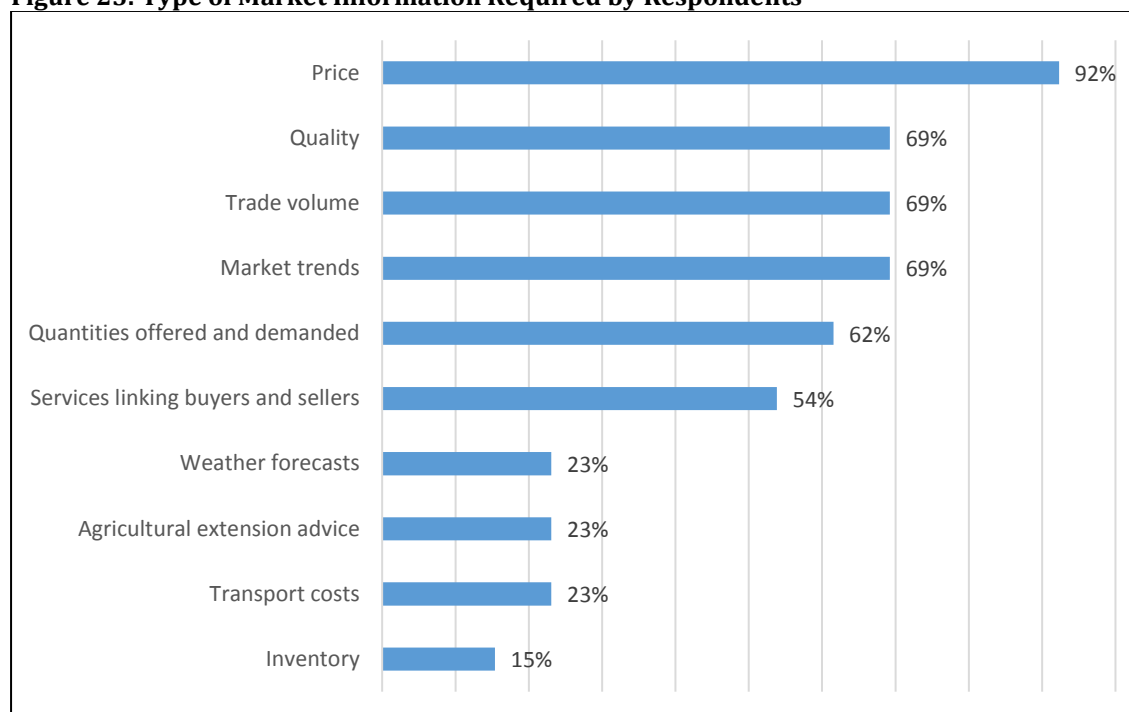
4.5 RESULTS OF ONLINE SURVEY ON MIS

The online survey findings are based on over 60 responses from about 600 experts surveyed. Most of the respondents are policymakers who use MIS and only a few (12%) are MIS providers. The questionnaire is provided in Appendix 2 and the profile of respondents is summarised in Appendix 3. It is apparent from Figure 25 that most of the respondents are interested in price information but, in addition, they prioritise access to the following information:

- Quality of commodities traded and related prices;
- Trade volumes, including quantities, demanded and supplied;
- Market trends;
- Linkage to buyers and sellers; and
- There was also interest in weather information as well as extension advice, transport costs and inventories. However, demand for such information appears to be on the low side.

The emerging evidence suggests a preference for weekly market information rather than daily, though the relative weight is low because the majority is only 36% as against 29% for those requiring information on a daily basis. The majority also prefer that market information is sent to them rather than them searching for it and an overwhelming majority (86%) want to receive the information via websites. This is most likely because most of the respondents are policymakers who have regular internet access and receive considerable information on a daily basis via the internet. Only a few, representing less than 30% of the respondents, preferred receiving information via mobile phones. Considering that a major part of the push for 2GMIS is based on information dissemination via mobile phones, this may appear to be a rather surprising outcome. However, evidence from case studies discussed in the next chapter is also consistent with this finding. Very few respondents preferred information dissemination via the radio and television, which had been the principal means by which information was disseminated under the first generation MIS.

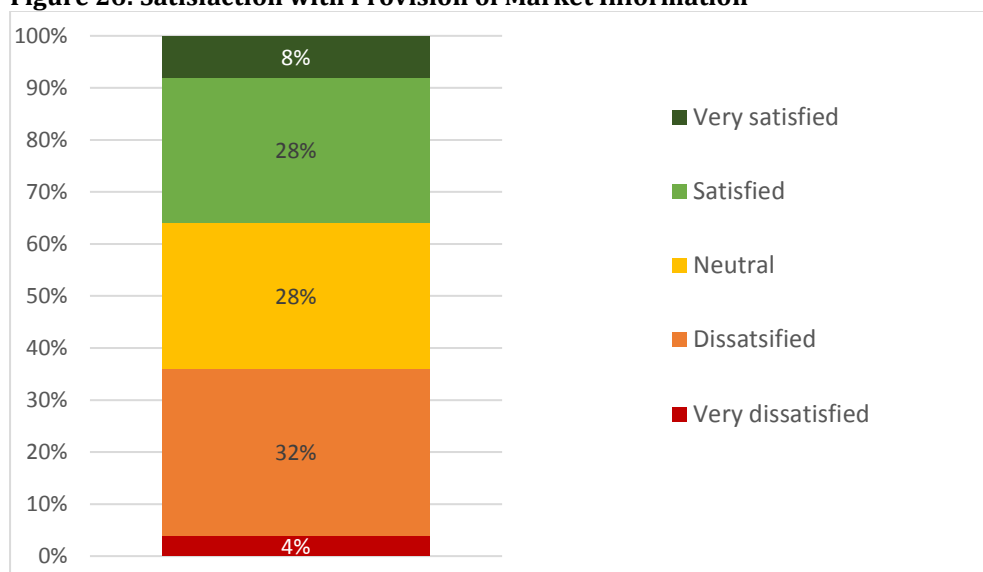
Figure 25: Type of Market Information Required by Respondents



Source: Online Survey Findings

Overall the level of satisfaction with MIS services among the respondents is rather mixed as shown in Figure 26. The number who expressed satisfaction is only slightly higher than those not satisfied. A sizeable proportion of the respondents are neutral in terms of their rating of the services provided. The quality of data provided seems to be one of the main reasons cited for dissatisfaction with existing MIS. For instance, there were complaints about the accuracy and reliability of the data disseminated. This may partly be attributable to the fact that most of the providers reported obtaining information and data via interviews with market players and not directly based on actual transactions which have taken place. Having transitioned from a paper-based system for recording and transmission of data to using digital technology may have speeded up information dissemination whilst reducing the scope for human error. However, the question of reliability and accuracy of data appears not to have been solved because parties with a specific interest, e.g. traders are the source of the information.

Figure 26: Satisfaction with Provision of Market Information



Source: Online Survey Findings

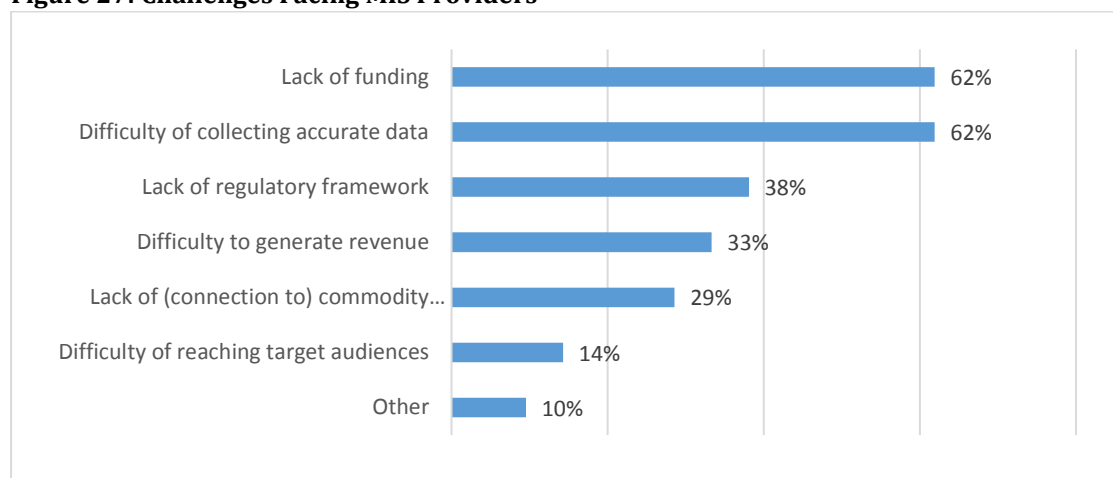
Some of the respondents indicated that the information provided was not sufficiently comprehensive and that the providers did not have systems in place to capture the needs of the target audience in order to tailor their services and products to meet those needs. Furthermore, the respondents complained about the insufficient analysis of the nominal price data disseminated, stressing that archived data which could even facilitate analysis by other parties is often difficult to obtain.

The service providers who responded indicated that though their primary target audience are farmers, traders and processors it is apparent that access tends to be dominated by policymakers, academia and inputs suppliers. This may be partly due to complaints about the reliability and timeliness of information provided, an issue that many of them appear to agree with (i.e. from their responses). Sustainability or lack of sufficient funding appears to be one of the most critical challenges facing the providers (Figure 27). None reported having achieved sustainability in the provision of MIS services and most of them reported are dependent on grants from donors and government. The contribution of user fees in funding operations appears rather marginal. The private providers who are less dependent on donor/government grants are mainly those engaged in commodity trading and are therefore in a position to cross-subsidise MIS provision. They do so as a means to generate additional commercial business. Though some acknowledge the usefulness of an enabling regulatory framework, this did not rank high among their demands.

When it comes to improving the functioning of MIS, almost 75% of the respondents stated that an effective regulatory framework can play a contributory role in further improvements. Specifically, many of the respondents suggest that enabling policies which government frame for MIS should, for example, provide clear guidelines regarding standardisation of data collection and dissemination in order to ease comparison of data from different MIS platforms and to improve the interoperability. This will involve ensuring that data collection methodologies are sufficiently standardised to allow for data comparisons as would the means

of sharing data (e.g. via APIs) in order to facilitate retrieval and analysis of data. Governments can also play an important role in assuring the reliability of information by ground-truthing data and monitoring data sources. The respondents also advocated that governments should provide funding for MIS, thereby assuring longevity.

Figure 27: Challenges Facing MIS Providers



Source : Online Survey Findings

4.6 CONCLUSIONS ON REVIEW OF MIS IN THE OIC COUNTRIES AND ONLINE SURVEY REPORT

It has been shown from the discussions in this chapter that MIS in OIC countries is moving from the 1GMIS to more advanced forms of 2GMIS as is happening globally. The transition includes both government-run and private MIS as well as national, regional and international platforms. In most of the Arab Group of OIC countries, public-run MIS are the most dominant. This appears to reflect the policy emphasis on mitigating the effects of price shocks on the local population, especially for imported food products such as wheat. In this Group, dissemination of national price information tends to be reinforced with tracking forecast domestic and international output of the strategic imported food produce. Though the price and other information which is disseminated is targeted at a wide range of actors in the relevant agricultural value chains, the main users are policymakers and officials of donor agencies working on food security issues. These parties monitor information in order to determine actions necessary to moderate spikes in international prices, including setting domestic wholesale and retail prices. Their actions are supported by a range of public institutions, including specific working committees which coordinate public and donor actions. Uptake of such information by private actors is, therefore, quite limited.

In the Asian and African Groups of OIC member countries, similar MIS and supporting public institutions exist for purposes of assuring national food security. However, in some Asian Group OIC countries such as Malaysia, which have thriving agricultural exports (e.g. palm oil products), market institutions including commodity exchanges have been set up to promote efficient produce marketing. In such markets, market information does not only consist of transparently-discovered prices but also analysis of price trends and monitoring of relevant supply and

demand data. This encourages uptake of market information by private actors, not so much because of the dissemination technology but more so because of the content and the fact the MIS is linked to market-supporting institutions.

Though there have been several pilots market institutions in the African Group of OIC countries, the institutions (e.g. WRS and commodity exchanges) remain underdeveloped. As such the most advanced capability to utilise market information is in the public sector, with its focus on food security. As in other cases in the OIC countries, national price information dissemination is integrated with regional and international MIS which provide output forecasts as well as track regional flows of strategic food products. There are also efforts to develop advanced 2GMIS platforms which facilitate monitoring of production and marketing by producers, which has the potential to increase the supply of finance to players in the agricultural value chains. However, uptake of the new types of 2GMIS remains low as output forecasting and stock monitoring capabilities are underdeveloped. The expectation is that progress is burgeoning as a result of advances in ICT and further development of market institutions in these countries.

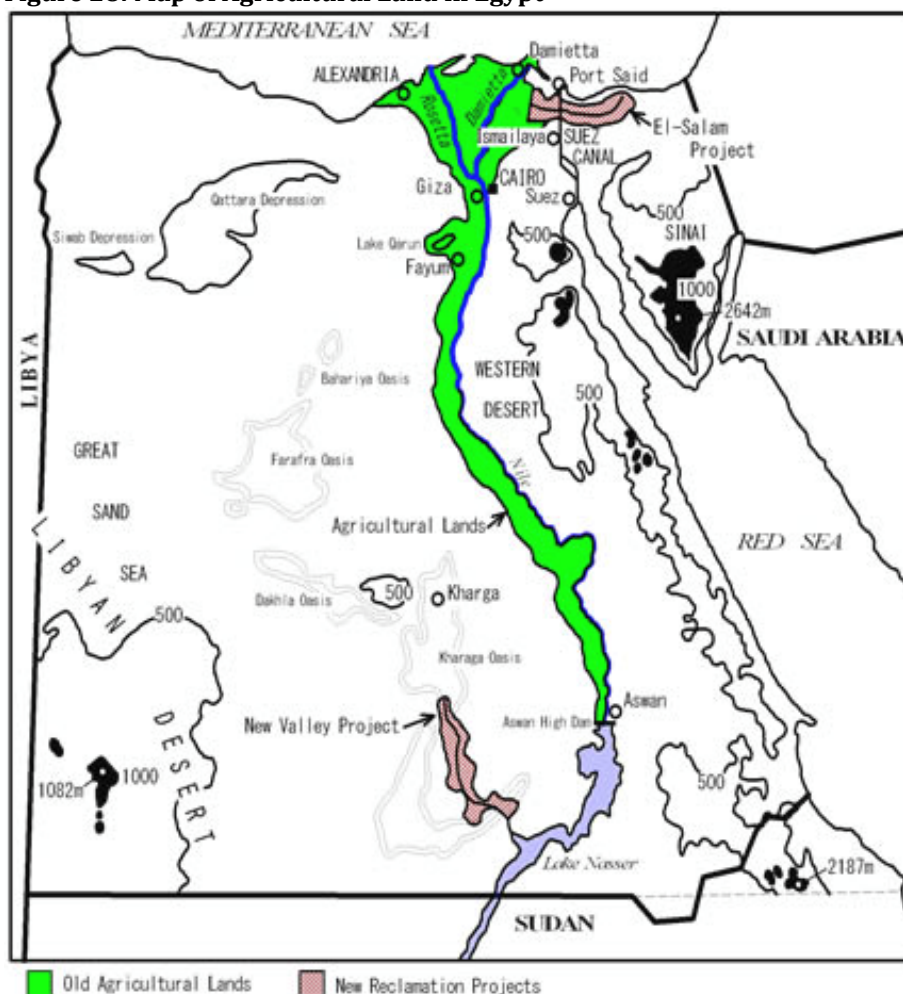
The evidence in this chapter is confirmed by the outcome of the online survey conducted as part of this study. It shows that there is still a need to improve existing MIS beyond the introduction of new dissemination technology in order to optimise their positive impact on agricultural marketing systems. The existing situation is stymieing uptake of the information services by market players (especially farmers and traders) though policymakers continue to use the information provided. Improving the content of the information provided, especially in aligning price information to opportunities to sell into formal market segments where trade is set around standardised weights and quality is one area that needs paying attention to going forward. These issues affect all types of providers, with the notable exception of commodity exchanges. Thus, the way forward does not appear to be to shift from government to provision by private or professional organisations but rather to deal with the identified weaknesses. Furthermore, for policymakers, it will appear that it is not the regulatory framework which is the biggest challenge in improving uptake of MIS. What is needed is to tie investments in improving MIS to efforts to promote innovative marketing systems such as commodity exchanges. This is because the transparent information they generate through transactions are reliable and can potentially trigger market participation by the main actors. These observations are further examined in the next chapter which reports on the three country cases.

5. EGYPT CASE STUDY

5.1 INTRODUCTION AND BACKGROUND

Egypt is an important producer, consumer and exporter of agricultural goods. Agricultural production is highly concentrated in irrigable zones along the Nile River and in irrigation schemes (Figure 28). Agriculture contributes around 16% to GDP and employs about 34% of all labour. Production is largely intensive using irrigation. Egypt's climate allows for three annual crops making it potentially highly productive. The agricultural sector is quite diverse. By value, vegetables are by far the largest crop followed by wheat, maize rice and fruits (see Table 6). Livestock production for meat and milk is substantial and involves producers of all scales. However, Egypt is a net food importer with notable shortfalls in the domestic wheat production with the supply gap filled by means of imports. Also imported are vegetable oils and many other food products (WTO, 2005).

Figure 28: Map of Agricultural Land in Egypt



Source: www.ipipotash.org

Table 6: Output of Selected Major Egyptian Agricultural Crops (Tonnes)

Commodity	Subcategory	2013	Main markets
Cereals	Maize	7,956,593	Domestic
	Rice	5,724,106	Mostly domestic
	Wheat	9,460,200	Domestic
Sugar	Beet	10,044,266	Mostly domestic, some refined, pulp and molasses exported
	Cane	15,780,005	Mostly domestic, some refined, pulp and molasses exported
Food legumes	Broad beans	157,639	Domestic
	Green beans	257,469	Domestic
	Peas	190,127	Domestic
Fresh fruit	Apples	629,613	Domestic
	Bananas	1,158,224	Domestic
	Dates	1,328,468	Domestic
	Grapes	1,434,666	Mostly domestic
	Mangoes	712,537	Domestic
	Melon	924,768	Domestic
	Olives	541,790	Mostly domestic
	Oranges	2,855,022	Domestic and export (fresh and juice)
	Peaches	281,119	Domestic and export
Fibres	Cotton	435,000	Mostly domestic
Fresh vegetables	Artichokes	304,298	Domestic
	Cabbage	555,474	Domestic
	Chillies and green peppers	565,424	Domestic
	Cucumber	504,558	Domestic
	Eggplants	1,246,707	Domestic
	Garlic	234,164	Domestic
	Onions	1,093,230	Domestic, some exported dry
	Potatoes	4,265,178	Mostly domestic but substantial export
	Pumpkins	494,664	Domestic
	Tomatoes	8,290,551	Domestic
	Eggs	470,863	Domestic
	Beef (all types)	888,182	Domestic
	Buffalo (all types)	779,619	Domestic
	Chicken (all types)	1,786,842	Domestic
Aquaculture*	All types	1,137,000	Domestic
Dairy	Butter (buffalo & cow)	121,900	Domestic
	Cheese (buffalo & cow)	374,750	Mostly domestic, some export
	Milk (cow)	2,908,071	Domestic

Source: FAOSTATS and representatives of government and donor agencies interviewed during visit to Egypt.

* = 2014 figure

Recent significant macroeconomic adjustments, including the depreciation of the Egyptian Pound, have encouraged a strong focus on exports (Torchia and Aboulenein, 2016). This has, to some extent, led to a dual agricultural economy with a relatively technology led and international food-safety compliant export sector and a largely traditional and non-compliant domestic sector. Sectors considered as strategic, such as wheat, have significant government policy engagement, including maintenance of guaranteed minimum prices and pan-territorial farmgate pricing.

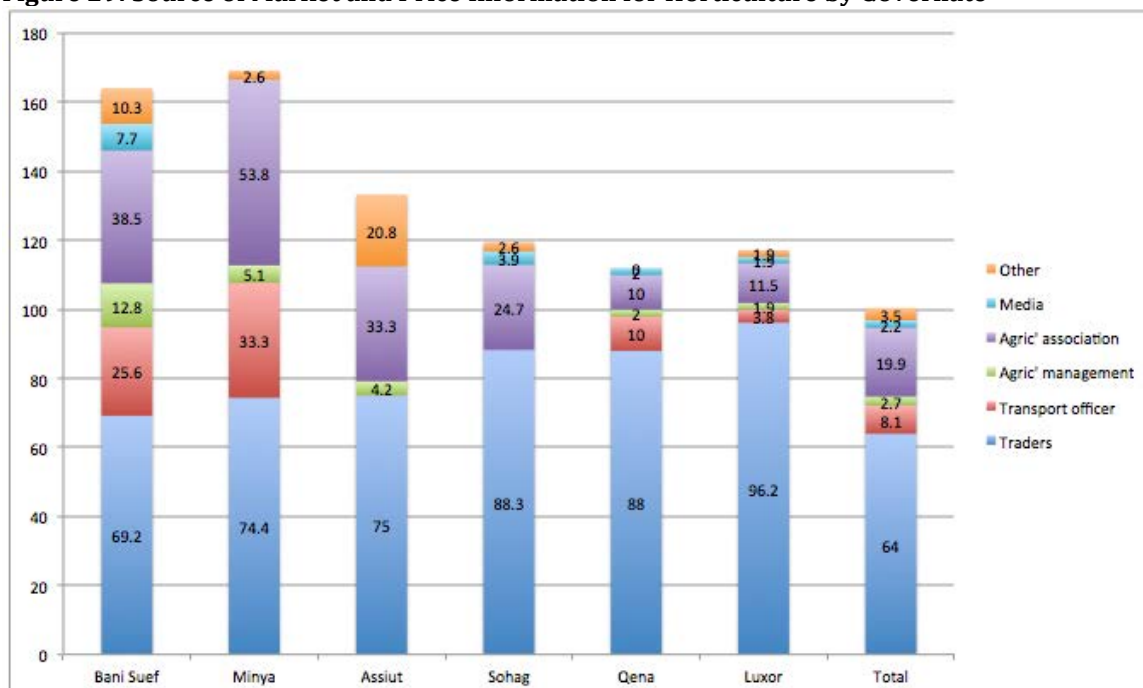
FAO/EBRD (2015) reports that the government buys all wheat at a price higher than the import parity price and this tends to discourage production of other crops such as potatoes, onions and forage. The government controls the price and organises all imports to make up for domestic shortfalls. Subsidies occur along the value chain from fertilizer to rationed 'baladi' bread given to 65 million Egyptians through a ration card system at a fraction of the free market price. Information about the wheat floor price is disseminated throughout the country through media,

but FAO/EBRD (2015) report lack of transparency on stocks of wheat and wheat products, deliveries, demand and forecasting. FAO/EBRD (ibid.) further estimate that the complexity of wheat tenders and postharvest costs adds USD30/tonne to the domestic price of wheat.

Among the challenges the country faces in boosting domestic food production capacity are land fragmentation (Alfiky et al, 2009), water-use conflicts (Fick and Bushra, 2014), environmental degradation and the impacts of climate change (Fawaz and Soliman, 2016). In addition, the agricultural credit system, necessary for smallholder farmers to invest in production, has largely collapsed in recent years. A National Agricultural Bank exists with over 5,000 branches but has a limited loan portfolio for smallholder farmers. The main cause is that farmers are not prepared to risk offering land as collateral and have no other sources of collateral to secure loans. This finding is supported by Christiansen (2011). Other challenges include the need to restructure the highly centralised wheat market as well as improve the informal and unstructured markets for other crops including tomatoes. Mobile phone coverage and ownership is relatively high and reported to be close to 100% in terms of ownership of handsets and over 30% in terms of ownership of smart phones.

Baseline information on farmers' market information sources and needs gathered from vegetable farmers in Upper Egypt by the El-Meehy (2011) and depicted in Figure 29 shows the range of different information sources as well as the high level of dependence of farmers on information provided by traders. Thus, the power and influence of traders in owning market information is clearly illustrated. It is also interesting to note that this is universal in Egypt regardless of land size, which varies across governorates.

Figure 29: Source of Market and Price Information for Horticulture by Governorate



Source: UNDP (2011)¹⁸

¹⁸ Adapted from the original in which some individual percentages did not necessarily add up to 100%.

5.2 MAPPING EXISTING MIS IN EGYPT

The main agricultural MIS in Egypt is run by the Ministry of Agriculture and Land Reclamation. Much of the existing system MIS seems to be derived from a long history of donor projects in different sectors, mostly USAID funded. Examples include the Market Information Project (MIP), the Cotton Sector Promotion Programme (CSPP) and the Agricultural Transfer and Utilisation Project (ATUP)¹⁹. The focus is mainly on the collection and dissemination of basic price information for strategic commodities gathered daily in the key Cairo wholesale markets. The Ministry collects price data from various governorate markets around the country and distributes this through fax. To date, the prices collected are not related to market arrivals and no supply data is collected or disseminated at this level.

Dissemination is done by notices in newspapers and through a 'banner' on the Agricultural News TV channel which airs daily. Government-run open markets are expected to display these prices. Some wholesale markets have websites that display these prices. A government-run mobile phone-based information system has been proposed but is not yet functional. This government system is mostly for fruit and vegetables. There is no similar system for livestock or livestock products, but Macfadyen et al (2012) reports on two real-time price information systems for aquaculture products (see Box 6).

Box 6: Aquaculture Price Information in Egypt

Fish farmers rely primarily on information provided by traders and other farmers. This is done by phone calls to knowledgeable farmers or from the official local government market prices. For example El-Obour market in Cairo (www.obourmarket.org.eg Nb: website no longer working when this report was written). This website historical and 1 – 2 day old prices for major markets, minimum and maximum daily prices, method of sale (e.g., in box) and grades.

Another source of information was claimed to be the General Authority for Fish Resource Development (GFARD – www.gfard.org). It was reported that even though fish farms are often close to markets, farmers are unaware of the daily volumes traded in those markets or about where their product goes after it has been sold from the farm.

The authors of the report concluded that the general availability of price information was good through the value chain, but that key elements were missing such as volumes, prices of competing products and export prices.

Source: Macfadyen et al (2012)

Several specific value chains were discussed with respondents during the value chain analysis and are summarised in this section. Egypt has a large, mostly informal dairy sector. Most milk is marketed in raw form by informal market agents and prices vary along and across chains. El-Amaiem (2014) argues that the complexity of the Egyptian milk marketing system and absence of policy frameworks is exacerbated by the paucity of market information for producers and calls for government intervention to set prices and standards. This type of view is fairly typical of many government officials in Egypt and was reflected in a number of the interviews for this case study.

¹⁹ Described in Erich and Fawzy, 2002. There are many more: see for example Christiansen et al (2011), Annex A.

The cotton sector is of historical importance in Egypt. Prices have been fixed centrally since 2015, however production, productivity and land under cotton has fallen consistently in recent years (UNIDO, undated). The mandate for setting prices has been given to the Alexandria Cotton Export Association (ALCOTEXA). This approach, which negates the need for market information systems, is fairly typical for the large strategic commodities in Egypt.

Tomatoes are a very important crop in Egypt and there is a significant tomato processing sector for paste. Egypt produces around 8 million tonnes of tomatoes on 200,000 hectares of land making it the fifth largest tomato producer in the world. Several different production systems are used in a range of geographies to ensure year-round supply. Studies point to very high postharvest losses and suggest that poor market information is one cause (Issahaku, 2012).

Reviewing the IFAD support to developing the tomato value chain, IFAD (undated) concluded that “the availability of a well-designed pre-production market information [system – sic] for planning purposes and indicative market prices at the selling point is critical in optimizing income among the target group”. This is a particular reference the challenge of integrating small-scale producers into value chains based on high standards and contracts. Within the ‘traditional’ tomato value chain much of the literature focuses on the absence of market information and the power that this conveys to market agents like traders and middlemen (IFAD, undated; and Kassem, 2015).

Egypt is one of the world’s largest orange producers with 2.7 million metric tonnes in 2015. Growing conditions are particularly favourable as well as advantageous harvest timing for international markets. About 50% of this production is consumed domestically with the rest exported fresh or as juice. Market information is by word of mouth and between the many farmers and rather smaller number of traders and exporters. In common with some other fruit and vegetable export sectors in Egypt, exporters claim that they have to buy all of the crops from farmers but then sell a high proportion (say 30%) on domestic markets at a discount. This leads them to set an average buying price that is below farmers expectations (GAIN, 2015 and interviews).

Herbs and spices are important crops in Egypt that are probably under-reported as many fall into other vegetable categories. Egypt produces fennel, marjoram, basil, mint, chamomile, thyme and geranium, largely for the export markets, but at least 20% is consumed domestically (Sallam and Shelaby, 2011). No information was available from interview on either public or private market information systems for these crops beyond the traditional relationships between producers and buyers or agents of buyers. The sector has an association, the Egyptian Spice and Herb Export Development Association, but this has no web page and does not provide price information.

Egypt is a member of the Agricultural Marketing Information System (AMIS), which is discussed in Chapter 3 (Subsection 3.4.1). Whilst Egypt is a full member, she faces the challenge of consistent data supply which is a prerequisite for use of quite powerful forecasting tools (see www.amis-outlook.org) available for the related stakeholders according to interviews conducted with the FAO and the AMIS Secretariat during this study.

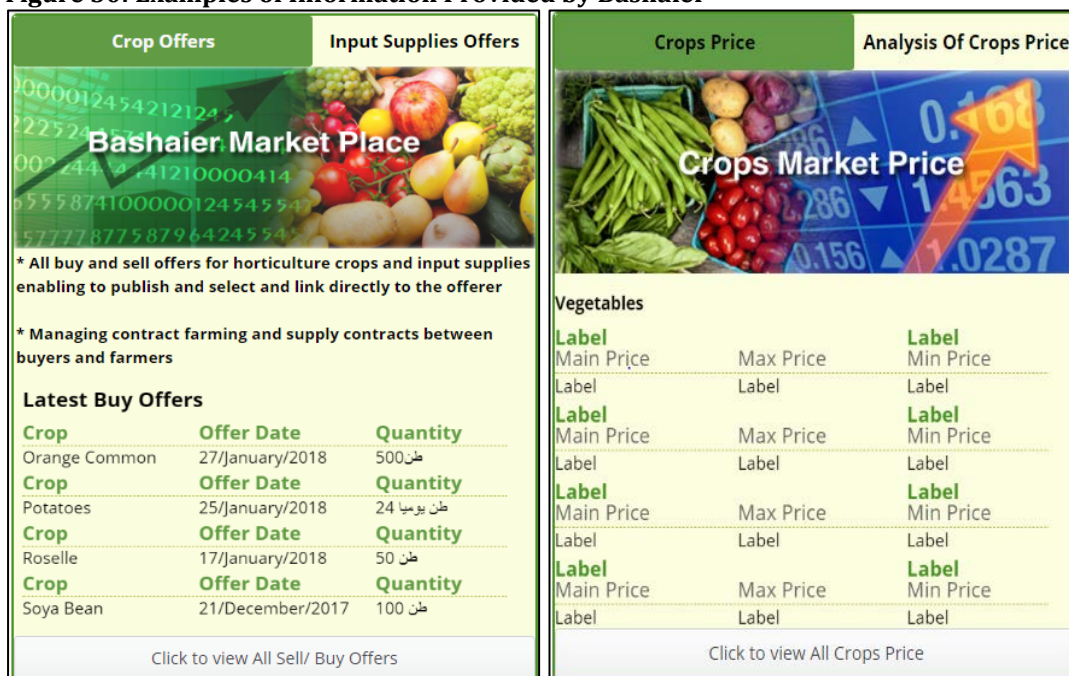
5.3 PRIVATE MIS INITIATIVES IN EGYPT

Outside the wheat sector, free trade operates. Respondents indicated that most market information in Egypt is shared by word of mouth. All Egyptian farmers are members of cooperatives, but these are largely moribund and do not provide any market information to members. Where exports are concerned and scale is large, farmers subscribe to private international price information systems specific to those commodities. The Chamber of Food Industries provides subscribers, who are all large-scale, with regular price and market news bulletins taken from international commercial services. Three new ICT-based MIS initiatives were identified during the mission, Bashaier, WE and HEIA. These are described below:

Bashaier

Knowledge Economy Foundation (KEF) claim that their Bashaier Network (<http://www.bashaier.net>) is the first of its kind in Egypt with the aim of doing digital trading through farmer groups. Features of the platform, which are similar to private 2GMIS in the Africa Group such as ESOKO, are regular prices, historical price analysis, weather reports and technical tips (see Figure 30). They also want to have a trading element. During a period of donor funding, they set up 50 farmer associations with 45,000 members, largely in the horticulture sub-sector. They have on-going initiatives in both micro-dairy and fish. At the moment the Bashaier network does not have elaborate monitoring and evaluation plans. The system is subscription based with different packages ranging from EGP8 – 25 a month. However, KEF acknowledged that sustainability of the system largely depends upon KEF finding new donors.

Figure 30: Examples of Information Provided by Bashaier



Source: www.bashaier.net

Horticulture Export Improvement Association (HEIA)

Started in 2005 under a USAID funded project, the Horticulture Export Improvement Association included market price bulletins for its members three times a week. Christiansen et al. (2006) reported that the system was unsustainable and no evidence could be found of it during this short case study.

The Poultry Bourse

Egypt set up a Poultry Bourse in 2002 with offices in all Provinces. All commercial poultry producers have to sell through the Bourse and this is regulated by the Ministry of Agriculture. All delivery trucks have transponders and this allows all shipments of live chicken to be traced. A fee is charged for this service. Daily prices are set by a committee above the cost of production and allowing a deviation for distance. The prices are then distributed by the government television service or word of mouth.

The case for this system was based upon the power asymmetry between poultry producers and market agents which was forcing prices below production costs. The poultry bourse is an interesting and novel model. Forcing all participants to use the bourse and its single price against a fee negates the market information 'cost' for sellers and changes the power dynamic of the market.

5.4 ASSESSMENT OF EXISTING MIS IN EGYPT

Christiansen et al. (2011) in a study over six years back noted that smallholder farmers are held back by limited access to reliable market information and that this situation hampered planting decisions as well as marketing decisions, especially in terms of choice of trader/wholesaler with whom to trade. It can be reported that the situation has not changed much as at the time of the mission and there is need to improve the system. One area which needs to be addressed is that of enabling policies in the agricultural sector. For instance, government control of the wheat market does not only limit the utility of market information for players in that chain but also constraints investments in other subsectors.

The tomato sub-sector is a good example. Here farmers use state of the art crop management, production and traceability practices in order to enter the European Union market. The Government of Egypt has supported this effort with a number of policies (UNIDO, 2015). In the domestic market, no such policy support exists and losses are reported to be very extensive²⁰. Segmentation of the market which results from this makes interpretation of market information rather difficult and discourages uptake. Furthermore, the private MIS which exist for crops such as tomatoes disseminate information mainly through televisions and bulletins in wholesale markets and are unavailable to smallholder farmers.

A rough map of the Egyptian MIS is shown in Table 7. During the short case study it was not possible to completely explore the entire Egyptian agricultural sector in detail, therefore this table generalises based on interviews with key informants in the Ministry of Agriculture.

²⁰ MALR (pers. comms.)

Table 7: An Overview of MIS in Egypt – Some Examples Identified During the Case Study

Sector	Subsector	Scale	Public*	Private#	Notes
			Identified MIS		
Grains	Wheat	Commercial/large	✓	✓	Floor price set centrally and provided by local government
		Small/medium	✓	✓	
	Rice	Large	-	-	No specific information available
		Small	-	-	No specific information available
Fruit & veg	Bananas	Large	-	-	Private sector use international prices
		Small	-	-	No specific information available
	Strawberries	Large	-	✓	Private sector use international prices
		Small	-	-	No specific information available
	Onions	Large	-	✓	Private sector use international prices
		Small	-	-	Some efforts with projects only
	Tomatoes	Large	-	✓	Private sector uses international prices – an initiative by Heinz.
		Small	-	✓	Some efforts with projects only
Herbs & spices	Fennel, marjoram, basil, mint	Small/medium commercial	-	-	None identified
Meat	Beef	Large/commercial	-	-	No specific information available
		Small	-	-	No specific information available
	Poultry	Large	-	✓	Poultry bourse
Aquaculture	Fish	Large	✓	-	Local government
		Small	✓	-	Local government
Dairy	Milk	Large	-	-	No specific information available
		Small	-	-	No specific information available

Source: Interviews

* Refers to the MALR MIS

refers to open source international MIS sources

No evidence was found in Egypt to suggest that the existing MIS, either public or private, are linked to the development of market-supporting institutions such as warehouse receipt systems (WRS) or commodity exchanges. There also does not appear to be any initiative linking the MIS to sustainable agricultural credit delivery system.

Despite numerous international projects and NGO efforts, not a lot seems to have changed in Egypt for the past decade or more when USAID (2006) identified the following issues:

- Small farmers often have less information about output prices than local traders or exporters, and thus have a weak bargaining position at the time of sale or at the time a contract is set for future delivery
- Farmers lack critical information about the optimal timing of planting and marketing of crops.
- Lack of suitable contract conditions and enforcement mean that agreed prices are in any case hard to maintain and farmers struggle in these circumstances because they have no independent source of price information for validation of claim.

It is apparent from the foregoing that Egypt has under-invested in MIS as a means of improving agricultural productivity. An impact of this in the long term has been that the private sector has invested in and evolved its own MIS, which means that any new public or private systems of information supply have to compete with these sunk costs.

Linked to this is evidence from interviews conducted indicating the need to build capacity especially at the level of small-scale farmers in using up to date ICT systems which can unlock the huge potential available, reduce the currently high (but unmeasured) postharvest losses and promote important strategic goals such as equity, food security and food safety.

6. INDONESIA CASE STUDY

6.1 INTRODUCTION AND BACKGROUND

Indonesia was selected for this study due to the fact that it has an up and running agricultural MIS, and the existence of a donor-supported MIS has been in place since the 1980s and 1990s (Shepherd, 1997; Shepherd and Schalke, 1995). Indonesia is the largest economy in South-East Asia and has progressed rapidly over the past decade into a dynamic, highly competitive and decentralized electoral democracy with a rapidly growing middle class. Steady economic growth has led to a gradual reduction in overall poverty in the country, which fell from 17 percent in 2004 to 11 percent in 2014. At the same time, nearly 40% of Indonesians still live just above the national poverty line, and these households are vulnerable to shocks including a rapid increase in food prices. While the agricultural sector's share of the country's GDP is reported to have declined markedly during the last five decades, it still provides income for a major proportion of Indonesian households, contributing 17% of GDP (IFAD 2015). However, according to the World Bank (2010), the sector has since the 1990s been characterized by stagnation and low productivity due to years of declining private- and public-sector investment. The main crops produced in Indonesia are listed in Table 8.

Table 8: Indonesian/World Agricultural Production, Selected Commodities

2016 Production ('000 MT)			
	Indonesia	World	Indonesia %
Palm oil	36,000	66,855	54%
Rice*	37,000	483,662	8%
Coffee**	10,900	159,312	7%
Sugar	2,200	179,636	1%
Maize	11,350	1,036,898	1%
Cassava	23,436	268,000	9%
Natural rubber	3,153	13,245	24%
Poultry	1,660	89,470	2%
Cocoa*	728	4,450	16%
Tea	154	5,560	3%
Coconut oil	970	3,440	28%
Tobacco	196.3	7,176	3%

* Milled production

** in '000 60-kilogram bags

Source: adapted from COMCEC (August 2017), which is based on USDA Foreign Agricultural Service (2017), FAO (2017), International Trade Center (2017).

According to IFAD (2015), Indonesia's National Long-Term Development Plan 2005-2025 sets out the country's key aims in terms of poverty reduction and development as follows:

- Achieving equitable development that gives greater attention to those who are disadvantaged, including poor communities in remote or disaster-prone areas;
- Increasing national food security and self-reliance based on local diversified food resources; and

- Developing rural areas through the promotion of agricultural production and agro-industry, by building capacity, developing infrastructure and enhancing access to information, markets and financial services.

In addition, an important feature of the agricultural policy framework is the establishment of medium-term (5-year) plans. While the MoA has the main responsibility for policy development and implementation, several other central government ministries and agencies are involved, as are local government agencies since decentralization (WTO, 2013). The current agricultural policy looks to balance support for agricultural producers, stabilise food prices for consumers, and ensure the availability of food at reasonable prices, while the existing intervention mechanisms include national stockpiling, pricing policy, input subsidies (e.g. for seeds and fertilisers), import measures (e.g. tariffs and requirements), and the RASTRA/RASKIN “rice for the poor” distribution programme (ICA/COMCEC, 2017). There are several agricultural and food market institutions, such as BULOG (marketing board), PTPN III and PT Pupuk Indonesia (both state-owned economic enterprises), and COFTRA (licensed public warehousing company) (ICA/COMCEC, *ibid*).

The main MIS which exist in the country are all based in the public sector. The host institutions for MIS in Indonesia are Ministry of Agriculture (MoA), the Badan Pusat Statistik (BPS or National Office of Statistics) and the Ministry of Trade (MoT). The Bureau of Logistics (Badan Urusan Logistik or BULOG), which is a government-owned company, as well as the local office of the World Food Programme (WFP) are also involved in providing market information.

This multiplicity of public sector MIS in a country is an experience which is not uncommon in many developing countries, including cases from West Africa such as Ghana (Shepherd, 1997). It is therefore, a case from which valuable lessons are expected in this review.

In Indonesia, provision of market information services is regulated under the Law of Statistics – i.e. Act. No: 16/1997 and other related legislation such as Government Regulation (PP) 51/1999: Operation Manajemen of Statistics Act. No: 32/2004. Under this law, the BPS has statutory authority to coordinate the collection and dissemination of statistics, including price and other market-relevant data (Nuryanti and Kadamanto, 2015). Though each sector ministry (e.g. Ministry of Agriculture) may have a statistics department, BPS exercises a coordination function.

6.2 MAPPING EXISTING MIS IN INDONESIA

6.2.1 GOVERNMENT-RUN MIS IN INDONESIA

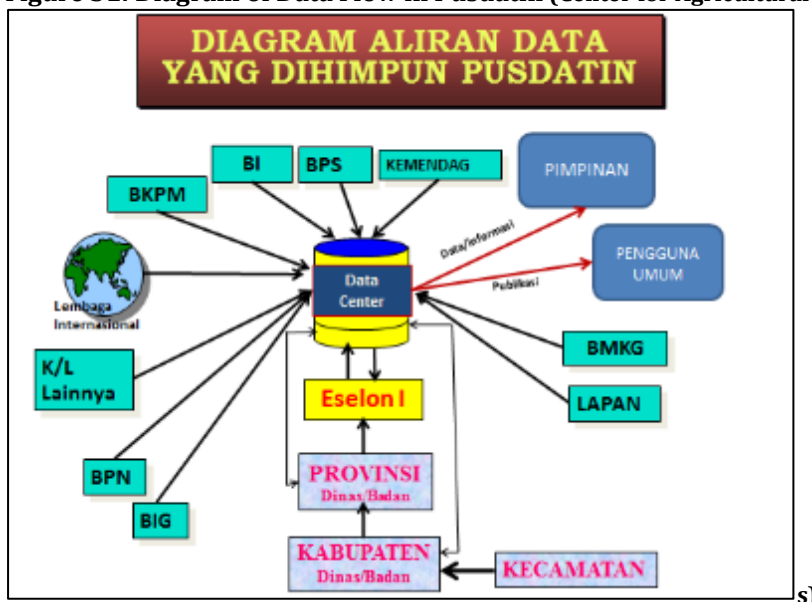
The Ministry of Agriculture (MoA) is the main provider of agricultural market information in Indonesia. Its Centre for Agricultural Data and Information Systems (CADIS) is the main unit responsible for this function²¹. The MoA, in addition to collecting, analysing and publishing agricultural market information, is also involved in collecting other socio-economic and technical data for policymaking purposes. District and provincial level staff of the MoA collect price data at farmgate and from the main markets in rural and urban areas. The data collected is processed at the Centre and shared with the BPS as well as other agencies. The main crops and livestock products reported on are:

²¹ <http://pusdatin.setjen.pertanian.go.id/>; www.pertanian.go.id/

- Food crops such as rice, maize, soybeans, cassava, peanuts;
- Horticultural produce including onions, chillies, carrots and pineapples;
- Estate commodities like sugar and rubber; and
- Livestock products such as beef, poultry meat, eggs and milk.

Usually, the prices are reported in Rupiah²² per kilogram (Rp/kg) except in the case of products such as milk (Rp/litre) or eggs (Rp/piece). In most cases, there is no quality differentiation in terms of prices reported (i.e. one price for the commodity without an indication of the grade). However, for rice, which is quite important in Indonesia's food system and agricultural economy, different prices are reported for different grades, for example for medium or premium quality. Figure 31 provides an overview of the flow of primary data through to receipts of the processed information.

Figure 31: Diagram of Data Flow in Pusdatin (Center for Agricultural Data And Information System



Source: Nugroho (2016)

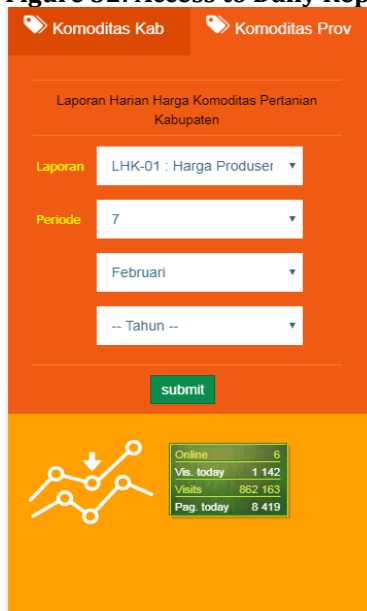
Dissemination of the information generated is through the dedicated website of the MoA. Figure 32 provides an overview of the data flows between the district and provincial staff and the Centre and its dissemination channels, which include the BPS as well as international partners such as the UN Food and Agriculture Organisation (FAO) and the Association of Southeast Asian Nations (ASEAN).

The MoA publishes "Daily Reports on Agricultural Commodity Prices" on the section of its website entitled "*Laporan harian harga komoditas pertanian*" (see Figure 32). The price data is sent by SMS by agricultural staff from districts or provincial headquarters to the MoA, where they are automatically entered into a database and made available on the website. Receipt of the

²² Indonesia's local currency.

data is confirmed, and the data are validated by CADIS staff. The price data published by the MoA focuses on farmgate prices and wholesale prices. Although the main means by which the Ministry publishes price data is via its website, it also uses other means of dissemination such as radio, television, newspapers (magazines), and social media. For example, the Bureau of Public Relations in the MoA publishes an agricultural newspaper *Sinartani*, which is available in hard copies and online (Figure 33).

Figure 32: Access to Daily Report on Agricultural Commodity Prices in Indonesia



Source: MoA/Gol (www.pertanian.go.id/)

Figure 33: Examples of Sinartani Agricultural Newspaper in Indonesia



Source: MoA/Gol (www.pertanian.go.id/)

6.2.1.1 Funding of Government MIS

Personnel costs are covered by the MoA but this does not entail incremental salary expenditure as the staff undertake other core activities. For example, at district level, it is the Agricultural Officers who collect price information from farmers by phoning them and also by visiting local markets and asking traders about prevailing prices. This does not detract from their core functions such as providing farm extension to farmers and monitoring production and/or yield data. Likewise, at the CADIS the staff of 9 in a dedicated sub-division spend only about 25% of their time working on the MIS as they perform other official tasks. The financial resources for the required ITC infrastructure (e.g. computers, bandwidth) are again provided by MoA. The Ministry also pays each of the district and provincial staff Rp 500,000 (i.e US\$41) per month to cover data collection and transmission costs. In the past, the MoA also purchased telephones for the staff but this has been discontinued.

6.2.1.2 Role of The Ministry of Trade In MIS

The main remit of the Ministry of Trade (MoT) as far as information relevant to agricultural markets is concerned is to collect and disseminate information on food prices at retail level, mainly consumer prices. The data is collected mainly from urban areas – from about 30 big cities in the country. The MoT shares the information it collects with other government agencies including the MoA, which publishes the price information as part of its MIS function. However, the MoT and the BPS use the information collected primarily for tracking inflation and, in particular, food prices for purposes of advising government actions to mitigate any potential food price shocks. The MoT usually publishes the information on its website targeting other parts of government and private sector actors. The publication is in both English and the official Indonesian Bahasa language.

The main remit of the Ministry of Trade (MoT) as far as information relevant to agricultural markets is concerned is to collect and disseminate information on food prices at retail level, mainly consumer prices for selected commodities (Figure 34 below). The data is collected mainly from urban areas – from about 30 big cities in the country. The MoT shares the information it collects with other government agencies including the MoA, which publishes the price information as part of its MIS function. However, the MoT and the BPS use the information collected primarily for tracking inflation and, in particular, food prices for purposes of advising government actions to mitigate any potential food price shocks. The MoT usually publishes the information on its website targeting other parts of government and private sector actors. The publication is in both English and Bahasa Indonesian.

6.2.1.3 Role of the Badan Pusat Statistik (BPS or National Office of Statistics)

The coordinating role of the BPS entails receiving all data and information collected by the MoA and MoT though they also sometimes collect primary price data from the same sources as the others. Whenever the BPS publishes any information or data it acknowledges the primary source²³. Its role is seen as important in ensuring quality control of the data published in order to avoid different, and sometimes confusing, data being published by different government departments. This is not only to improve the quality of data which non-government actors can

²³ <http://setkab.go.id/en/president-jokowi-only-bps-is-responsible-for-data/> (accessed 26/10/2017)

access but also to ensure that government policy actions are informed by the most reliable data and information available. Part of its coordinating function involves holding review meetings, for instance, with the MoA and MoT.

Figure 34: Food Price Statistics by Ministry of Trade, Republic of Indonesia

Home // Statistics // Prices // National Price Table

National Price Table

Period : 2017 ▾ September ▾ [Tampilkan Data](#)

No	Commodity	Units	Period: Septem									
			4	5	6	7	8	11	12	13	14	15
1.	Unpacking Cooking Oil	Rp / kg	11,486	11,417	11,423	11,418	11,433	11,446	11,455	11,442	11,457	11,428
2.	Beef	Rp / kg	116,450	116,288	115,972	116,371	116,420	116,371	116,371	116,469	116,447	116,450
3.	Ranged Chicken Meat	Rp / kg	31,802	31,610	31,536	31,298	31,105	30,760	30,659	30,505	30,497	30,298
4.	Ranged Chicken Eggs	Rp / kg	22,857	22,913	22,842	22,534	22,560	22,727	22,622	22,612	22,651	29,800
5.	Wheat Flour	Rp / kg	9,104	9,101	9,106	9,098	9,104	9,106	9,096	9,096	9,070	9,106
6.	Imported Soybean	Rp / kg	10,652	10,672	10,684	10,684	10,659	10,684	10,656	10,640	10,685	10,652
7.	Local Soybean	Rp / kg	10,699	10,715	10,749	10,699	10,709	10,724	10,724	10,699	10,709	10,724
8.	Medium Rice	Rp / kg	10,596	10,610	10,613	10,614	10,617	10,595	10,590	10,567	10,621	10,665
9.	Granulated Sugar	Rp / kg	13,114	13,106	13,092	13,084	13,056	13,065	13,069	13,028	13,024	13,038
10.	Curly Red Chilli	Rp / kg	30,971	31,023	30,175	30,448	29,772	30,387	29,811	30,206	29,597	29,800
11.	Onion	Rp / kg	28,122	28,014	27,619	27,665	27,376	27,330	27,135	27,150	26,906	26,736

Source: Direktorat Jenderal Perdagangan Dalam Negeri, Kementerian Perdagangan

Source: <http://www.kemendag.go.id/en/economic-profile/prices/national-price-table?year=2017&month=9>
(accessed 26/10/2017)

6.2.1.4 Badan Urusan Logistik (BULOG) and MIS in Indonesia

The Bureau of Logistics, that is Badan Urusan Logistik (BULOG) is a government-owned food marketing company. It is the key market institution through which the Government of Indonesia intervenes in agricultural markets in the country. The Government is mainly involved in stabilizing the price of rice through BULOG's guaranteed purchase of rice from domestic producers at a set price as well as through its import activities (WTO, 2013). The procurement price for rice purchases is usually determined before the planting season (around October), taking into account factors such as moisture content; impurities; broken grains; and whitening agents.

According to GAIN (2017), in February 2017 the Government of Indonesia issued Presidential Decree No. 20/2017, moving BULOG's authority on issues related to the procurement, import, management of government stocks, and government purchasing prices of paddy and rice to the Ministry of Agriculture (MoA). As a consequence, BULOG will continue its role as the implementer of these programs, but all decisions will be taken by MoA (GAIN, *ibid*).

BULOG's food price stabilisation role involves selling into the domestic market as well as engaging in managed imports and exports, especially of rice, in order to stabilise prices. BULOG publishes information on its buying prices as well as stock levels for various staple foods, mainly through its website²⁴. Figure 35 is an illustration of the publication. This information is perceived by market actors as indicative of conditions in the markets in which BULOG trades and therefore partly informs their marketing strategies.

Figure 35: Information on Price and Stocks of Staple Food Commodities on BULOG Website

Raskin		Harga Pembelian Pemerintah	
RTM Sasaran	14.212.742 RTM	GKP Tingkat Petani	Rp.3.700/kg
Pagu setahun	2.558.294 Ton	GKP Tingkat Penggilingan	Rp.3.750/kg
Realisasi	2.133.068 Ton	GKG Tingkat Penggilingan	Rp.4.600/kg
RTM Penerima	14.212.742 RTM	GKG di gudang BULOG	Rp.4.650/kg
24/10/2017		Beras di gudang BULOG	Rp.7.300/kg
Realisasi Pengadaan		Inpres no. 5 tahun 2015	
2.052.147 Ton			
24/10/2017			

Source: <http://www.bulog.co.id/> (accessed 25-10-2017)

6.2.1.5 Utilisation of Market Information By WFP In Indonesia

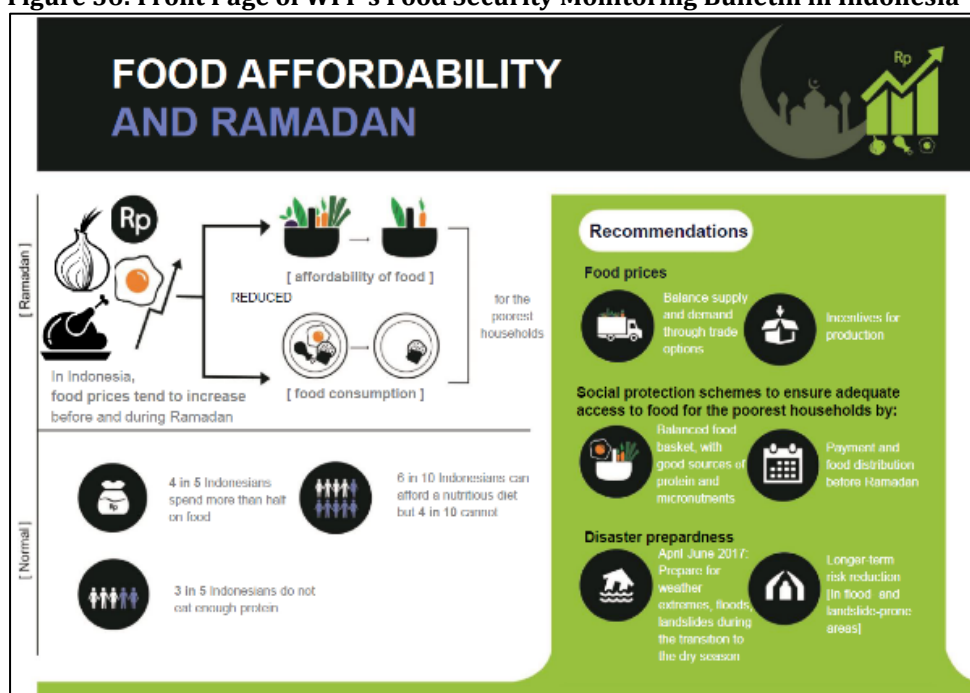
The World Food Programme (WFP) produces Food Security Monitoring Bulletins which cover topics such as crop production, demand for and prices of major food products and weather

²⁴ BULOG website: <http://www.bulog.co.id/>

reports. Publications are available in both Bahasa Indonesia and English. The WFP's Food Security Monitoring Bulletin is produced with funding support provided by the Government of Germany. The bulletin is produced by a Technical Working Group (TWG) led by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG). Members of the TWG include the MoA, the National Institute of Aeronautics and Space (LAPAN), National Disaster Management Authority (BNPB) and the Central Bureau of Statistics (BPS). The WFP and FAO provide technical support, including the generation of maps and data analysis.

The bulletin tracks food retail prices (based on Ministry of Trade data), for example before and during the Ramadhan (fasting period), showing price fluctuations (often in graphs) and the potential impact on the most vulnerable households. In Box 7 is an example of WFP's Food Affordability Report, the cover page of which is depicted in Figure 36. Food prices tend to rise before and during Ramadan, reflecting the increased seasonal demand during the fasting month. While retail prices of rice, cooking oil, sugar, fresh fish (mackerel) and beef meat can increase slightly around this time, prices of chicken meat, eggs and onion show more consistent and higher increases over the past 10 years. In 2016, national retail prices of chicken meat rose by 12.9 percent and chicken egg prices by 9.2 percent in nominal terms, compared to the prices 3 months prior to Ramadan. This increase was consistent with the trend over the past 10 years. Prices of onion around Ramadan in 2016 show several increases, likely caused by other factors beyond the Ramadan-driven demand. However, in the past 5 years, the rise in onion prices before Ramadan was more significant, ranging from around 10 to 50 percent in nominal terms, compared to the prices 3 months before Ramadan. Increases in rice, cooking oil, fresh fish and sugar prices during Ramadan are not as consistent as they are for chicken meat, eggs and onion. The price trends are illustrated in Figure 37.

Figure 36: Front Page of WFP's Food Security Monitoring Bulletin in Indonesia



Source: Food Security Monitoring Bulletin, INDONESIA, Special Focus: Food Affordability and Ramadan, Volume 6, April 2017, WFP

Box 7: Example of WFP's Key Messages from Food Affordability Report

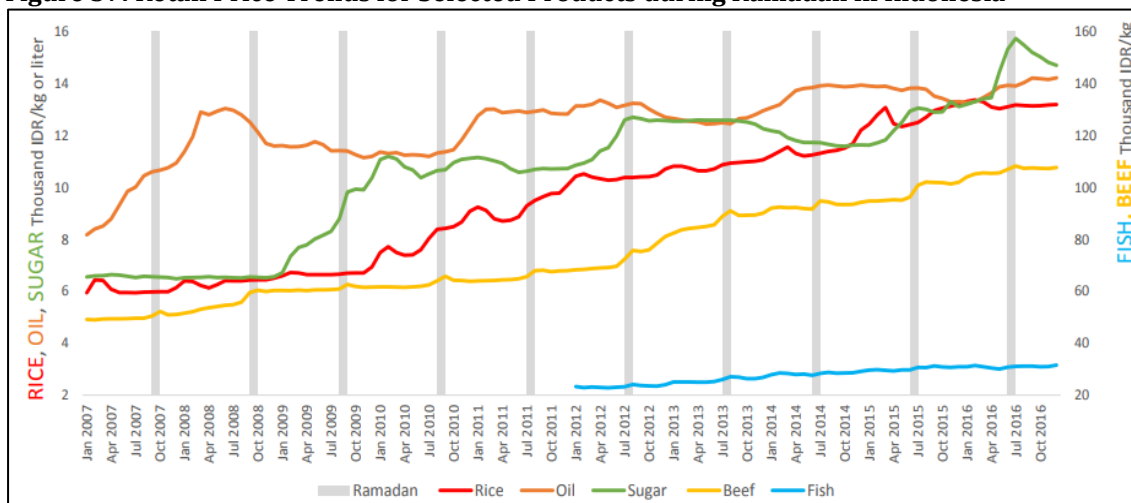
In Indonesia, food prices tend to rise before and during Ramadan, especially for chicken meat, eggs and onion, reflecting the increased seasonal demand during the fasting month. Price fluctuations stress food and nutrition security of the most vulnerable households who spend a large proportion of their expenditures on food.

Recommendations:

- To discourage price spikes of key food commodities such as chicken meat, eggs and onions during Ramadan, the Government should consider trade options to balance supply and demand before the fasting month, and consider proper incentives to increase the production of these commodities. Access to food for the most vulnerable households through the existing social protection schemes.
- To mitigate the transfer of risk from food price increases on the poor households, payments or distribution of food through social protection schemes such as PKH and Rastrea should be made before the fasting month
- To address the inadequate consumption of nutritious food, food basket should be balanced, providing commodities that are a good source of protein and essential micronutrients, such as eggs

Source: Food Security Monitoring Bulletin, INDONESIA, Special Focus: Food Affordability and Ramadan, Volume 6, April 2017, WFP

Figure 37: Retail Price Trends for Selected Products during Ramadan in Indonesia



Source: Food Security Monitoring Bulletin, INDONESIA, Special Focus: Food Affordability and Ramadan, Volume 6, April 2017, WFP

6.2.2 PRIVATE MIS: EVOLUTION BEYOND 2GMIS INTO E-COMMERCE IN INDONESIA

Several agribusiness platforms in the form of e-commerce start-ups have been created in Indonesia during the last few years, in order to, amongst other things, shorten the agricultural supply chain by providing an outlet for farmers without middlemen. The objective is that producers can directly communicate with buyers on the start-up platforms, thereby improving farmers' livelihoods. For example, the Indonesian President Joko Widodo has launched apps specifically created to improve the lives of farmers in the country. In doing so the GoI is working together with Indonesian startups and a community of developers to produce the Android-based apps²⁵. Given that the e-commerce platforms display information on produce prices, and allow sellers and buyers to enter into contact, they also perform a market information service (Figure 9). The e-commerce platforms tend to charge a fee for facilitating farmers and buyers dealing in produce. It is acknowledged that for the time being only a small proportion of farmers (i.e. those who have smartphones) are using the platforms. However, it is expected that their market share will increase once the platforms are better known and more smartphones are used in the villages. Also, groups of farmers can use the service.

Examples of e-commerce platforms include:

- a. LimaKilo, which considers itself a social enterprise that partners with small farmers to shorten the food supply chain (#yukbelanjakepetani;
twitter: @limakilo_id; email: hi@limakilo.id;
Websites: <http://limakilo.id/>; <https://vibbi.com/limakilo.id>
- b. 8villages (producing Petani app) <http://8villages.com/?lang=ind>
The start-up is a [hub to connect farmers](#) and give them information about agricultural topics like crop prices, weather forecasts, and farming tips.
- c. Usahadesa (<http://www.usahadesa.com>; <http://www.berdesa.com/>); focus on different village enterprises such as farming, food production, handicrafts, and eco-tourism. Villagers can access market and information, and they can network.
- d. TaniHub (producing TaniHub app)
An Indonesian agriculture marketplace aimed to connect farms with people through integrated, reliable, and efficient e-commerce solution for a balanced agriculture ecosystem
<https://www.youtube.com/watch?v=UpR4V0IpSlg>
<https://www.tanihub.com/>
- e. Sikumis, www.sikumis.com
(Agribusiness e-commerce platform).
- f. CI Agriculture; attempts to increase land productivity by providing integrated device and software solutions to help farmers predict land productivity through data provided by satellite imaging and sensors.
- g. [SIPINDO with NGO](#) Yayasan Bina Tani Sejahtera (<http://www.binatani.or.id>).

²⁵ Source: <https://e27.co/in-indonesia-startups-and-president-team-up-to-improve-farmers-life-20160411/> (accessed on 29/09/2017)

6.3 PROMOTING WRS AND TRADING OF COMMODITY FUTURES IN INDONESIA

As part of efforts to promote structured trading systems for agricultural commodities, the Government of Indonesia launched a WRS in 2014, initially for products such as rice, maize, coffee and seaweed. This legal framework underpinning the WRS centres around Law No. 9/2009 and Law No. 9/2011.353 (COMCEC, 2017). These laws, among others, stipulate the minimum statutory requirements for licensing the produce stated above under the WRS. The framework also sets out the rights of holders of warehouse receipts issued under the system as well as the official regulator of the WRS, which is the Indonesian Commodity Futures Trading Regulatory Agency (COFTRA). The regulatory agency, COFTRA, operates under the supervision of the Ministry of Trade and its mandate includes overseeing the operations of licensed warehouses. COFTRA regulates the country's commodity futures trading market. It also regulates the operations of auction markets for agricultural produce in the market.

The WRS and formal markets – the auction and futures markets – are recent and emerging. The progress made includes licensing of a total of 165 warehouses, including 44 private-owned warehouses, which are strategically located across the country. The commodity coverage has been extended beyond the initial list and includes a number of export crops such as rubber, cocoa, and pepper as well as coffee which was in the original list. The auction markets regulated by COFTRA across Indonesia was 14 in 2017 (COMCEC, *ibid.*). These auction markets bring together buyers and sellers of agricultural commodities to determine commodity prices through physical settlement. It is anticipated that as the market institutions discussed in this subsection mature, they will impact positively on the collection and dissemination of price data as well as stock information in Indonesia.

6.4 ASSESSMENT OF EXISTING MIS IN INDONESIA

Studies undertaken in the 1990s concluded that the MIS in Indonesia provides a valuable service, most notably to farmers and was also sustainable (Shepherd, 1997). Rather few assessments of the system have, however, been carried out in recent times. From this review, it is evident that the MIS in Indonesia is quite elaborate. It operates within a legislative framework with clearly defined roles for various government agencies. The defined roles are complementary and well-coordinated to assure the quality of information published by BPS.

Funding for the MIS is assured through government budgetary provisions to the Ministries of Agriculture and Trade. These government agencies are therefore able to deploy their staff at district and provincial levels to collect and transmit data using modern ICT to speed up the process. The staff involved are incentivised to undertake the collection of data in addition to their core functions, which for example includes the provision of extension advisory services to farmers. The staff at CADIS, who are responsible for collating, analysing and disseminating market information only spend 25% of their time doing this as they have other responsibilities. This structure makes it possible for the government to fund this activity on a sustained basis, though donor support (e.g. from the Government of Germany) is leveraged for the production of the WFP Food Security Monitoring Bulletin.

It is evident that one of the main reasons for public investment in MIS is to enhance government capacity to respond to food security emergencies in the country. An important feature of the

system which has been set up for this purpose is that it is not simply based on tracking food prices but a Technical Working Group involving donor agencies such as WFP and FAO has been set up to regularly review relevant developments and advise the government on policy responses to mitigate any potential food crisis. WFP regularly publishes outcomes of the reviews, providing a means by which market actors can be informed about the risk of food price and supply shocks.

Despite these impressive features of the MIS in Indonesia, especially in underpinning policy actions, the evidence from this study shows that farmers and other actors are not using the system as the basis for their marketing strategies and action. This is happening despite the fact that the system covers a wide range of agricultural and livestock products and the collection of data extends to remote parts of the country. Farmers and traders interviewed in and around Bogor at the end of September 2017 indicated that they mainly obtain price information by phoning potential buyers in different markets (e.g. around Bogor or in Jakarta). As such the mobile phones (standard phones or smartphones) play an important role for farmers in terms of obtaining information for bargaining but not as anticipated in theory – i.e. by checking published prices. Trust appears to play an important role in this system where farmers rely on the word of traders despite the high risk of conflict of interest.

The main factors which appear to be hampering uptake are accuracy and frequency of dissemination of the data. The view of especially farmers is that the price data disseminated is not qualitatively better than what they obtain directly by phone. This is because the data is obtained by phoning traders and farmers rather than being a record of transparently discovered prices as occurs, for instance, at commodity exchanges. Furthermore, apart from a few commodities such as rice, the price reported does not give any indications of quality premiums which exist in the markets.

It is anticipated that as the WRS and structured marketing systems which are being developed by the government mature, their role in generating transparently discovered prices as well as filling data gaps (e.g. on stock levels) will enhance the quality of information disseminated and foster increased up. This is expected because the use of the modern trading systems requires access to reliable and timely market information, as seen from best-practices in the world, including in OIC countries discussed in Chapter 3 and Chapter 4 respectively.

7. UGANDA CASE STUDY

7.1 INTRODUCTION AND BACKGROUND

Agriculture is of strategic importance to the Ugandan economy. Official data indicates that in 2015 the sector accounted for 25.4% of GDP and 40% of export earnings. Though the services sectors accounted for 51.9% of GDP during that year, it employed only 23.7% of total labour force compared to far higher contribution to employment of 71.9% by agriculture. The agricultural sector also makes a very significant contribution to the reduction of poverty, especially in rural areas (Hery A, 2016). The country has very diverse agro-climatic conditions which makes it possible for it to produce a wide range of crops and livestock as shown in Table 9. Though it is a landlocked country, it is well-endowed with large water bodies, the largest being Lake Victoria (see Figure 38), making fisheries one of its important industries.

Table 9: Uganda Agricultural Products in 2013

Product type	Crop/livestock	Output per annum (tonnes)*	Main markets
Food crops	Banana (locally called Matoke)	4,297,345	Mainly domestic markets.
	Root crops (cassava & potato)	4,867,515	
	Maize	177,952	Domestic and regional markets.
	Beans	24,495	
	Vegetables	8,850	
Oil crops	Sesame and sunflower	15,260	Domestic market.
	Oil palm	35,145	
Export crops (also termed cash crops)	Coffee	169,040	Mainly international export markets with marginal sale into the domestic market.
	Cotton	39,280	
	Tea	55,210	
	Cocoa	19,660	
	Tobacco	17,540	
	Sugarcane	93,665	
Livestock and fisheries products	Fish	418,600	International and local markets.
	Cattle*	11,434,795	Mainly domestic market.
	Sheep and goats*	15,754,780	
	Poultry*	39,250,400	
	Pigs*	3,184,295	

Source: Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) *In numbers (not tonnes).

7.1.1 LIBERALISATION: NEW OPPORTUNITIES BUT ALSO CHALLENGES IN AGRICULTURAL MARKETS

When Uganda liberalised the agricultural sector in the 1980-90s, the government scaled back its role in the marketing of the main export crops (sometimes referred to as traditional exports), which are coffee, cotton and tea. Private exporters were allowed entry into the trade and major multinational trading companies, which are vertically-integrated with local subsidiaries emerged as the dominant trading companies (Butterworth and Kleih, 2005). One of the effects of this liberalisation was that the marketing chain for these commodities was lengthened due to entry by a range of middlemen with variable financial and technical capacity to aggregate at the

farmgate level. Consequently, distribution margins increased and producer margins were squeezed. In addition, it was noted that most of the rural aggregators (“bicycle traders”) failed to pay a quality premium at the farmgate leading to the quality of Ugandan exports being compromised and the country losing out on quality premiums. The government also disengaged from setting administrative prices for the export crops leading to increased price uncertainty.

Within the domestic agricultural markets, part of the reforms included the disengagement of government from setting guaranteed minimum prices and enforcing quality standards. As a result the marketing systems for grains experienced price uncertainty, quality variability and lengthening of the chain (Onumah and Nakajjo). A recent study by IFAD (2015) estimates that farmers on the average lose over US\$260 million per year as a result of their limited capacity to mitigate volatility in output prices. This is more than double the estimated annual losses due to crop pests and diseases and also more than six times the estimated annual losses due to the incidence of drought. The same factors also limit the capacity of Uganda to exploit huge regional agricultural exports potential. Most of the countries sharing borders with Uganda (See Figure 38) have significant food deficits, especially for staple grains and oilseeds. Top among these is maize into Kenya and South Sudan as well as beans and oilseeds into Rwanda and the Democratic Republic of Congo (DRC).

Figure 38: Map of Uganda and Border Countries



In addition to the challenges in the agricultural output markets, IFAD (2015) also notes that the quality and reliability of agricultural inputs marketed Uganda became highly uncertain when government discontinued direct inputs distribution and allowed a private inputs marketing system to emerge. These factors contributed to under-performance of the agricultural of the sector over the past two decades, with its growth stagnating at about 2% per annum (Mwesigye et al., 2017). This growth rate is way below the annual growth target of over 5% set by the National Development Program (NDP) for effective poverty reduction in the country (IFAD,

2015). It is also below the 6% annual growth target set under the Africa Union's Comprehensive Africa Agriculture Development Program (CAADP).

7.1.2 MIS PERCEIVED AS IMPORTANT IN IMPROVING AGRICULTURAL MARKETING IN UGANDA

The policy objective of improving institutional infrastructure, such as existing MIS, is expected to help transform the growth performance of the sector by providing an informed basis for actions by players and investors in agricultural value chains. One of the expectations is that by providing information on commodity prices (e.g. in markets close to farmers' communities), the bargaining power of farmers will be strengthened. This information will also enable farmers to adopt income-optimising marketing strategies because they will be able to choose which markets and best timing for selling their produce. Other market players such as traders, including exporters, will also be able to plan their produce purchases better. A reliable MIS is also seen by policymakers as crucial in taking actions to manage food crisis as well as inform strategies to promote sustained growth in output and productivity.

7.1.3 HISTORY OF MIS IN UGANDA

Uganda is one of the trailblazers in setting up MIS. The first among these is FOODNET (Box 8), which was established late 1993 by the Postharvest and Marketing Research Network of ASARECA hosted by the International Institute of Tropical Agriculture (IITA). The development of the platform received financial support from the USAID and there was close collaboration with the National Agricultural Advisory Services (NAADS) – an autonomous public agency within the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) with responsibility for public agricultural advisory/extension services. Collection of price data from the 19 district markets which were covered was undertaken by field extension officers employed by NAADS. There was another collaboration between FOODNET and the North-West Smallholder Agricultural Development (NWSAD) Project, which was funded by the African Development Bank. This resulted in five additional districts with 36 produce markets in the West Nile Region being included. Enumerators deployed in West Nile Region were mainly Marketing Officers employed under NWSAD Project.

Box 8: FOODNET in Uganda

FOODNET involved the collection, analysis and dissemination of principally price data from several markets in Uganda, starting with markets in the following six districts: Arua, Mukono, Soroti, Tororo, Kibaale and Kabale. Later, with funding from USAID, this increased to markets in 19 districts. Additional funding was provided for this activity through collaboration with NAADS, which received financial support from the European Union. Dissemination of price data was mainly by means of radio but was later extended to include access by means of text messages delivered by local mobile phone networks. Sustainability of the MIS became a major challenge as donor funding for the initiative dried up when projects under which the funding was provided ended.

Source: Butterworth R. and U. Kleih (2005) from notes from consultations with Martin Fowler.

The data collected was transmitted via mobile text messages to collation unit at IITA offices in Kampala, which employed data entry clerks to input price data collected. As was the case with most of the 1GMIS at the time, dissemination of price information by FOODNET was initially through national radio networks. Later FOODNET became one of the first in Africa use mobile phone networks to disseminate market information – users sent text messages to the mobile

service provider and received return messages with details of the price information requested (per crop and per market). The dissemination was paid for by FOODNET with the available donor funding. When direct funding ended the staff involved took over the operation and continue to provide the service, this time as FARMGAIN.

A brief assessment of FOODNET in 2004 showed that, despite being widely acknowledged in the literature on MIS at the time, very few market participants used it in Uganda (Onumah and Linton 2004²⁶). Very few farmers were aware of it and the traders who knew about its existence did not consult it. The explanation was that they could obtain a more up-to-date information on prices by calling people in their informal network who include agents and farmers in rural communities as well as other traders. Even members of the Uganda Grain Traders Association (UGTA), who were emerging as formal grain traders in the country, did not consult FOODNET except when they were preparing bids to supply grains to WFP for its relief operations. Other users of information from FOODNET are policymakers.

Other IGMIS platforms existed in Uganda along with FOODNET include a MIS run by the Uganda Cooperative Alliance (UCA), which is a national federation of cooperatives in Uganda. The UCA set up this parallel system mainly because their members were not satisfied with FOODNET and the Management was keen to establish a more reliable MIS. Under their system, field officers of UCA collect information on buyers as well as prices from markets in 10 districts as well as markets in Kampala. This information is collated at the head office of the UCA in Kampala. Staff at both the district level and at the head office dedicated 15-20% of their time to work on MIS. The information is disseminated via mobile phones and is updated 1-2 times per week. The same information is also posted on notice boards hosted by the Area Cooperative Enterprises (ACAs). The ACAs act as marketing units for groups of cooperatives and employ a manager, who uses information from the MIS to negotiate sales on behalf of the members. The initiative was funded by the Swedish Cooperative Centre.

Running parallel to the MIS run by the UCA was another which was set up by the Ministry of Tourism, Trade and Industry (MTTI) under the Area-based Agricultural Modernisation Project (AAMP). The parallel MIS was set up under the project, which was funded by IFAD, though the MTTI was the host Ministry for the UCA. Market information, mainly in the form of commodity prices, was collected by the MTTI's Trade and Commerce Officers in the sub-counties (divisions within districts in Uganda). The information was collected from major markets in 13 districts. Initially, the information was disseminated by means of national as well as local radio broadcasts. This, however, proved too expensive and the operators switched publications in local newspapers as well as posting of bulletins on notice boards. The cost was covered under the IFAD-funded AAMP.

The two MIS platforms which run parallel to FOODNET did not fare any better. Beyond the narrow audience of the direct programme stakeholders, there is no evidence that other players including especially farmers and traders actually used the information they disseminated.

²⁶ The assessment was undertaken as part of a review of factors which hampered the operations of the then Uganda Commodity Exchange.

7.2 MAPPING EXISTING MIS IN UGANDA: NATIONAL SYSTEMS

A recent survey by IFAD (2016) of sources of information on agricultural risks identified several agricultural MIS in Uganda, categorised as national, regional and international systems based on the defined coverage of the information provided (Table 10).

7.2.1 FARMGAIN: NATIONAL PRIVATE PROVIDER

FARMGAIN is a private MIS provider. It was established in 2007 by former technical staff who used to work on FOODNET and who had gained valuable experience in running such a system over a period of about 10 years. The platform disseminates information on average national-level wholesale and retail prices on a weekly basis, citing prices in different major urban markets. In addition, daily prices in the major markets in the capital Kampala (e.g. the Owino Market) are also published. It covers a wide range of food crops including maize, soybean, beans, rice and sunflower as well as export crops such as coffee and livestock product e.g. dairy products.

Details reported in Box 9 show different prices for a sample of three major markets covered by FARMGAIN in Uganda for maize and two for coffee. It also features a report on the potential impact of the onset of rains, for instance on the quality of crops such as maize and anticipated price trends.

FARMGAIN uses its field staff to collect information from rural and urban markets. It has also developed strong networks with other information providers such as RATIN and FEWSNET for information-sharing purposes at the regional level. It also had formal collaboration with NAADS, as a result of which it received some funding from government but this was affected by a cutback in the funding available to NAADS.

Its main target audience are farmers, grain traders, agro-processors, development partners and policymakers. The information is disseminated through its website, emails and also via mobile phones (users have to text a short **access code 8198**).

Table 10: Existing MIS in Uganda (2016)

Name of provider	Type of provider	Product coverage	Type of information/services	Data collection technology	Dissemination technology	Information users	Funding
National MIS							
FARMGAIN Africa	Private	Food crops and export crops	Prices, stock availability, product flows, regional prices and other advisory services.	Interviews and observation by enumerators and data from regional sources.	Email, website, mobile SMS	farmers, traders, government	Internal cross-subsidies and donors
AGRINET	Private	Food crop for domestic market	Prices, stock availability and traders.	Interviews observation by enumerators	email, website, mobile SMS	farmers, traders, government	Internal cross-subsidies and donors
Infotrade.	Private	Food crop for domestic market	Prices, stock availability and traders.	Interviews observation by enumerators	email, website, mobile SMS	farmers, traders, government	Internal cross-subsidies and donors
Uganda Coffee Development Authority (UCDA)	Public	Coffee	Local market prices; export parity prices; supply availability and output forecasts.	Interviews by field officers of UCDA	email, website, mobile SMS	farmers, exporters and government	Government and donors.
Regional MIS							
Regional Agricultural Trade Intelligence Network (RATIN)	NGO	Food crops traded in regional market	Regional prices, stock availability, product flows, trading platform (GSOKO)	Mainly sourced from national platforms	email, website	farmers, traders, government	Internal cross-subsidies and donors
Betta Grains	Private	Food crops traded in regional market	Prices, stock availability, product flows, comparative regional prices	Interviews and observation by enumerators and sourcing from national platforms	email, website	farmers, traders, government	Internal cross-subsidies and donors
FEWSNET	Donor	Food crops traded in regional market	Local market prices; regional prices; supply availability; regional produce flows and output forecasts.	Sourcing from national and regional platforms	email, website	farmers, traders, government	Donor.

Source: Authors.

Box 9: FARMGRAIN Crop Bulletin (Maize and Coffee) Published on 30th September 2017

Maize wholesale prices per kilogram in rural markets such as Masindi ranged between UGX 750 and UGX 900 and in urban markets such as Mbale at UGX 900 per kg. However, as the supply situation improves, it is anticipated that prices will decline in coming weeks, for example to between UGX 500 and UGX 600 per kg in Kampala. The onset of rains is likely to affect the quality of maize on the market, as crop with relatively high moisture content is likely to be delivered.

Major exporters offered to buy FAQ coffee at between UGX 5,800 and UGX 6,500 per kilogram but with locational differences: Kasese (UGX 5,000/kg) and Masaka (UGX 5,000-6000/kg). As a result of a dry spell, the quality of the new crop is reportedly poor in most of the major producing areas in Eastern and Central Regions. Areas where the quality of the crop is reported to be good include Mbarara and Masaka.

Source: Farmgrain website as well as consultations with officials of Farmgrain and NAA

7.2.2 AGRINET: NATIONAL PRIVATE PROVIDER

AgriNet is another private MIS provider which was established in 2008. It collects market information through its field coordination offices. The location of the field coordination offices (Figure 39) are very similar to those run by FARMAGAIN. The provision of market information by AgriNet is linked to other commercial activities including offering commodity marketing services. It runs an online trade linkage platform called “*Kudu*”, which facilitates trading via mobile phones. However, there is no evidence of uptake of this platform. This experience is similar to other online commodity trading platforms in Africa which are linked to MIS, including for example ESOKO. In most cases, there is little or no uptake mainly because there is no guarantee of delivery of traded commodities (Onumah 2012).

Figure 39: Locations of Agrinet Field Coordination Offices in Uganda



AgriNet's offline commodity trading is linked to major grain storage, processing and end-use companies such as the following:

- ✚ Agroways Uganda Ltd – a local grain warehouse operator and marketing company.
- ✚ Sunrise Commodities – local grain traders and millers.
- ✚ Nile Breweries – local brewery which utilises locally-produced maize and sorghum.
- ✚ The WFP – a leading buyer of grains in Uganda for local and regional relief operations (the latter including supplies to South Sudan, Kenya and Tanzania).
- ✚ Mombasa millers – a major Kenya-based grain milling company which imports grains from Uganda.
- ✚ Busia Produce Market – major border market for grain exports from Uganda into Kenya.
- ✚ Some local medium-scale maize millers.

All the major grain buyers trading with AgriNet require quality grains, especially the brewery and WFP. The only exception is buyers in the Busia Produce Market and the medium-scale grain millers. Though premium prices are offered for quality grains, this is neither reported by AgriNet as well as the other MIS providers in Uganda. One of the effects of non-reporting of quality-linked grain prices is that farmers and grain assemblers have no informed basis for computing net gains from adopting postharvest crop handling practices which ensure delivery of quality produce. As a result, Uganda is missing out on important grain opportunities at the regional level and also to WFP. Onumah and Baine (2015) estimate that Uganda is losing about US\$ 65 million per year because of its inability to take advantage of this market opportunity due to lack of compliance with set quality standards.

7.2.3 INFOTRADE: NATIONAL PRIVATE PROVIDER

Infotrade is also a private provider which emerged in 2008 as a joint project initiated between FIT Uganda and the Agricultural Sector Programme Support (ASPS) supported by DANIDA. It collects and disseminates price information on a range of crops and livestock including market reports covering weekly average prices for various commodities; offers/bids for selling and buying commodities; analysis of price changes during the week; and weather bulletins.

Markets covered in the collection of price data are similar to those covered by FARMGAIN and AgriNet. Dissemination is via mobile phones, radio, website and postings on notice boards at the selected markets and district offices of Infotrade (Box 10). The format used in presenting prices is shown in Table 11. Prices are reported per kilogramme based on estimated average weight of traditional volume measures. This approach is a source of error in price data reporting.

Box 10: Provision of Agricultural Price Information via Mobile Phone by Infotrade, Uganda

Users can request price information by texting the keyword PRICE; then COMMODITY and then the name of the location and send to **8555**. For example send PRICE, BEANS and MASAKA to 8555.

Registration is also through the same platform and entitles users to receive specified information (i.e. by commodity) on a weekly basis.

Source: <http://www.infotradeuganda.com/index.php/about-infotrade/overview.html>

Table 11: Infotrade Average Wholesale Prices For Agricultural Produce In Uganda: Week 27, 3rd-8th July, 2017 (In Uganda Shillings Per Kilogram)

CITY/TOWN		Owino	Kisenyi	Nakawa	Masindi	Mbale	Gulu	Masaka	Soroti	Iganga	Tororo	Mbarara			
DATE		08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul	08-Jul			
CROP		wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	wholesale	min	mean	max
Maize Grain	kg	930	910	1,200	820	900	1,000	800	900	780	900	1,000	750	946	1,300
Maize Flour	kg	2,000	2,000	2,100	2,000	1,700	2,400	2,100	2,300	2,400	2,000	2,000	1,700	2,167	2,600
Beans (K132)	kg	2,150	2,100	2,200	2,100	1,900	2,100	2,000	2,300	2,300	2,100	1,800	1,800	2,047	2,300
Beans Rosecoco	kg	2,100	2,000	2,200	2,000	2,000	2,200	2,000		2,400		1,800	1,500	2,027	2,400
Yellow Beans	kg	2,400	2,300	2,400	2,300	2,300	2,300	2,300			2,200	2,000	2,000	2,296	2,450
Millet grain	kg	1,750	1,600	2,000		2,800	1,900	2,300	2,600	2,800	2,600	2,900	1,600	2,334	2,900
Millet flour	kg	3,300	3,200	3,300	3,400	3,200	3,200	3,400	3,300	3,400	3,400	3,400	2,400	3,282	3,400
Sorghum grain	kg	1,150	1,100	1,200	1,000	1,200	1,100	1,250	900	1,100	700	800	700	1,200	1,600
Sorghum flour	kg	2,450	2,400	2,600	2,400	2,500	2,400	2,400	2,500	2,500	2,300	2,500	1,800	2,432	2,600
Rice (super)	kg	3,700	3,600	3,700	2,500	3,600	3,500	3,800	3,800	3,600	3,500	3,500	2,500	3,641	4,000
Cassava Chips	kg		1,350		1,200	1,400	600		1,500	1,400	1,300	1,400	600	1,273	1,500
Cassava Flour	kg	1,650	1,600	1,700	1,500	1,550	1,200	1,600	1,800	1,600	1,600	1,600	1,200	1,653	2,200
Groundnuts	kg	3,500	3,400	3,500	3,500	3,500	4,000	3,500	3,500	3,600	4,200	3,600	3,400	3,750	4,500
Simsim	kg	2,600	2,500	2,600		3,500	3,500	3,300	3,800	3,800	4,700	3,800	2,500	3,563	4,800
Soya beans	kg	1,400	1,350	1,400	1,500	1,800	1,200	2,000	1,500	1,550	1,800	1,700	1,200	1,638	2,400
Ginger	kg	2,000	2,000	2,000									2,000	2,000	2,000
Fish: Tilapia	pc	14,000		16,000			14,000			14,000	11,000	15,000	11,000	14,000	16,000
Fish: Nile Perch	kg	10,000	10,000	10,000			12,000			10,000	10,000	12,000	10,000	10,750	12,000
Fresh Cassava	kg	600	610	615	500	770	650	655	900	685	813	800	500	692	900
Sweet Potatoes	kg	900	900	1,000	550	800	618	830	800	738	755	800	515	774	1,000
Irish Potatoes	kg	1,000	1,076	1,100	1,200	600	1,200	1,000	845	1,200	700	1,038	500	1,005	1,500
Matoke/Banana	kg	767	781	829	828	1,087	1,087	956	1,200	1,087	1,165	478	478	904	1,200
Milk (one Litre)	lt	1,200	1,200	1,200	1,000	1,200	1,100	1,200	1,100	1,200	1,000	1,200	1,000	1,194	1,500

Source: <http://www.infotradeuganda.com>

7.2.4 UCDA MIS FOR COFFEE: NATIONAL GOVERNMENT PROVIDER

The Uganda Coffee Development Authority (UCDA) is a public regulatory and policy agency for the coffee industry in the country. Prior to liberalisation, it had a monopoly over the coffee trade, handling domestic procurement of the crop through cooperatives and being solely responsible for exports. Among its current functions is provide players in the coffee value chain with regular price information. These include daily price updates on terminal market prices and the export parity equivalent. It also collects and disseminates coffee prices in the main domestic markets, using its field officers as enumerators. Box 11 shows highlights of its monthly report. It includes information on the volume of exports and foreign exchange earned. This is mainly for the policymakers. For industry players, including buyers, it is the average domestic and international prices which are important.

Box 11: Highlights of UCDA Monthly Report for August 2017

- The total volume of exports for August 2017: a total of 418,340-kilo bags of coffee valued at US\$ 47.06 million were exported in August 2017 at an average weighted price of US \$ 1.87 US cents, 6 cents lower than the previous month.
- Coffee exports for 12 months (September 2016 to August 2017) totalled 4.47 million bags worth \$530 million comprising Robusta 3.48 million bags worth US\$ 388.54 million and Arabica 0.99 million bags worth US\$ 141.2 million.
- Farmgate prices for Robusta Kiboko averaged Shs. 2,050/= per kilo; FAQ Shs. 5,150/= per kilo, Arabica parchment Shs 6,250/= per kilo and Drugar Sh. 6,050/kilo.
- The ICO Composite Indicator price increased from US cents 127.26 per lb. in July 2017 to US cents 128.24 per lb. in August 2017.

Source: UCDA website

UCDA's market information is disseminated through its website, emails and weekly bulletins by local or community radio stations. The radio broadcasts also include reports on relevant weather reports and forecasts as well as information on plant disease and pest outbreaks. In addition, UCDA provides extension advice to farmers through the broadcasts. In 2005 the UCDA launched mobile phone dissemination of price information under a project funded by the Common Fund for Commodities (CFC). To assure sustainability beyond the CFC project, UCDA entered into an agreement with a mobile service provider under which it provided price information on a very regular basis and shared in revenues generated through users accessing the information via an SMS text message. That programme has been maintained but at the time of this study, UCDA reported that uptake of the phone services.

7.3 MAPPING EXISTING MIS IN UGANDA: REGIONAL/INTERNATIONAL SYSTEMS

7.3.1 RATIN: A REGIONAL MIS ACCESSIBLE IN UGANDA

The Regional Agricultural Trade Intelligence Network (RATIN) is regional MIS run by the Eastern Africa Grain Council (EAGC), which has its head office in Nairobi, Kenya. It provides information on prices of grains (mainly maize, rice and wheat as well as pulses and beans) in the main markets in Kenya, Uganda, Tanzania, and Rwanda. This information is mainly sourced from the Country Representatives of the EAGC. RATIN also captures information on flows of

commodities across the borders in Eastern Africa, including data on informal cross-border trade volumes. The information is disseminated through its website, emails and via mobile phones. The information provided is intended to promote grain trade in Eastern Africa. The expectation is that reporting price differentiates across regional markets (see Table 12), will encourage EAGC members, most of whom are grain traders and processors, to exploit arbitrage opportunities in the regional grains markets.

There are, however, interpretation difficulties for users. First, maize prices are reported in Kenyan Shillings (KES) per bag of 90 kilogrammes. This is the standard weight per bag of maize in Kenya but it is not uniformly applied across the region. It applies in Tanzania but not in Uganda, where MIS providers usually report prices on per kilogramme basis. Furthermore, users have to convert prices into local currency but the network does not report exchange rates for the day. The prices quoted do not distinguish between different grades of maize, despite the fact that Eastern Africa has adopted harmonised grades for maize and other major staples as part of measures to promote unhindered regional trade in grains. Locational differences in price as reported tend to be meaningless if not translated into localised export parity prices, but this form of analysis of prices is missing.

Table 12: RATIN Maize Prices in Eastern African Cities (KES/90kg) on 18th December 2017



Country	Market town/city	Wholesale price	Retail price
Kenya	Mombasa	2,790.00	4,500.00
	Nairobi	3,780.00	4,320.00
Uganda	Busia	1,961.00	2,305.00
	Masindi	1,663.00	1,791.00
	Kampala	1,919.00	2,559.00
Tanzania	Iringa	1,854.00	2,060.00
	Dar es Salaam	2,883.00	4,119.00
Rwanda	Ruhengeri	2,751.00	3,301.00
	Kamembe	3,837.00	4,385.00
	Rubavu	3,289.00	4,166.00
South Sudan	Juba	4,592.00	5,299.00

Source: <http://www.ratin.net>

7.3.2 FEWSNET: AN INTERNATIONAL INFORMATION SYSTEM USED IN UGANDA

The Famine Early Warning Systems Network collects and disseminates information which provides, especially policymakers, early warning on food supply and insecurity at regional and national levels. It was created in 1985 by the USAID and runs in several African countries including Uganda. The FEWSNET reports provide an evidence basis for planning responses to food crisis at regional and national levels and includes information on the following: monthly reports and maps detailing current and projected food insecurity; timely alerts on emerging or likely crises; and specialized reports on weather, markets and trade, agricultural production, livelihoods, nutrition, and food assistance.

Box 12: FEWSNET Reports: Maize Supply and Weather Update in East Africa in Sept 2017

In East Africa, maize supplies are generally below average, causing above-average prices across most of the region. Staple food price levels are especially high in South Sudan. Markets remain severely disrupted by insecurity and significant macroeconomic issues in Yemen and South Sudan, impeding staple food supply access. Harvests are ongoing in Somalia, Tanzania and Uganda, and are about to begin in Kenya. Supplies are seasonally low in Ethiopia and Sudan as the lean season progresses.



Rainfall: Last week, average rainfall was recorded over the Greater Horn of Africa. Light to locally moderate rain fell over western Ethiopia and eastern Sudan. The largest (>25mm) rainfall totals were recorded throughout southern Sudan and North-Eastern South Sudan. Since August, positive rainfall anomalies dominated Eastern Africa, with seasonal surpluses, exceeding 100mm across eastern Sudan and western Ethiopia. The frequent and above-average rain over the past several weeks has benefited ground conditions over most areas, but also caused flooding. Next week, moderate to heavy rainfall is forecast over South Sudan, northern Uganda, western Kenya, and southwestern Ethiopia. Light to moderate rain is also expected over central Somalia.

Source : <http://fewsn.net/sites/default/files/documentst/reports/estafrica.market>

The Analysis, Monitoring and Evaluation Unit of the World Food Programme (WFP) in Uganda uses the FEWSNET information along with price data collected by its staff at its Sub Offices and other major urban markets to produce its Monthly Market Monitor (Figure 40). The report focuses on assessing food insecurity risks and forms the basis for consultations with other donors such as USAID as well as the Government of Uganda on actions which need to be taken to mitigate such risks.

Figure 40: Cover Page of WFP Uganda Monthly Market Monitor (August 2017)

Fighting Hunger Worldwide

DECEMBER 2017 ISSUE 45

WFP UGANDA

Monthly Market Monitor

HIGHLIGHTS

KARAMOJA


- ◆ In December, the average retail prices for maize grain increased by 10% compared to November, while the prices for sorghum and beans remained stable. The prices for maize grain and sorghum were significantly higher in Nakapiripirit by 33% and 25% respectively, due to high demand from traders from neighboring districts and regions;
- ◆ Compared to 2016, the overall average retail prices for maize grain, sorghum and beans continued to be lower by 19%, 38%, and 16%, respectively. Similarly, sorghum and beans prices were below the long term (2013-2016) average;
- ◆ Compared to November, the terms of trade for goats and labor wage rates, against maize grain deteriorated by 8% and 4% respectively, following an increase in the average price for maize grain. This depicts a rise in the living costs for pastoralists and casual laborers.

REST OF THE COUNTRY


- ◆ Compared to November, the average price for maize grain and sorghum in December increased by 13% and 6%, respectively, due to the second season (November-January) harvest. The overall price for beans remained stable, with an increase by 20%, experienced in Gulu;
- ◆ In December 2017, beans and maize grain average prices were below 2016 levels by 8% and 11%, respectively, following an improved harvest in 2017. Lira and Mbale observed significant price reductions.

The Uganda Market Price Update is produced by the Analysis, Monitoring and Evaluation (AME) Unit of the World Food Programme Uganda on a monthly basis. Price data collected by staff at WFP Sub-offices in Moroto, Kotido, Kaabong and Nakapiripirit is analyzed along with price data from Gulu, Kampala, Mbarara, Soroti, Tororo, Lira and Mbale. The update is divided into four sections: Karamoja markets, Price trends over one year, Other Markets and table on Price changes.

Markets Monitored & Analyzed by WFP Unit



Source: WFP Uganda AME



For further information please contact the AME unit WFP Uganda

Siddharth KRISHNASWAMY
Analysis Monitoring & Evaluation, Head.
siddharth.krishnaswamy@wfp.org

Hamidu TUSIIME
Food Security & Market Analyst
hamidu.tusiime@wfp.org

Nathan LOWANYANG
Programme Assistant
nathan.lowanyang@wfp.org

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Source: <https://www.wfp.org/content/uganda-monthly-market-monitor-2017>

7.4 FURTHER EVOLUTION OF 2GMIS IN UGANDA

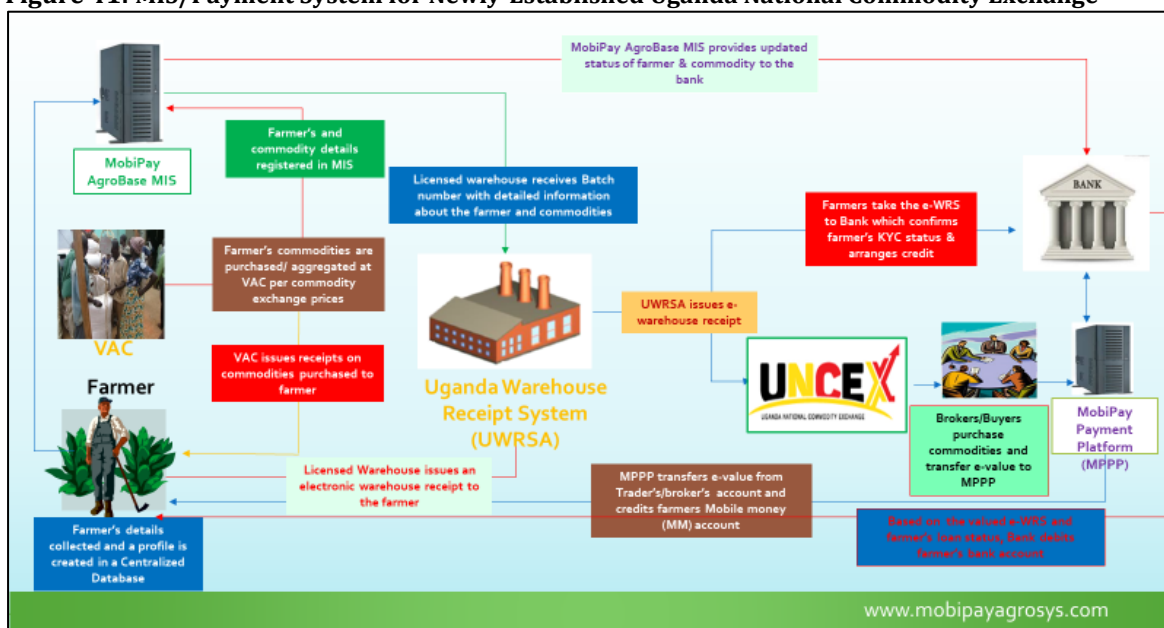
One of the innovative MIS which has just emerged in the Uganda landscape is Mobipay. It is an advanced, private 2GMIS with the features below which are also illustrated in Figure 41:

- A database of farmers including biodata details as well as GPS coordinates of farms and plot sizes. This facility makes it possible to link farmers to inputs suppliers to facilitate the acquisition of quality inputs. It is also possible to monitor crop performance during gestation, using the type of remote-sensing technology described in Box 4 (see Chapter 3 Section 3.6.1).
- The participating farmers are mainly smallholders, cultivating an average of 2 hectares. They there aggregate their produce using Village Aggregation Centres (VACs). Stocks delivered through the VACs as also monitored by Mobiday, with the data being collected by field officers, who include government extension officers as well as field staff of aggregators (traders) working in the community.
- The bulked produce is delivered to licensed warehouse operators who issue electronic warehouse receipts (EWRs), which provide details such as the quantity (in weight) and quality of the product deposited. A record of these details is maintained by the Uganda Warehouse Receipt System Authority (UWRSA), which regulates the receipt system and authorises issuing of the EWRs.
- The stored commodity is traded either directly to a buyer or through the newly-established Uganda National Commodity Exchange (UNCEX). In cases the trade is through UNCEX, the EWRs are transferred to buyers through licensed brokers and payment made through clearing banks appointed by the exchange. The clearing bank then channels payment through Mobipay to the seller (farmer or farmers' group). Where trade is directly to a trader or commodity exporter, the payment can either be channelled through a bank appointed by the farmers' group or directly through Mobipay to the sellers.
- The system of channelling payments through banks and/or Mobipay, makes it possible for who pays through other key actors as part of the MIS platform. This makes it possible for formal lenders to recover loans directly, thereby minimising the risk of loan default. This risk is further minimised through the monitoring crop performance by Mobipay. Postharvest finance is provided using deposited stocks, which is monitored by the UWRSA, as the collateral.
- Farmers on the Mobipay database obtain price information via mobile telephones. The same information is shared with banks, enabling them to compute the value of pledged commodities at the time of lending. Lenders are also able to monitor that value of the collateral on the basis of price information made available on a daily basis.

It is evident from the review of the Mobipay system that it is not simply the provision of price information which is making it beneficial to users, but also the linked crop monitoring and payments services. However, as at the time of this study, the price information disseminated was based not on actual transactions but on price levels in the general informal market. One

particular implication of this is that though the system is expected to promote formal trade, for example in grains, its impact in that regard is marginal. This is because it does not report quality-linked prices and, therefore, exerts a weak or no effect on price incentives for producers to adopt postharvest crop handling practices which assure premium quality for grains. This is a major challenge in the grain production system in Uganda (Onumah and Nakajjo, 2014). It is anticipated that as exchange trading takes off this issue will be addressed because players in the grains value chains will become aware of quality premiums in the market based on dissemination of quality-linked prices.

Figure 41: MIS/Payment System for Newly-Established Uganda National Commodity Exchange



Source: Mobipayagrosys, Uganda

7.5 ASSESSMENT OF EXISTING MIS IN UGANDA

The discussions in this section have shown that the MIS landscape in Uganda is populated with a wide range of platforms. Having been one of the pioneers with FOODNET, a 1GMIS in the 1990s, Uganda currently has MIS of all types, including those with national, regional and international coverage. As shown in Table 5, there are also government and private-operated MIS as well as platforms run by NGOs. The assessment of existing MIS in Uganda, which we report in this subsection, partly involved interviews with stakeholders including farmers' groups, grain traders, warehouse operators, bankers, insurance company executives, NGOs, development practitioners and policymakers, in particular from the Ministries of agriculture and Trade as well as Bank of Uganda (the country's central bank).

Among the stakeholders consulted a high number were either unaware of or dissatisfied with the existing MIS. As a result, most of them resort to alternative sources of information as the summary below indicates:

- **Farmers** tend to rely more on informal networks including consulting peers in the community and/or phoning up traders they usually sell for information on prevailing prices in rural and urban markets.
- **Traders** usually consult and/or observe their counterparts for updates on prices in the markets in which they trade as well as phone up agents in rural markets.
- **Warehouse operators** for crop output forecasts they “drive through familiar fields and observe” and/or consult leaders of farmers’ groups and their field agents. They also consult traders on prices in rural and urban markets.
- **Banks:** require market information, including crop output forecasts in appraising loan applications and also monitoring repayment, especially where credit is secured with crop inventories, the value of which has to be tracked on a regular basis. Rather than obtain information independent sources, they tend to rather rely on their clients who may be borrowers or, where possible, on staff at branch offices, who may have been involved in the approval and/or monitoring loans. This is largely because of lack of confidence in the information published by the existing MIS.
- **Policymakers:** a good number of policymakers consulted did not also utilise data published by MIS providers, except where they are directly involved in projects related to the MIS platforms. The notable exceptions are officials of NAADS, who require the information as part of the extension advice they provide to farmers.

The most active users of the existing MIS are development practitioners who are engaged in work on food security issues at national and/or regional levels such as the staff of WFP and USAID. These officials obtain information, especially from FEWSNET, as well as track data published by existing national and regional MIS platforms in order to assess emerging food crisis and plan their response in collaboration with the government. The WFP, for instance, publishes a Monthly Market Monitor, which summarises key developments in terms of prices and flows within the regional markets. They also track local prices for purposes of assessing the food supply situation in the country. USAID also undertakes similar reviews sourcing information from the main platforms identified in Section 7.3.2.

The low level of utilisation of the MIS platforms appears to have less to do with the dissemination technology adopted and more to do with content and timeliness and the discussions below demonstrate. For instance, though dissemination via mobile phones was expected to increase accessing of MIS by farmers and trader, this was not observed in Uganda. Rather these players are phoning directly to obtain the same information from informal sources such as peers. Speaking to an official of UCDA, she indicated that mobile phone dissemination was the least popular among users of its MIS. From the consultations with stakeholders, among the main weaknesses with the existing MIS in Uganda is the issue of gaps in the information disseminated. These gaps include the following:

- a. **Trend analysis is often missing:** Most of the data reported represent nominal prices prevailing in the markets. It was suggested that analysis of trends will be more helpful to users as it can indicate the direction of movement of prices and inform their marketing or procurement strategies. There isn’t enough of this in Uganda, except the regional and

international platforms (e.g. FEWSNET) which are published on monthly basis and may, therefore, be too late to be relevant to transactors.

- b. **Quality premiums not reported:** The average prices which are reported do not take account of quality differences. For instance, though it was noted during the field visit that there was a quality premium of close to 50% for maize, the reported prices did not capture this²⁷. It is therefore difficult for producers and grain handlers to decide to target quality-sensitive premium market segments and potentially earn higher household incomes. This is one of the barriers Ugandan producers face in accessing lucrative regional and relief food markets (Onumah and Nakajjo, 2014).
- c. **Missing information on output forecast and stock levels:** For farmers and traders who are interested in deferring sale of produce immediately after harvest as well as banks keen to provide them with inventory finance, prevailing prices are insufficient as they also require information on overall output as well as existing stock levels in order to take a position on future price levels based on demand and supply projections. This information is largely unavailable in Uganda.
- d. **Prices for quality inputs:** Farmers consulted indicated the need for information on prices and sources of quality inputs. Variability in the quality of available agricultural inputs is reported to cost farmers about US\$10.7 million to US\$ 22.4 million per annum (IFAD, 2015). Inputs risk can be reduced and, along with it the associated losses, if reliable information on credible suppliers is provided. There is a dearth of this type of information in Uganda.
- e. **Access to archived data:** Another important gap in information is the availability of reliable historical data on commodity prices as well as on output and demand. These are important in undertaking trend analysis but there are reported difficulties in accessing such information²⁸.

Standardisation of weights, measures and quality bring structure to commodity marketing and reduce uncertainty in transacting. The development of agricultural commodity exchanges and warehouse receipt systems (WRS) can contribute to the emergence of structured agricultural marketing and finance systems, which will, in turn, create incentives for investment in increased farm productivity and output (Onumah 2012). COMCEC (2017) noted that commodity exchanges improve marketing of physical products; offer price hedging instruments; and boost links between agriculture and finance, and making the commodity sector more efficient and competitive. Acknowledgement of these potential benefits encouraged many African countries to promote exchanges in the post-liberalisation 1990s. Uganda was among the frontrunners in this, having set up the Uganda Commodity Exchange (UCE) even before the South Africa Futures Exchange (SAFEX) was launched in 1996. The UCE has, however, failed to take off as have so many other similar initiatives in Africa (African Development Bank, 2013; and Bjerga and Davison, 2015). Several factors have been identified as hampering the development of

²⁷ At the time of the visit in August 2017, the prevailing market price per kilogram of maize was UGX 800. However, during that same period, the price per kilogram for Aflatoxin-free maize was UGX 1190/kg, a premium of 48.8% which farmers and traders could have taken advantage of if informed.

²⁸ An official of the new Uganda National Commodity Exchange (Mark Kaija) reported considerable difficulty accessing historical price and output data for the major grains and other export crops to be traded by the exchange (pers. comm. 13/10/2017).

commodity exchanges, among these being the limited capacity of the new exchanges to enforce trade contracts (Sitko and Jayne, 2011). This simply means that the exchanges are unable to ensure that sellers deliver against the trade contracts and that buyers honour payment obligations. In an assessment of UCE in 2014, Onumah and Nakajjo (2014) concluded that the latter problem can be fixed by setting up a credible clearing and settlement system involving at least one of the major banks – which was demonstrably feasible. They stressed, however, that the much more difficult challenge was in guaranteeing delivery of quality products in a country where a reliable WRS is missing. As at the time of this study, this challenge remained and needs to be addressed by private stakeholders and the Government of Uganda.

As shown in Table 5, different forms of funding configurations are in place for MIS in Uganda. This includes the totally government-funded Coffee MIS run by the UCDA and donor-funded systems such as FEWSNET and the WFP's platform which aims the monitor developments which signal the risk of a food crisis either at national or specific community levels. In addition, there are private MIS platforms which rely on internal-cross subsidisation from other commercial activities undertaken by the providers such as commodity trading and provision of advisory/consultancy services. The private providers, however, receive various levels of critically needed supplementary from donors and the government. There is no single case in Uganda where an MIS has achieved autonomous financial sustainability. It is apparent therefore that sustainability remains a major challenge for most of the providers.

No formal legislative or regulatory framework exists in Uganda for MIS, which has partly contributed to the large number of providers who populate the MIS landscape in the country without driving up uptake, especially among the key market players such as farmers, traders and financial institutions. There is no apparent coordination among the providers and no structural responsibility for validating the quality of information disseminated and ensuring it is aligned to the needs of market players. Though none of the stakeholders consulted advocated for such an enabling regulatory framework, it may be worthwhile for Uganda to learn from Indonesia and institute a working platform which rationalises investment in MIS capacity in order to ensure delivery of reliable information which meets the needs of the target audience.

It also appears important in promoting effectively utilised MIS as well as overall development of agricultural marketing systems in Uganda that Government avoids policy actions which discourage transparent engagement in market transactions. For example, Government policy objective of encouraging domestic value addition is perceived by stakeholder to be against the export of maize grains rather than maize flour into regional markets. The unintended consequence of the policy, therefore, appears to include restricting transparent formal exports but rather boosting informal cross-border trade in maize grains. One of the effects is under-reporting of the flows as well as price incentives for maize grain exports.

A similar appears to have emerged in the sorghum subsector, where Government policy aims to protect domestic producers and restrict imports from regional suppliers. The anecdotal evidence obtained during the consultations with stakeholders in the course of this study indicate that this action is only encouraging under-reporting of the volumes of cross-border trade in sorghum and may be misrepresenting the overall state of the trade.

8. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study was commissioned by COMCEC for purposes of assessing the extent to which MIS in member countries of OIC have achieved set objectives such as facilitating trade decisions by players in agricultural value chains; improving market transparency; enhancing the bargaining power of, especially, farmers; and providing policymakers and researchers with valuable material. The study aimed to provide an overview and mapping of current MIS in OIC member countries; elaborate policy recommendations to improve MIS in the OIC countries in order to contribute to improvements in the performance of agricultural marketing systems, and to recommend suitable indicators to allow policymakers to monitor MIS and its use in decision-making. The methodology adopted included a review of the literature on MIS; an online survey targeting users and providers of MIS services; and three country case studies involving field visits to Egypt, Indonesia and Uganda. The conclusions from the evidence generated are summarised below. Also set out in this chapter are relevant recommendations.

After liberalising the agricultural and other sectors of the economies in the 1970-80s, most developing countries prioritised the development of market institution in order to improve the performance of agricultural inputs and output markets. This was seen as important in driving sustained output and productivity growth in the agricultural sector. In the course of liberalisation, government-run institutions which were dominant prior to the reforms were scaled down. These included state-owned economic enterprises in the agricultural sector, commodity marketing boards and commodity market regulatory authorities (COMCEC, 2017). The role of cooperatives in the marketing of agricultural inputs and outputs was also affected by liberalisation. The new market institutions which were promoted include as market information systems (MIS) as well as warehouse receipt systems (WRS), commodity quality and quantity assurance systems and agricultural commodity exchanges (Coulter and Onumah 2002; and COMCEC, 2017).

The primary aims for which many developing countries set up the MIS included:

- a) To facilitate trade decisions for buying, selling and investing;
- b) Improve market transparency;
- c) Minimise information asymmetry between market actors;
- d) Enhance the bargaining power of smallholder farmers in selling their marketable surplus;
- e) Provide policymakers with reliable evidence-basis to guide policy decisions, especially with regards to food security; and
- f) Assist agricultural research.

Several decades of MIS in most developing countries has evolved, in particular as advances in ICT has made it possible to improve and speed up collection, processing and dissemination of market information. In addition, service provision has moved beyond governments and increasingly involves private sector actors and NGOs as well as professional representative organisations such as farmers' organisations. This study was commissioned to assess the extent to which MIS in member countries of OIC have achieved the objectives outlined above. The aims of the study are to provide an overview and mapping of current MIS in OIC member countries; to identify and elaborate options for policy recommendations to improve agricultural market performance through the use of MIS; and to recommend suitable indicators to allow

policymakers to monitor MIS and its use in decision-making support for agricultural and trade policies. The study included a review of literature; an online survey targeting users and providers of MIS services across the globe; and three cases studies involving field visits. The case study countries are Egypt, Indonesia and Uganda.

8.1 MAPPING OF MIS: GLOBAL CASES AND IN OIC MEMBER COUNTRIES

Mapping of MIS in developing countries shows that, as has been the case in many other developing countries, the systems in OIC member countries have followed a trajectory of advancing from the mainly government-run First Generation MIS (1GMIS) to the more ICT-intensive Second Generation (2GMIS). This evolution was driven partly to reduce the cost of service delivery, especially in the dissemination of information; improve the timeliness of delivery; and also enhance the accuracy of reported data by minimising human intervention in data entry and processing. Advances in ICT contributed to the evolution, in particular, it made it possible to transition from the publication of price information through national radio, television and newspapers to the more cost-effective vehicles of websites, emails and mobile telephony. ICT also made it possible to undertake and report on trend analysis and present in more user-friendly formats than the long price lists which were reported under the 1GMIS.

It is evident that the improvements in MIS have been beneficial, especially for governments in terms of policy actions and plans to manage food security and other developments in the agricultural sector. This is partly because of two main factors. First, it is possible to fill data gaps on supply forecasts and stock levels by accessing available regional and international platforms to which many of the OIC members belong. Second, data analysis capacity is pooled from national government agencies as well as a network of donor organisations involved in food security. In many cases, the institutional, as well as legislative framework, exists for ensuring coordinated action, the most interesting example being Indonesia.

However, the anticipated benefits to private sector stakeholders, especially farmers and traders, appears to be less tangible. Consequently, the impact of MIS appears to be more tangible in the public sector than in catalysing the development free and efficient agricultural marketing systems. This situation is attributable, in part, to the fact that the focus of most MIS continues to be on collecting and disseminating price information, with little or no investment in trend analysis. Other identified gaps in the information provided include lack of output forecasts and stock monitoring data which are critical in assessing the supply situation and projecting future prices. This information is particularly important when market actors have to decide on delaying the sale of commodities or where lenders are evaluating the request to finance inventories which are to be sold or used at a future date. Another crucial factor is that complementary market institutions through which well-informed players can transact (e.g. WRS and exchanges) are either missing or under-developed in the OIC member countries. In particular, in the Arab Group countries, the focus on government interventions to moderate transfer of price shocks for imported strategic grains to the national populations appears to have diluted incentives to promote private-oriented market institutions. In many of the African Group countries, including Uganda, such market institutions have been piloted but remain underdeveloped. Asian Group examples such as Malaysia demonstrate the benefits from promoting MIS in tandem with market institutions. However, where these are developed, export commodities appear to be more targeted than produce traded mainly in the domestic markets.

Further advances in ICT are also opening up new opportunities for 2GMIS platforms to include, for example, directly facilitating trade. A well-cited example in Africa is ESOKO, which is trailblazer in West Africa and RATIN in Eastern Africa. These platforms attempt to connect buyers and sellers. However, the considerable investments which have gone into this have borne little on or fruit because they lack systems which guarantee delivery of offered stocks and/or payment by successful bidders. The emergence of market institutions such as WRS and commodity exchanges will optimise the potential to exploit the structured trading opportunities which are created. In addition, some private platforms are setting farmers' database and deploying remote sensing technology in order to monitor the on-farm performance of crops. This is particularly interesting to lenders. However, evidence from countries such as South Africa suggests that scaling up such platforms will be significantly boosted if the development of MIS is tied to the promotion of complementary market institutions. The evidence also shows that most MIS in developing countries face challenges in terms of sustainability and providers remain dependent on donors for support.

Evidence from Online Survey of MIS

Though the response rate to the online survey was rather low, about 10% of the target respondents, the evidence which emerged confirmed observations from the literature review, including mapping of MIS in developing countries. It is quite clear that the advance to 2GMIS models has broadened the range of crops and livestock covered; diversified service providers to include not only governments as was the case with 1GMIS but also provision by private sector players and NGOs. It is evident, however, adopting ICT has not addressed some of the challenges which have stymied uptake of information services by market players (especially farmers and traders). Improving the content of the information provided is one of the areas which emerged as critical from the online survey. This should include aligning price information to opportunities for producers and traders to sell into formal market segments where trade is set around standardised weights and quality. It is apparent that respondents are not strongly advocating regulatory framework for MIS but rather policy actions which foster the development of formal structured trading systems.

8.2 EVIDENCE AND LESSONS FROM CASES FROM OIC MEMBER COUNTRIES

The three countries selected for the case studies were Egypt, Indonesia and Uganda. The MIS landscape in Egypt is dominated by government-based providers. Though are initiatives by the private sector and non-government organisations to set up MIS, these are at rather early stages of development. Hence, as was noted in a study by Christiansen et al. (2011) over six years ago, smallholder farmers continue to be held back by limited access to reliable market information. The situation is partly attributed to government control of markets for strategic commodities such as wheat, where it dominates domestic procurement and imports and therefore determines. The ripple effects of this dominance are reported to affect other subsectors such as tomato, where opportunities exist for producers to adopt production and marketing strategies which ease entry into the large and lucrative European Union market. There is no evidence from Egypt to suggest that the existing MIS are linked to initiatives to promote the development of market institutions such as WRS and commodity exchanges or even to sustainable agricultural credit delivery system.

Indonesia in the 1990s was one of the lead countries in operating 1GMIS and has continued to maintain a predominantly government-run system. It has in place legislative framework with clearly defined roles for various government agencies in providing market information. The Ministry of Agriculture focuses on collecting and disseminating wholesale prices for agricultural produce whilst the remit of the Ministry of Trade concentrates on retail prices. The Badan Pusat Statistik (BPS or National Office of Statistics) has statutory authority to regulate information collection and dissemination, including assuring the quality of information disseminated. Government funds MIS operations, in part through utilising part of the staff time of personnel at relevant district, provincial and national levels. The information collected is shared with major players such as WFP, which monitors the food supply situation principally for food security reasons.

Despite being well-structured and generating information which is valuable to policymakers, evidence obtained from this study shows that farmers and other market actors are not accessing the MIS and using the information provided as a basis for their marketing strategies and investment decisions. For instance, farmers and traders in and around Bogor, who were interviewed during the study, indicated that they mainly obtain price information by phoning potential buyers in different markets. As such the mobile phones (standard phones or smartphones) play an important role for farmers in terms of obtaining information for bargaining but not as anticipated in theory – i.e. by checking published prices. The ongoing development of WRS and structured trading systems, including auction markets, which is led by the government regulator COFTRA, is anticipated to boost the quality of information disseminated by MIS whilst enhancing prospects for successful development of the market institutions.

Uganda has advanced from being one of the pioneers of 1GMIS in the 1990s (with FOODNET) to a landscape populated by a wide range 2GMIS platforms provided by the government and private organisations as well as by NGOs. The diversity of existing MIS platforms is further shown by the fact that whilst some were limited to national coverage, especially the private ones, others covered regional and international market information. However, most of the stakeholders consulted reported not being aware of and/or not accessing existing MIS. The stakeholders include farmers, traders (both small-scale rural traders and large-scale ones), warehouse operators and bankers. Even among policymakers, several did not consult the existing MIS. The only exceptions are policymakers working on food security and agricultural extension issues such as NAADS, and development practitioners whose remit includes interventions to mitigate food crisis (e.g. officials of WFP and USAID).

Among the factors identified as limiting uptake of existing MIS by key market actors in the country is the apparent disconnect between the information stakeholders perceive as crucial to their trade and investment decisions and what is offered on the MIS platforms. Trend analysis is often missing and the price information provided tends to be de-linked from quality standards which are enforced in the formal segments of the markets. Reliable output forecasts and data on available stocks within the country are often not reported. Also missing, as is the case in Uganda, is information on prices and availability of quality inputs. The price data reported also does not reflect actual transactions with auditable trail but rather information obtained by phoning or interviewing traders. Farmers and traders in both Indonesia and Uganda find it quicker and more reliable to phone their peers and other traders directly rather than consult MIS. As is the case in most countries, policymakers appear to be the most equipped to utilise market information for policy actions, including food security.

Developing market institutions such as agricultural commodity exchanges and WRS, which foster structured trading based on standardised weights, measures and quality can generate transparent prices which can increase uptake of MIS. At the same time such systems can enhance agricultural marketing and finance, thereby creating incentives for increased investment in raising farm productivity and output – making the new Mobipay system more fit-for-purpose. However, there are challenges in developing the market institutions, as has been the general experience in most African countries.

8.3 RECOMMENDATIONS TO IMPROVE MIS IN OIC MEMBER COUNTRIES

Based on the evidence from best-practices in the world obtained from the review of literature as well as from the online survey and the three case study countries, the goals for which OIC member countries set up MIS are yet to fully materialise. Further action is required to optimise the benefits to be enjoyed, especially by market actors such as farmers, traders and financial intermediaries. Towards this end, we propose the following recommendations:

- a. **Designing MIS should specifically take into account the needs of target stakeholders:** In designing MIS the focus should be on improving the content of the information provided. The basic aim should be to align information provided to the identified needs of target stakeholders, especially farmers, traders, financial intermediaries and other private actors in the agricultural value chains. Hence, an assessment of the needs of the target stakeholders as well as audience satisfaction reviews should be regularly undertaken by providers. This is missing in all the cases reviewed but is crucial going forward.
- b. **MIS should go beyond price information to include trend analysis and forecasting:** Based on evidence found on the expectations of market players, it is clear that the content of MIS should go beyond price information and include reporting trend analysis which can signal supply and demand conditions and allow market players to take positions regarding immediate and future price levels. To achieve this, there needs to be investment in building output forecasting capacity, which is becoming increasingly more feasible with advances in ICT. It will also require promoting stock monitoring systems which can be built, for example, around well-regulated WRS.
- c. **Linking MIS to other market-supporting institutions and/or other risk-management tools to increase their mutual benefits:** Indeed linking the development of MIS to that of other market-supporting institutions such as WRS and agricultural commodity exchanges can lead to mutual benefits. On one hand such institutional innovations will ensure that price discovery is more transparent and therefore worth accessing. On the other hand, effective and reliable MIS is an important prerequisite in successfully developing these market institutions.
- d. **Government support ranging from cross-subsidisation to direct external support can sustain MIS:** Sustainability of MIS remains a challenge as we found no single case in the reviews where an existing platform has achieved financial sustainability. Internal cross-subsidisation by private and government providers, arising from linkages to core functions appear to reduce the scale of dependence on external agencies such as donors. It appears,

however, that if uptake is enhanced and benefits in terms of improvements in agricultural production, marketing and finance are more tangible then external support may be more justifiably advocated on the grounds of the 'public good' characteristics of market information.

- e. **Formal or informal institutional setting can improve coordination among the key stakeholders:** Though the specific case of Indonesia indicates potential benefits from instituting a formal legislative or regulatory framework to underpin MIS, there does not appear to be strong demand for replicating this in other countries. Despite that, the Indonesia case offers important lessons in terms of governance of MIS, which other countries can learn from, especially where there is a proliferation of platforms with many of them being dependent to some degree on external funding support. Key among the governance systems we recommend is setting up specific working groups with representation from government, providers, key stakeholders and donors. The working groups should coordinate and rationalise the information collection and dissemination process in order to optimise efficiency. Furthermore, the quality of information provided and its relevance to target users should be regularly reviewed.
- f. **Aligning agricultural trade, market development and food security policies and implementation can optimise the benefits from MIS:** Pursuit of food security objectives aimed at moderating short-term food price shocks tends to lead to marginalisation of long-term agricultural market development goals. Efforts are then concentrated in promoting MIS and allied public institutions which facilitate governments' respond to food supply and price shocks. The downside is marginalisation of actions to develop MIS which meets the needs of market actors including producers, traders and financiers. Furthermore, complementary market institutions are underdeveloped, the exception often being in value chains for strategic agricultural exports. The consequence is inefficient domestic markets for agricultural produce which lead to dampening of producer incentives and therefore cannot catalyse sustained output growth in agriculture. This leads to dependence on imports even if favourable agro-climatic conditions exist as is the case in many of the African and Asian Groups of OIC member countries. Vulnerability to food supply and price shocks is deepened, further reinforcing the cycle of short-term market interventions which stifle domestic market development. A major policy shift, which ensures that food security objectives and long-term market development goals are properly aligned will allow MIS to become more effective in driving sector performance and reducing national vulnerability to food insecurity. This option is highly recommended to governments and other stakeholders.

8.4 RECOMMENDATIONS ON MIS MONITORING INDICATORS

One method of improving existing MIS is by enhancing the Monitoring and Evaluation (M&E) of the systems and developing more appropriate monitoring indicators. It has been acknowledged by many researchers that assessing the impact of MIS is fraught with methodological complexities. Attribution has been a central challenge (Staatz et al., 2014). The authors of this report are, however, of the view that effective monitoring and evaluation is important not in ensuring that the target audience gain the anticipated benefits but also because of the need to ensure the investments in MIS by governments and donors prove worthwhile. In this regard, we recommend the following indicators to allow policymakers to monitor MIS:

- (i) **User satisfaction with the information provided should be regularly assessed.** User surveys represent one means in carrying out this assessment. It can be done at relatively low-cost if users who access information via mobile phones are tracked (this methodology was used in the case reported in Box 3). However, for most market players the surveys conducted should not only rely on a quantitative methodology using a structured questionnaire but also a more qualitative approach using semi-structured questions. The experience from this study, especially the low but not unusually low response rate informs this recommendation.
- (ii) **The quality, relevance and timeliness of information provided should be particularly assessed.** This may involve triangulating information provided by the MIS platforms with available data and information from other sources. In particular, assessing the relevance of the information need to be underpinned by baseline surveys on the needs of the target stakeholders, allowing reviews to be properly benchmarked.
- (iii) **Cost-efficiency of service provision along with the effectiveness of governance systems for MIS should be assessed:** Cost-efficiency is critical, especially where external funding is needed to sustain the MIS operation. A review of the information/data collection, analysis and dissemination process can reveal opportunities where, for instance, collaboration rather than duplication, can reduce the overall cost to the economy of running MIS. In addition, the governance systems of the MIS platforms need to be assessed, in particular, to ensure effective coordination which can reduce costly duplication.
- (iv) **Impact of MIS on overall development of agricultural markets needs to be assessed:** Though this assessment poses major attribution challenges it is important and has been advocated by many of the online survey respondents. Collaboration with academic institutions (local and international) can contribute to a more cost-effective monitoring and evaluation process. For this purpose, maintaining an easy-to-access archive of data will offer a means to attract researchers who are studying various sector-related issues and can shed some light on the contribution of MIS to developments in the sector.

To conclude, it appears that MIS continues to attract investment from government, private sector and donors because of its potential contribution in enhancing agricultural trade and investment. The evidence reviewed generally suggest that technological advances have triggered significant changes in the delivery of market information. Further improvements are however required to ensure that the information provided is more relevant to market actors as well as policymakers. The improvements recommended include the content of the information provided and how it is aligned to stakeholders' needs; and the governance of the system, even if no formal regulatory system is instituted. Policy can further advance improvements if it's tailored to be more supportive of innovations and initiatives which improve the performance of agricultural marketing systems.

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APPENDIX 1: LIST OF STAKEHOLDERS CONSULTED DURING COUNTRY VISITS

APPENDIX 1A: LIST OF STAKEHOLDERS CONSULTED IN EGYPT

Name	Organisation
Prof. Adel M.Aboul-Naga	Agricultural Research Centre
Dr Mohamed Abdel Nabi Desouki	Head of Economic Affairs Economic Affairs Sector, Ministry of Agriculture
Dr Mohamed Heikal	Deputy Director Agricultural Economics Research Institute
Dr Mohamed Zakaria	Head of Research Agricultural Economics Research Institute
Dr Mohamed Ali Ahmed	Head of Research Agricultural Economics Research Institute
Edgar Tawil	Treasurer Knowledge Economy Foundation
Bassem Orban	Regional Manager Green Universe
Mohamed Khaled Ebn El-Waled	Marketing Manager WE
Dr Ragab Alpitar	Agricultural Economics Research Institute
Prof Mahmoud Khallaf	OIC Comcec contact point Agricultural Economics Research Institute
Prof Mohamed Moteleb	Head of Cooperation & Finance Agricultural Economics Research Institute
Dina Farms	Engineer Tariq

APPENDIX 1B: STAKEHOLDERS CONSULTED IN INDONESIA

Names	Title and Organisation
Andrew Shepherd	Independent Consultant
B. Dwiagus Stepantoro	National Consultant, Jakarta, Indonesia
Dr Anna Astrid Susanti	Head of Center for Agricultural Data and Information Systems at Ministry of Agriculture, Indonesia
Dr Leli Nuryati	Focal Point of Agricultural MIS at Ministry of Agriculture, Indonesia
Dr S Nugroho	Designer of Agricultural MIS, Ministry of Agriculture
Mark Smulders	Representative of Food and Agriculture Organization (FAO) of the United Nations in Indonesia
Siska Widyawati	Communication Specialist, FAO Indonesia
Katarina Kohutova	Manager, Food Security Monitoring Bulletins, World Food Programme (WFP), Indonesia
Farmers and traders	Agricultural markets and farms, Bogor
Mohammad Najib	CEO, USAHADESA, NGO & Village Enterprise Startup; Yogyakarta
Mr Fadel	Food price data unit, Ministry of Trade, Jakarta
Edwin Saragih	Director, Yayasan Bina Tani Sejahtera, NGO & SIPINDO startup

APPENDIX 1C: STAKEHOLDERS CONSULTED IN UGANDA

Names	Title and Organisation
Deborah Kyarasiime	Executive Director, UWRSA, Ministry of Trade Industry and Cooperatives
Mathias Okurut	Warehouse Inspector, TGPU
Martin Fowler	Agriculture and Livelihoods Advisor, USAID, Uganda
David Eboku	Manager Standards, Uganda National Bureau of Standards
Ivan Asiimwe	General Secretary/CEO Uganda Cooperative Alliance
Vivian Tumuhairi	Quality Assurance Supervisor, Agroways Uganda Limited
Fred Ogene	Under Secretary, Ministry of Trade Industry and Cooperatives
Joseph Kitandwe	Commissioner for Cooperatives, Ministry of Trade Industry and Cooperatives
Chris Baine	Executive Director, Uganda National Commodity Exchange
	Bugaya Farmers' Cooperative, Bugaya (60 km from Jinja)
Dr Samuel Mugasi	Executive Director, NAADS
Michael Mukasa	Head, Business Analysis Dept. DFCU
David Sekabembe	Executive Director, DFCU
Charles Mukama	Ministry of Agriculture, Animal Industry and Fisheries, Entebbe.
Mark Kaija	MIS Manager, Uganda National Commodity Exchange
Lilian Asiimwe	Market Intelligence Officer, UCDA
Brian Akimanzi	Financial Markets Dept., Bank of Uganda
David Baziwane	Snr Project Officer (Agro-Industry), Uganda Development Corporation
Nsubuga Tadeo	Britam Insurance Co. Ltd.

APPENDIX 2: ONLINE SURVEY QUESTIONNAIRE

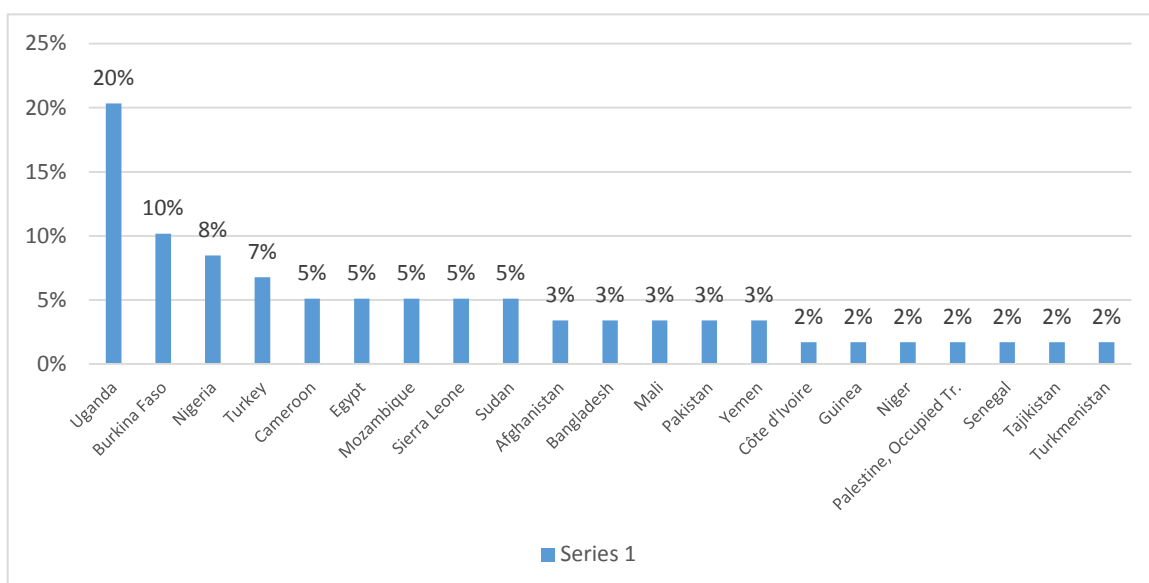
	Screening	
1	In which of the following countries do you have most experience related to agricultural market information systems (MIS)? [COUNTRY]	All respondents
2	Which statement best describes your relationship to MIS systems? (choose one)	All respondents
	Users information requirements	
3	What type of organisation do you currently work for?	Users & General
4	What are the main activities of your organisation? [Private sector only]	Users & General
5	In which types of commodities/crops and/or livestock are your organisation involved? [OPEN]	Users & General
6	Which type of market information do you require?	Users & General
7	How frequently do you need this information?	Users & General
8	Which form of delivery would you prefer for market information, regardless of whether this is currently offered?	Users & General
9	Which channels would you prefer to use to access this information, regardless of whether these are currently offered? Please choose no more than 5	Users & General
	Agricultural MIS in respondent country	
10	Which agricultural market information systems (MIS) are currently available in [COUNTRY]? [Multiple open answers]	All respondents
11	From a national perspective, how satisfied are you with the provision of market information on agricultural crops/commodities and livestock in [COUNTRY]? [Very satisfied – satisfied – neutral - dissatisfied - very dissatisfied]	All respondents
12	For which reasons are you satisfied with the provision of market information for agricultural crops/commodities and livestock in [COUNTRY]?	All respondents
13	For which reasons are you not satisfied with the provision of market information for agricultural crops/commodities and livestock in [COUNTRY]?	All respondents
14	Which MIS is currently your main source of market information? Please provide the full name. [Users]	All respondents
15	Please provide a shortened name or acronym for this MIS. You may use the same name as above if applicable. [MIS]	All respondents
16	Please provide the website address of [MIS] (optional)	All respondents
17	Who is the main organisation(s) providing [MIS]?	All respondents
18	What type of organisation is this?	All respondents
	Operations of MIS	
19	What systems are used by [MIS] to collect market data? Please select all that apply.	Providers
20	How is data transmitted from enumerators to the system? Please select all that apply.	Providers
21	Who are the main target audiences of [MIS]? (please select all that apply)	Providers
22	What are the main sources of funding of [MIS]? (please select all that apply)	Providers
23	Which measures is [MIS] taking to increase the number of its users? [OPEN]	Providers

24	Has research been done to understand the impact of [MIS]?	Providers
25	If the results of this research are available openly online, please provide a link the research output below.	Providers
26	According to the research, which of the following impacts have been measured and related to [MIS]?	Providers
27	Which types of information does [MIS] collect on its users?	Providers
Assessment of MIS		
28	Do you use [MIS] to access market information?	General
29	Which types of crops/commodities and/or livestock do you use [MIS] for? [OPEN]	Users & General
30	What are your main reasons for using [MIS]? [OPEN] [User]	Users & General
31	What, in your opinion, are the main reasons for users to use [MIS]?	
32	How, in your opinion, could [MIS] be improved? [OPEN]	Users & General
33	Are there any alternatives to [MIS] in [country]?	All respondents
34	What is the name of the closest alternative to [MIS] in [country]? [COMPMIS]	All respondents
35	Please provide the website of [COMPMIS]	All respondents
36	Who is the main provider of [COMPMIS]?	All respondents
37	What type of organisation is [COMPMIS]?	All respondents
38	What, in your opinion, are the strengths of [COMPMIS] compared to [MIS]?	All respondents
39	What, in your opinion, are the weaknesses of [COMPMIS] compared to [MIS]?	All respondents
40	Which of the following organisational functions does the information obtained from [MIS] influence? Please select all that apply.	Users
41	How are these functions affected by the information obtained from [MIS]? [OPEN]	Users
42	Please rank the following criteria of effectiveness of agricultural MIS in order of importance.	All respondents
43	How do you rate the services of [MIS] on the following criteria? [poor – fair – average – good – excellent]	All respondents
Challenges and opportunities facing MIS		
44	Which of the following challenges are applicable to agricultural MIS providers in [country]? Please select all that apply.	All respondents
45	Which of the following support mechanisms are in place for agricultural MIS in [country]?	All respondents
46	To what extent do you think an effective regulatory framework could improve the functioning of MIS in [COUNTRY]? [Not at all – very little – somewhat – to a great extent]	All respondents
47	What, specifically, would you propose to improve the functioning of MIS in [COUNTRY]? [SHOW IF 'somewhat' or 'to a great extent' are selected in previous question]	All respondents

48	What would be the most effective measures, in your opinion, to encourage the uptake of available market information and other services provided?	All respondents
	Demographics	
49	What is the name of the organisation you currently work for? [Organisation] [OPEN]	All respondents
50	What is your role at [Organisation]?	All respondents
51	Your email address (optional) [OPEN]	All respondents
52	Please enter any additional comments or remarks you would like to make below (optional) [OPEN]	All respondents

APPENDIX 3: PROFILE OF ONLINE SURVEY RESPONDENTS

1. In which of the following countries do you have most experience related to agricultural market information systems (MIS)?



2. Which statement best describes your relationship to MIS systems?



3. <i>What type of organisation do you currently work for? [Users and general]</i>	
International organisation	26%
University	26%
Public body	20%
Other	13%
NGO	9%
Private sector	6%

4. <i>What are the main activities of your organisation? [Private sector only]</i>	
Warehousing	67%
Processing	67%
Farming	67%
Input supply	33%
Transport	0%
Produce trading	0%
Other	0%

5. <i>In which types of commodities/crops and/or livestock are your organisation involved? [OPEN]</i>	
Cereals	28%
Livestock	24%
Pulses	12%
Cash crops (coffee, cocoa, sesame)	11%
Roots & tubers	9%
Vegetables	7%
Fruit	5%
Aquaculture	4%
Horticulture	2%