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India–Africa Partnerships for Food Security and Capacity Building

South–South Cooperation

Edited by Renu Modi · Meera Venkatachalam

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Editors

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Foreword I

In the global push to achieve the 2030 Agenda for Sustainable Development and to realize the Sustainable Development Goals' ambition of eradicating poverty by the end of the coming decade, the importance of South-South cooperation has never been more crucial; and the roles of both India and Africa are central to its success.

Yet, despite progress on many fronts, the Food and Agriculture Organization of the United Nations' State of Food Security and Nutrition in the World (SOFI) 2019 report paints a different picture—that undernourishment and hunger are on the rise, food insecurity is still ever present for hundreds of millions of people and that 'the situation is most alarming in Africa'. Decades of progress are under threat.

The publication of *India–Africa Partnerships for Food Security and Capacity Building: South–South Cooperation*, is, therefore, extremely timely and informative. The development relationship, especially with regard to agriculture, between India and Africa is fundamental to both regional and global prosperity and is important in reversing this worrying trend in undernourishment and hunger.

This book clearly charts a pathway to improved collaboration between India and Africa. It outlines the current situation and the challenges and opportunities that underlie it; and what the role of knowledge-sharing, capacity building and innovative credit and financial and technological mechanisms is to be in shaping the future partnerships between them.

On the eve of this crucial decade, a renewed push is needed to achieve lasting results. The clear, collaborative vision outlined here shows the path ahead for India and Africa.

Rome, Italy

Ashwani K. Muthoo
Director, Quality Assurance Group
Office of the President and Vice-President
International Fund for Agricultural Development

Foreword II

Food security and agriculture are critical areas of development for India and Africa. With a large number of the population below, the poverty line, agriculture and food production become the highest priorities for the two geographies. The employment aspect of agriculture is also very important. In both India and Africa, the majority of the population depends on agriculture for their livelihoods. Yet, farmers' distress is a major socio-economic problem. The challenge is to make agriculture a viable economic activity for the small and marginalized farmers. This needs both innovative policies and inputs of appropriate technologies.

Studies have shown that a one per cent increase in the agricultural sector has an effect on poverty reduction equivalent to three to four times of a similar increase in other sectors. This book addresses these issues of vital importance in a comprehensive and professional manner. It is a collection of papers by eminent scholars in the field. It lays stress on South-South cooperation with particular reference to India-Africa engagements in sharing of knowledge. It also has papers on agricultural financing, capacity building and trade in agricultural commodities. The message that comes out of this compendium is that to make agriculture productive and achieve total food security, all the challenges have to be addressed in a holistic approach. This book should generate further discussions and debates leading to valuable inputs for scholars and policymakers.

I congratulate the authors for their excellent research. I also commend the publishers, Palgrave Macmillan for bringing out this volume. Dr. Renu Modi and Dr. Meera Venkatachalam have done a creditable job in editing the volume to keep it concise, precise and focused.

H. H. S. Viswanathan
Distinguished Fellow
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Acknowledgements

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A number of other organizations extended financial support for this meeting and partnered with the host organizations, including ORF (Mumbai) and the Centre for African Studies, University of Mumbai. We thank the Department of Economic Diplomacy, Ministry of External Affairs (MEA), Government of India; Ashwani K. Muthoo, Director of the Quality Assurance Group in the Office of the President and Vice-President at the International Fund for Agricultural Development (IFAD), Rome; Ivan Mugisha, the then India country manager of

RwandAir; R. Mukundan, Managing Director and CEO of Tata Chemicals Ltd.; and V. Shankar, former Managing Director and CEO of Rallis India, for their support in this academic endeavour.

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Mumbai
December 2020

Renu Modi
Meera Venkatachalam

About the Conference

This compendium is an outcome of an interdisciplinary conference entitled *India–Africa Partnerships for Food Security and Capacity Building: South–South Cooperation*, held on 23rd–24th January, 2018 in Mumbai. It was organized jointly by the Observer Research Foundation (ORF) and the Centre for African Studies (CAS), University of Mumbai.

The meeting attempted to analyse the current trends in South-South cooperation between India and select countries in Africa in the agriculture and agro-processing sectors. Scholars and practitioners shared multiple perspectives on the role of India's development compact—i.e., aid, trade, private sector-driven Foreign Direct Investments (FDIs), and concessional Lines of Credit (LOCs) extended at the behest of the Government of India (GoI)—for augmenting agricultural productivity and building value chains in agro-commodities, inter alia; sugar, cotton, cashew, pulses and oilseeds in Africa. India's experience with the 'Green Revolution'—its successes, challenges and competence to manufacture 'appropriate, adaptable, and affordable' (triple A) technologies for the agriculture and agro-processing sectors; cost-effective solutions towards 'smart agriculture', and upscaling human and infrastructural capabilities—could be a valuable learning for Africa. Training and capacity building programs extended by the GoI and private sector organizations facilitate skill transfers to several countries in Africa. Collaborative initiatives to set up Small and Medium Enterprises (SMEs), and Micro, Small and Medium Enterprises (MSMEs) have immense potential for value addition to agricultural commodities and

employment on the continent which is projected to account for more than half of the world's population growth by 2050.

The conference underscored that the ongoing collaborations between the various stakeholders have been mutually beneficial. The African continent provides India with a vast market for her agro-technology, investments and opportunities for partnerships in the agriculture and value addition segments. The export of select agricultural commodities from Africa has helped India diversify her import base and meet the shortfall in domestic production, such as in pulses and oilseeds.

The symposium also attempted to understand the tangible outcomes of India-Africa partnerships in the agriculture and agro-processing sectors over the past decade, alongside the accomplishments, experimentations with mechanisms of engagements, limitations and challenges. The participants concurred that to counter global food insecurity, a resolute and collective action is required, such as through the ongoing South-South initiatives between India and Africa.

The outcomes of the conference offered valuable policy inputs on India-Africa trade, FDI and capacity building initiatives in the farming and related sectors for building food security and further strengthening India's ongoing initiatives in this area. The findings were valuable for policymakers to further strengthen mutual cooperation through Government to Government (G2G), Business to Business (B2B), Business to Consumer (B2C) and People to People (P2P) ties between the stakeholders. The conference also made a strong case for the empowerment of women smallholder farmers in Africa through Woman to Women (W2W) initiatives between Indian civil society organizations and their counterparts across the continent to build their skills and collective organizational capabilities.

Academics, researchers, development professionals, NGOs, private sector representatives, and government and international organizations shared empirical findings and emerging trends on the ongoing modalities, practices, opportunities, anxieties and challenges in the partnerships for enhancing food security and poverty reduction in the two geographies under study.

Praise for *India–Africa Partnerships for Food Security and Capacity Building*

"The compendium examines, with carefully selected case studies, the major impediments to agricultural transformation in Africa and suggests some concrete plans for overcoming them, particularly focusing on India's own experience and capital. The successful result of such an effort would benefit both India and the specific African countries in question. The collection also closely scrutinizes other diverse issues that are relevant to agriculture and food security in the context of the fledgling alliance between India and Africa. This is empirically rich, theoretically grounded and timely analysis of an important aspect of the political economy of South-South relations."

—Seifudein Adem, *Professor, Graduate School of Global Studies, Doshisha University, Japan*

"This book makes a valuable contribution in outlining ways for India and Africa to work together towards ensuring greater food security. Indeed, Africa remains a region full of potential in the agricultural sector, presenting opportunities as the continent is set to double its population to 2 billion by 2050. Through cooperation and knowledge exchanges with longstanding partners such as India, the continent can boost its level of productivity, find new markets, and use the sector to attract investment and create jobs. However, this can only be done through partnerships that boost the continent's internal capacity in this critical sector."

—Dr. Philani Mthembu, *Executive Director, Institute for Global Dialogue, University of South Africa, Pretoria, South Africa*

Contents

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Abbreviations

AAA	Adaptation of African Agriculture
AAIN	African Agribusiness Incubator Network
ABI	Agri-Business Incubator
ABP Ltd.	Afri-Banana Products Ltd
ACDI/VOCA	Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance
ADARSA	Alliance for Democratising Agricultural Research in South Asia
ADF	Acid Detergent Fiber
ADL	Acid Detergent Lignin
AfCFTA	African Continental Free Trade Area
AfD	Agence Française de Développement
AfDB	African Development Bank
AgBIT	Agribusiness Incubation Trust
AGN	African Group of Negotiators
AGOA	Africa Growth Opportunities Act
AGRA	Alliance for a Green Revolution in Africa
Agricoop	Department of Agriculture, Cooperation and Farmers Welfare
AIDS	Acquired Immune Deficiency Syndrome
AID-SA	Agro Industry Development Society Ltd (Mali)
AIIC	Agribusiness Innovation and Incubation Consortia
AIP	Agribusiness and Innovation Platform
ANAFE	Agro Forestry and Natural Resources Education

ANGRAU	Acharya N. G. Ranga Agricultural University
AOSIS	Alliance of Small Island States
APART	Assam Agribusiness and Rural Transformation
APEDA	Agricultural and Processed Food Products Export Development Authority
APMC	Agricultural Produce Market Committee
ARI	Animal Research Institute
ASALS	Arid and Semi-Arid Lands
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASDP	Agricultural Sector Development Program
ASDS	Agricultural Sector Development Strategy
ASEAN	Association of Southeast Asian Nations
ASSOCHAM	Associated Chambers of Commerce of India
ATA	Ethiopian Agricultural Transformation Agency
AU	African Union
AUC	African Union Commission
B.Sc.	Bachelor of Science
B2B	Business to Business
B2C	Business to Consumer
B2G	Business to Government
BAIF	Bharatiya Agro Industries Foundation
BAPA	Buenos Aires Plan of Action
BASIC	Brazil, South Africa, India and China
BBC	British Broadcasting Corporation
BIPPAs	Bilateral Investment Promotion and Protection Agreements
BJP	Bharatiya Janata Party
BMGF	Bill and Melinda Gates Foundation
BRICS	Brazil, Russia, India, China and South Africa
C4	Cotton Four countries (Benin, Burkina Faso, Chad and Mali)
C40	Cities Climate Leadership Group
C4CP	C4 Cotton Partnership Project
CAADP	Comprehensive Africa Agriculture Development Programme
CABin	Center for Agricultural Bioinformatics
CAP	Common African Position
CARMMA	Campaign on Accelerated Reduction of Maternal Mortality in Africa
CBDR	Common But Differentiated Responsibilities
CBDR-RC	Common But Differentiated Responsibilities and Respective Capabilities

CC	Collection Centre
CCARDESA	Centre for Coordination of Agricultural Research and Development for Southern Africa
CCARI	Central Coastal Agricultural Research Institute
CCIMA	Chamber of Commerce Industry Mines and Crafts
CCLEAr	Creating Competitive Livestock for Entrepreneurs in Agribusiness Consortium
CCPI	Climate Change Performance Index
CDM	Clean Development Mechanism
CDO	Cotton Development Organisation
CDRI	Coalition for Disaster Resilient Infrastructure
CEO	Chief Executive Officer
CFC	Common Fund for Commodities
CGAP	Consultative Group to Assist the Poor
CGDSF	Center for Global Development and Social Finance
CGIAR	Consultative Group for International Agricultural Research
CHA	Cotton Expert House Africa
CIAE	Central Institute of Agricultural Engineering
CIAT	International Center for Tropical Agriculture
CICR	Central Institute for Cotton Research
CIFF	Children's Investment Fund Foundation
CII	Confederation of Indian Industry
CIMMYT	International Maize and Wheat Improvement Center (known by its Spanish acronym)
CIRCOT	Central Institute for Research on Cotton Technology
CIS	Commonwealth of Independent States
CLFMA	Compound Feed Manufacturers Association
CmiA	Cotton made in Africa
COMESA	Common Market for Eastern and Southern Africa
COMPACI	Competitive African Cotton Initiative
COMRICE	Commercialization of Rice Farming in Tanzania Project
COO	Chief Operating Officer
COP	Conference of Parties
CORAF/WECARD	West and Central African Council for Agricultural Research and Development
COVID-19	Coronavirus disease 2019
CP	Crude Protein
CRA-CF	Centre for Agricultural Research—Cotton and Fibers
CRDB	Cooperative and Rural Development Bank
CRI	Climate Risk Index
CRP	CGIAR Research Program

CSIR-ARI	Council for Scientific and Industrial Research—Animal Research Institute
CSO	Civil Society Organization
CSWRI	Central Sheep and Wool Research Institute
C-TAP	Cotton Technical Assistance Programme for Africa
CURAD	Consortium for Enhancing University Responsiveness to Agribusiness Development
CW	Central Warehouse
D.Sc.	Doctor of Science
DADF	Department of Animal Husbandry, Dairying and Fisheries
DAICO	District Agricultural and Livestock Officer
DANIDA	Royal Danish Ministry of Foreign Affairs
DARE	Department of Agricultural Research and Education
DBMS	Database Management System
DfID	Department for International Development
DFTP	Duty Free Tariff Preference
DIB	Development Impact Bonds
DM	Dry Matter
DoCD	Directorate for Cotton Development
DPA	Development Partnership Administration
DPR	Detailed Project Report
DRSS	Department of Research and Specialist Services (Zimbabwe)
DST	Department of Science and Technology
EAC	East African Community
EAGC	East African Grains Council
EBA	Everything But Arms
EDI	Entrepreneurship Development Institute of India
EDP	Exposure and Dialogue Program
EEP	Exposure and Exchange Programmes
EG	Educate Girls
EIAR	Ethiopian Institute for Agricultural Research
EITs	Economies in Transition
E-NAM	National Agriculture Market
EPA	Economic Partnership Agreement
EPC	Engineering, Procurement and Construction
EPOSPEA	Ethiopian Pulses, Oilseeds and Spices Processors—Exporters Association
ESA	Eastern and Southern Africa
ETG	Export Trade Group
EU	European Union
EXIM Bank	Export-Import Bank of India

FACT	Factory
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FARA	Forum for Agricultural Research in Africa
FCDO	Foreign, Commonwealth & Development Office
FCFA	West African CFA franc
FDI	Foreign Direct Investment
FF	Farm Force
FfD	Financing for Development
FFS	Farmer Field Schools
FGAPL	Frontier Growth Advisors Private Limited
FICCI	Federation of Indian Chambers of Commerce and Industry
FIDC	Forum for Indian Development Cooperation
FIFO	First In First Out
FOCAC	Forum on China Africa Cooperation
FPBIC	Food Processing Business Incubation Centre
FPO	Farmer Produce Organisations
FSDT	Financial Sector Deepening Trust
FSF	Fiscal Stabilization Fund
FSSA	Food Safety and Standard Act of India
FTAs	Free Trade Agreements
FTL	Food Testing Laboratory
FTSE	Financial Times Stock Exchange
G2G	Government to Government
G77	Group of 77 (Coalition of 135 developing countries at the UN)
GATT	General Agreement on Tariffs and Trade
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEFI	Global Education First Initiative
GFI	Global Fairness Initiative
GHG	Greenhouse Gas
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GmbH	Gesellschaft mit beschränkter Haftung
GMO	Genetically Modified Organism
GoI	Government of India
GPC	Global Pulse Confederation
GPS	Global Positioning System
GRN	Goods Receipt Note
GSTP	Global System of Trade Preferences

Ha	Hectare
HICs	High Income Countries
HIV	Human Immunodeficiency Virus
HTML	Hypertext Markup Language
HYV	High Yielding Variety
IACG	International Agriculture Consulting Group
IAFS	India-Africa Forum Summit
IAIARD	India-Africa Institute of Agriculture and Rural Development
IARI	Agricultural Research Institute
IASRI	Indian Agricultural Statistics Research Institute
IBEF	India Brand Equity Foundation
IBSA Fund	India, Brazil and South Africa Fund
ICAC	International Cotton Advisory Committee
ICAG	International Agriculture Consulting Group
ICAR	Indian Council of Agricultural Research
ICARDA	International Center for Agricultural Research in the Dry Areas
ICC	International Chamber of Commerce
ICCR	Indian Council of Cultural Relations
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communications Technology
ICT4D	Information and Communication Technologies for Development
IDEAS	India Development and Economic Assistance Scheme
IER	Institut d'Economie Rurale (Mali)
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Center
IFFCO	Indian Farmers Fertiliser Cooperative
IIAB	Indian Institute of Agricultural Biotechnology
IIFT	Indian Institute of Foreign Trade
IIP	Index of Industrial Production
IIT	Indian Institute of Technology
IKS	Indigenous Knowledge Systems
IL&FS	Infrastructure Leasing & Financial Services Limited
ILRI	International Livestock Research Institute
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contributions
INM	Integrated Nutrient Management
INP	Innovation and Partnership Program
INRAB	l'Institut National des Recherches Agricoles du Bénin
INTRACEN	International Trade Centre

IOE	Independent Offices of Evaluation
IPGs	International Public Goods
IPM	Integrated Pest Management
ISA	International Solar Alliance
ISC	ICRISAT Sahelian Center
ISC	International Spices Conference
ISD	Innovation Systems for the Drylands
ISS	International Institute of Social Studies
IT	Information Technology
ITC or INTRACEN	International Trade Centre
ITEC	Indian Technical and Economic Cooperation
ITPO	India Trade Promotion Organisation
ITRA	Institute of Agronomic Research
IVOMD	In Vitro Organic Matter Digestibility
IYP	International Year of Pulses
JAP	Joint Action Plan
JICA	Japan International Cooperation Agency
JNU	Jawaharlal Nehru University
KARI	Kenya Agricultural Research Institute
Kg	Kilogram
Km	Kilometre
KYF	Know Your Farmer
LDC	Least Developed Countries
LIC	Life Insurance Corporation of India
LMICs	Low and Middle Income Countries
LOC(s)	Line(s) of Credit
LOI	Letter of Intent
LPG	Liberalization, Privatization and Globalization
Ltd.	Limited
M.Sc.	Master of Science
MAFC	Ministry of Agriculture Food Security and Cooperatives
MANAGE	National Institute of Agricultural Extension Management
MBA	Master of Business Administration
MBOs	Member-Based Organisations
MDGs	Millennium Development Goals
ME	Metabolizable Energy
MEA	Ministry of External Affairs
MFN	Most Favoured Nation
MIS	Logistics Management Information System
MNCs	Multi-National Corporations
MoA	Memorandum of Agreement
MOFPI	Ministry of Food Processing Industries
MOP	Margin of Preference

MoU	Memorandum of Understanding
MPOWER	Mitigating Poverty in Western Rajasthan
MS Access	Microsoft Access
MSE	Micro-Small Enterprises
MSIs	Medium and Small Industries
MSME	Micro, Small and Medium Enterprises
MSP	Minimum Support Price
MT	Million Tonnes
MTAs	Marker-Trait Associations
MW	Megawatts
NABARD	National Bank for Agriculture and Rural Development
NABCONS	NABARD Consultancy Services
NAEB	National Agricultural Export Development Board
NAFDAC	National Agency for Food and Drug Administration and Control
NAM	Non-Aligned Movement
NARL	National Agricultural Research Laboratories
NARS	National Agricultural Research Systems
NASA	National Aeronautics and Space Administration
NaSARRI	National Semi-Arid Resources Research Institute
NCAER	National Council of Applied Economic Research
NCBI	National Center for Biotechnology Information
NCIPM	National Centre for Integrated Pest Management
NCU	Neem Coated Urea
NDC	Nationally Determined Contributions
NDF	Neutral Detergent Fiber
ND-GAIN	Notre Dame Global Adaptation Index
NDRI	National Dairy Research Institute
NEH region	North-Eastern Hills Region
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NHSRC	National Health Systems Resource Centre
NIANP	National Institute of Animal Nutrition and Physiology
NIC	National Informatics Centre
NIRS	Near-Infrared Spectroscopy
NITI Aayog	National Institution for Transforming India
NIVEDI	National Institute of Veterinary Epidemiology and Disease Informatics
NMB	National Microfinance Bank
NMDC	National Mineral Development Corporation
NORAD	Norwegian Agency for Development Cooperation
NPA	Non-Performing Assets
NPHL	National Public Health Laboratory

NPK	Nutri Plus Knowledge
NRI	Non-Resident Indian
NSIC	National Small Industries Corporation
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
OIA	Overseas Infrastructure Alliance
OIF	Overseas Investment Finance
OPEC	Organization of the Petroleum Exporting Countries
ORF	Observer Research Foundation
P2P	People to People
PACM	Pan-African Cotton Meeting
PanAAC	Pan-African Agribusiness & Agroindustry Consortium
Paravet	Paraveterinary
PASNSPA	PagSung Shea Butter and Shea Nut Pickers Association
PCRD	Post-Conflict Reconstruction and Development
PCT	Pest Control Technology
PDS	Public Distribution Scheme
Ph.D	Doctor of Philosophy
PHP	Hypertext Preprocessor
PIAPA	Platform for India-Africa Partnership in Agriculture
PIB	Press Information Bureau
PICS	Purdue Improved Crop Storage Bags
PIDA	Programme for Infrastructure Development in Africa
PMA	Programme Management Agency
PMI	Permanent Mission of India (Geneva)
PMU	Project Management Unit
PoU	Prevalence of Undernourishment
PPF	Project Preparation Facility
PPI	Progress out of Poverty Index
PPP	Public-Private Partnership
PPR	Peste des petits Ruminants
PPTL	PeePee Tanzania Company
PSUs	Public Sector Undertakings
PUC-Rio	Pontifical Catholic University of Rio de Janeiro
Pvt.	Private
PW	Port Warehouse
PwC	PricewaterhouseCoopers
QC	Quality Controller
QPE	Quality Pulses Export
QTL	Quantitative Trait Loci
R&D	Research and Development
RBA	Result-Based Aid

RBF	Results-Based Financing
RBI	Reserve Bank of India
RBS	Rwanda Bureau of Standards
RCEP	Regional Comprehensive Economic Partnership
RDBMS	Relational Database Management System
RDC	Rice and Diversified Crops
RECs	Regional Economic Communities
RFUK	Rainforest Foundation UK
RIS	Research and Information System for Developing Countries
RRIDMA	Rajasthan Rural Institute of Development Management
RTI	Royal Tropical Institute
RUDI	Rural Distribution Network
SAARC	South Asian Association for Regional Cooperation
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
SAP	Structural Adjustment Programme
SCAAP	Special Commonwealth Assistance for Africa Program
SDAE	District Services for Economic Activities
SDGs	Sustainable Development Goals
SEA	Solvent Extractors' Association
SETU	Skill and Empower the Un-Served
SEWA	Self-Employed Women's Association
SEWU	Self-Employed Women's Union
SFF	Schmidt Family Foundation
SHGs	Self Help Groups
SIA	Social Impact Assessment
SIB	Social Impact Bonds
SIDO	Small Industries Development Organization
SIDS	Small Island Developing States
SITA	Supporting Indian Trade and Investment for Africa
SME	Small and Medium-sized Enterprises
SMS	SEWA Manager Ni School
SMU	Solar Multi-Utility
SNNPRS	Southern Nations Nationalities and Peoples Regional State
SOAS	School of Oriental and African Studies
SOFI	State of Food Security and Nutrition in the World
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
SSC	South-South Cooperation
SSTC	South-South and Triangular cooperation
STCs	State Trading Corporations
SU/SSC	Special Unit for South-South Cooperation

SVCDC	Sorghum Value Chain Development Consortium
SWOT	Strengths, Weaknesses, Opportunities and Threats
SWTL	Soil and Water Testing Laboratories
TADB	Tanzania Agricultural Development Bank
TASUPA	Tanzania Sunflower Processors Association
TB	Tuberculosis
TERI	The Energy and Resources Institute
TFTA	Tripartite Free Trade Agreement
TISI	Trade and Investment Support Institutions
ToT	Training-of-Trainer
TPDF	Tanzania People's Defense Force
TPN	Tanzania Pulses Network
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TShs	Tanzanian Shilling
TW	Transit Warehouse
UBSOF	UBS Optimus Foundation
UCGEA	Uganda Ginners and Cotton Exporters Association
UK	United Kingdom
UMICs	Upper Middle-Income Countries
UN	United Nations
UN COMTRADE	United Nations International Trade Statistics Database
UN DESA	United Nations Department of Economic and Social Affairs
UNCCD	United Nations Convention to Combat Desertification
UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNECA (or ECA)	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
UniBRAIN	The Universities, Business, and Research in Agricultural Innovation
UNICEF	United Nations Children's Fund
UNOSSC	United Nations Office for South-South Cooperation
UOSPA	Uganda Oil Seed Producers and Processors Association
USA	United States
USAID	United States Agency for International Development
USD	United States Dollar
VAT	Value Added Tax
VB	Visual Basic
VEO	Village Extension Officer
VOA	Voice of America

VTC	Vocational Training Centre
W2W	Women to Women
WAARI	West African Agribusiness Resource Incubator
WACIP	West African Cotton Improvement Program
WCA	West and Central Africa
WEF	World Economic Forum
WTO	World Trade Organization
ZBNF	Zero Budget Natural Farming

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CHAPTER 1

Introduction: India-Africa—Partnering for Food Security

Renu Modi and Meera Venkatachalam

In his closing remarks during the first India-Africa Forum Summit (IAFS-I) in April 2008, the President of the United Republic of Tanzania and Chairperson of the African Union, Jakaya Mrisho Kikwete, stated that one of the major concerns for Africa is food security. He summarized the state of agriculture in Africa[1] and the complementarities between India and Africa thus,

> Currently Africa's agriculture is peasant agriculture, traditional, plagued with low levels of production. If we are able to increase productivity in African agriculture, Africa would not only be able to feed itself, but have

[1]While using the term 'Africa', the authors acknowledge the extreme diversities among the fifty-four countries on the second largest continent in the world. India's 'Africa' outreach is conceptualized on a continental level, with aspects mediated through the African Union.

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> huge surpluses to sell to the world. India has the technology and the skills, which if made available to Africa, will help implement the African Green Revolution. (VOA 2008 cited in Modi 2010: p. 124)

He urged India to invest for building capacity in the agricultural[2] sector (MEA 2008).

The Farming Sector in Africa

Historically, sub-Saharan Africa's (SSA)[3] underdeveloped agriculture production system has been extremely extroverted. Countries on the continent have had a distinctive colonial history and different political regimes, each with a complex set of land relations. Over the past eight decades, there have been a series of land dispossessions—by the colonial powers in the 1920s and 1930s, followed by the appropriation of land by small domestic companies in the 1980s and 1990s. This was followed by a spurt of foreign direct investment (FDI) in land after the global food crisis of 2008, which resulted in yet another wave of forced displacements of indigenous peoples with usufructury right to land. In the aftermath of the independence movements in the 1960s and 1970s, the alienation in land de-accelerated and posted a growth in agricultural productivity, but it was short-lived. The neoliberal period of liberalization, privatization and globalization (LPG) that began in the early 1980s and 1990s saw a reversal of this growth (Moyo 2013: pp. 39–41).

Currently, the shortfall in agricultural output is met by food imports that are expected to grow from $35 billion in 2015 to approximately $110 billion in 2025 (AAA Initiative, n.d.; AfDB 2016: p. 12). Africa was self-sufficient in food production in the 1960s. Since then, food imports have increased 1.7 times the value of its exports, whereas agricultural exports have fallen by half since the mid-1990s (Wambugu 2015). What is ironic is that Africa is a net importer of food, despite the fact that it has 60% of the world's uncultivated arable land and access to water resources in several countries on the continent (Plaizier 2016).

[2] It includes forestry, fisheries, livestock rearing and dairy farming.

[3] Geographically, SSA is the area of the continent that lies south of the Sahara. Forty-eight countries out of Africa's 54 countries comprise the sub-Saharan region. Algeria, Djibouti, Egypt, Libya, Morocco and Tunisia are excluded from this category (World Bank 2018; Modi 2019: pp. 391–393).

While expounding the 'theory of entitlement', in the early 1980s, the Nobel Laureate Amartya Sen explained famines in terms of lack of 'access to food' rather than the availability of food (see Sen 1981). This viewpoint was incorporated by the Food and Agriculture Organization (FAO), which defined food security as 'all people at all times have physical and economic access to sufficient, safe and nutritious food…[for] an active and healthy lifestyle' (FAO 2001). Sen also factored in the role of democratic political regimes and proactive government policies for ensuring food security. Shortly thereafter, in the 'human rights decade' of the 1990s, food security was seen as integral to human security, which re-emphasized the importance of access to food. Today, with the problems of climate change, low productivity and spike in global prices, the discourse on food security is once again centred on the lack of food availability (in addition to access to food). The debate on this subject has thus come full circle.

Up-scaling the underfunded agricultural sector is essential for generating livelihoods, poverty reduction[4] and attaining 'The 2030 Agenda for Sustainable Development,'[5] and in particular, goals number 1, 2 and 5—on poverty reduction, zero hunger and gender equality, respectively (UN 2015).

State of Agriculture in Africa

The rural landscape in Africa continues to be marked by smallholder subsistence farms. Agriculture[6] in Africa is characterized by small farms with an average size of 2.2 ha making up 89.6% of the total number

[4] Economic poverty refers to how poor people spend on goods and services to maintain a minimally accepted standard of living in a given context. Poverty is also social, political and cultural (Modi 2019: p. 392).

[5] The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. It encompasses 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries—developed and developing—in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth, all while tackling climate change and working to preserve our oceans and forests (UN 2015).

[6] Agricultural land is a share of land area that is arable, under permanent crops, and under permanent pastures.

of farms (GRAIN 2014). Such farmers constitute more than 60% of the population and produce 80% of the food that is consumed on the continent (AGRA 2018; Devries 2017). These farms employ about 175 million people of which 70% are women and a bulk of them are poor (AGRA 2016: p. 15). Therefore, growth in the agriculture sector is of significance as this sector accounts for 32% of Africa's GDP and employs majority of the labour force on the continent (AGRA 2018).

The farming sector in Africa is one of the most undercapitalized in the world. Agriculture in Africa is exclusively rain-fed and highly dependent on erratic and unpredictable monsoons. Irrigation is underused in sub-Saharan Africa, and the continent has the lowest proportion of irrigated land of any region in the world (International Water Management Institute, n.d.; Esipisu 2018). Just six per cent of cultivated land is currently irrigated in Africa, compared to 14% in Latin America and 37% in Asia. Irrigation in Africa has the potential to boost agricultural productivity by at least 50%. For instance, in Niger where irrigation facilities have been scaled up, about 20% of agricultural gross domestic product (GDP) is generated through irrigated agriculture (AGRA 2019).

Fertilizer consumption in Africa is low. Globally, 140.6 kilograms of fertilizer per hectare was used in the land area under cultivation, in 2016 (World Bank 2019a). In the same year, the consumption in sub-Saharan Africa was just 16.2 kilograms per hectare of arable land—well below the global average. In India, however, 165.8 kilograms of fertilizer per hectare of arable land was used, significantly above the global average (World Bank 2019b, c).

Lack of access to agricultural inputs like fertilizers, seeds and irrigation; capital and markets; limited options for profitable alternative livelihoods; weak backward and forward linkages between agriculture and other sectors; poor competitiveness in global markets; land degradation; and climate change, have all impacted the farming sector adversely and resulted in low productivity (see Singh, Chapter 2, this volume). Unseasonal and heavy rainfall and floods damage crops and feedstock. The poor within these countries suffer disproportionately from the effects of climate change to which they contribute only marginally (see Modi and Venkatachalam, Chapter 3, this volume). Vagaries of weather due to climate change and low adaptive capacity to cope with dry spells or incessant rains have proven to be a serious challenge.

Further, African institutions of agricultural higher education, research and extension are underfunded. Therefore, innovation in home-grown technologies and basic support infrastructure for the agriculture sector is lacking.

Countering Poverty Through Job Creation

The most palpable way to make growth in the farming sector pro-poor is by engaging with a large number of smallholder farmers, who have limited access to economic resources (Ehui 2016). Therefore, African countries are working towards transforming agriculture from the predominantly subsistence-orientated smallholder systems to more sustainable, efficient and market-orientated ones, to reduce poverty through employment generation. Africa is the second-largest and the second-most populous continent in the world with a population of 1.2 billion (World Population Review 2019). 'Africa also has the youngest population in the world, and by 2055 the continent's youth population (aged 15–24), is expected to be more than double the 2015 total of 226 million' (Yahya 2017). In 2015, about 12 million young people entered Africa's labour force but only 3.1 million jobs were created (Yahya 2017). Creating job opportunities is also of essence on a continent where there is an urgent need to convert the youth bulge into a demographic dividend.

Further, in the years ahead, because of a growing population, rising incomes and an increased demand for biofuels the world over, food prices will have risen globally. The growing demand for food and a population growth at the rate of 3% per year in Africa requires that food production on the continent increase by 60% over the next 15 years (Lei and Wang 2016: p. 4).

Since the agriculture sector is diverse and labour intensive, the development of this sector by improving productivity and value addition to agro-products through the expansion of small and medium enterprises (SMEs), could potentially harness the demographic dividend. India has steadfastly supported Africa's agenda in the agriculture and allied sectors, through the framework of South-South cooperation. Such an approach to development is driven by the need for self-sufficiency and self-reliance through mutual cooperation for mutual benefit between developing countries of the Global South (UNOSSC 2016).

Partnering for Food Security Through South-South Cooperation

South-South cooperation is a dynamic concept and offers countries of the Global South a policy space as legislated at the international level by the UN. It is not merely limited to aid and has a wider ambit that

includes sharing of knowledge and capabilities, technical and/or financial, on concessional and non-concessional terms for working towards the Sustainable Development Goals (SDGs) (Simplicio 2011: p. 35). South-South cooperation increasingly compliments North-South partnerships, through trilateral and multilateral mechanisms.

The long-standing historical association between India and Africa has led to a partnership of diversified functionality and economic association between the two geographies (see Singh, Chapter 2, this volume). India and Africa have reinvigorated their economic, diplomatic, and global engagements at multiple levels. The three multilateral diplomatic initiatives—i.e. the three India-Africa Forum Summits held between 2008 and 2015—have prioritized collaborations in the agriculture and allied segments (MEA 2014). These summits have intensified India-Africa engagements through trade, investments, technology transfers, knowledge sharing, and capacity building, including in the agriculture sector. At IAFS-I (2008), India announced the Duty Free Tariff Preference (DFTP) Scheme for the Least Developed Countries (LDCs) in Africa, and the provisions were subsequently revised in 2014. Currently, 33 LDCs get preferential access to Indian markets for the exports of 98.2% of Indian tariff lines[7] (UN 2018; Department of Commerce 2015) (see also Singh, Chapter 2 and Andrew, Chapter 12, this volume).

The Indian Technical and Economic Cooperation (ITEC) programme led bilateral efforts in a variety of fields and provided the framework for India's foreign policy engagement with the developing countries, including those in Africa. Through the Special Commonwealth African Assistance Program (SCAAP)—ITEC's sister programme—India has shared its developmental experiences and technologies with several African countries. India and Africa cooperate in the field of sustainable agriculture through Government-to-Government (G2G) and Business-to-Government (B2G) initiatives. Initiatives under the ITEC and the IAFS processes aim to improve the standards of production, consumption and input technology, as well as the acquisition and channelling of FDI and technology into Africa, mainly through private investors. The G2G alliances are particularly in the domain of human resources development, extension of concessional Lines of Credits (LOCs) and value addition

[7] The DFTP scheme provides duty free market access on about 96% of India's tariff lines at HS 6 digit level of classification and 2.2% of the lines are under preferential duties (Department of Commerce 2015).

in the farming and allied sectors (see Singh, Chapter 2, this volume). India contributes towards capacity building in agriculture and related segments through the extension of scholarships and training programmes for Africans. The ITEC, the Indian Council of Cultural relations (ICCR) and the C.V. Raman Fellowship, awarded by the Department of Science and Technology (DST) are some of the notable grants (Lok Sabha and MEA 2017; MEA 2018). Thus, students and professionals from Africa get an opportunity to study in agricultural universities and institutions in India and thereby benefit from the Indian education system.

That the agriculture sector in Africa needs to be transformed is widely acknowledged. A four-pronged strategy to transform the agricultural sector could potentially include: productivity enhancement; mechanization of agriculture; technical collaboration; and investment in agriculture R&D. India's agriculture sector continues to cope with the challenges in the pathway of attaining agricultural sustainability and food security. Agricultural transformation in India faces multiple challenges inter alia; lack of access to credit, water and inputs, adverse consequences of climate change and limited adaptive capacity of smallholders that has led to agrarian distress. Amidst these challenges, India adopted a multipronged strategy—the Green Revolution, which improved access to agricultural mechanization, irrigation techniques, agricultural markets and more recently, contract farming to augment food security.

About the Compendium

Against the above backdrop, this compendium highlights the role of India's development compact, including grant assistance, trade, investments, concessional LOCs and FDIs to boost the agriculture and allied sectors in Africa. The present volume is an attempt to explore two critical issues:

- Firstly, how does India partner with Africa in the agriculture and related sectors to catalyse food security, build capacity and add value to agricultural commodities?
- Secondly, what is the role of select countries in Africa towards augmenting food security in India, such as through the export of oilseeds and pulses?

The collection of essays in this compendium offers readers an original set of insights into the bilateral, trilateral and multilateral collaborative mechanisms between India and Africa in the agriculture and allied segments. In addition to an introduction and conclusion, the fifteen chapters from a diverse group of authors offer rich and detailed analyses on a wide range of cooperation modalities for furthering food security. The introductory chapter by the editors sets the context for the discussions that follow in this volume.

The book is thematically segregated into five broad parts. Part I provides an analytical outlook on the potential areas of convergences and divergences in India-Africa collaborations. The second chapter by Singh[8] provides an overview on the subject from a practitioner's perspective and lays down a comprehensive backdrop from a critical perspective on the sustainability of India-Africa collaborations in the agriculture sector. Singh affirms that the three India-Africa Forum Summits have strengthened India-Africa cooperation significantly. The initial framework of cooperation adopted in IAFS-I (2008) and the subsequent enhanced frameworks of IAFS-II (2011) along with the bilateral initiatives through ITEC have reinforced India-Africa collaborations in the agriculture segment and harnessed the complementarity in production, processing and investments. This has helped bridge the knowledge and funding gap in the agriculture sector. Singh advocates social ventures such as the US$ 150 million Aavishkaar Africa Fund launched in 2018 and the Sankalp Africa initiative.[9] They have enabled digitization of financial transactions in agricultural value chains in Madagascar and led to the creation of a self-sustainable agri-business incubator in Ethiopia (Kiernan 2017).

The third chapter by Modi and Venkatachalam draws the readers' attention to the current reality of 'climate emergency' as evidenced by recent droughts, floods, and unpredictable weather events taking their toll on the agricultural economies of India and Africa. The authors highlight the geopolitics of India-Africa engagements in multilateral climate diplomacy and explain the negotiating blocks with which they align to further their climate agendas and arrive at a common minimum position. India and African states are part of the G-77/China negotiating block, which

[8] Gurjit Singh is the former ambassador to Ethiopia. During his tenure, he served as the Sherpa of the IAFS-II (2011).

[9] An event organized by Intellecap, a social entrepreneurship and impact investment consultancy firm.

includes all nations of the Global South. Furthermore, India and South Africa are both members of the BRICS grouping. India and Africa have common positions on the adherence to the Common But Differentiated Responsibilities (CBDR), and calls for transfer of finances from the industrialized nations to the developing world, for combating climate change through adaptation and mitigation initiatives. In addition to the above points of convergence, the chapter also explores the divergences between the positions of India and African states in multilateral climate forums. For example, African states complain that adaptation funds achieve greater impact in countries with more developed markets (such as India) and that some of the major emitters of greenhouse gas (GHG) emissions—particularly India and China—have yet to take adequate action to curb their emissions. The paper also unpacks select capacity building initiatives by India for clean energy such as the International Solar Alliance, Lines of Credit and aid to deal with climate change in countries on the African continent.

The second segment of this volume, entitled 'Sharing Knowledge', is structured around five evidence-based case studies: the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); the International Livestock Research Institute (ILRI); FeedBase Ethiopia for developing livestock feed; Cotton Technical Assistance Program (C-TAP), funded by the government of India (GoI); and the Women-to-Women (W2W) engagement of Self Employed Women's Association (SEWA)[10], with their counterparts in Africa. The ICRISAT and the ILRI[11] are both supported by the Consultative Group on International Agricultural Research (CGIAR). Chakravarty and his co-authors (see Chapter 4) showcase the role of ICRISAT in enhancing livelihoods among smallholders in Africa. Based in Hyderabad, ICRISAT-India has been working to increase yield per acreage of local food production through the cultivation of climate-resilient dryland crops such as millets that are affordable for the common people. ICRISAT uses crop improvement as a core approach for: providing crop varieties that are adapted to the ecologies of sub-Saharan Africa; are resistant to a wide range of biotic and abiotic stresses; and are acceptable by farmers and markets alike. It provides a

[10] A not-for-profit organization based in Ahmedabad, Gujarat.

[11] The International Livestock Research Institute (ILRI), a CGIAR (formerly the Consultative Group for International Agricultural Research) Research Center is headquartered in Kenya. It has sixteen country offices across Africa and Asia.

global platform for regular knowledge exchanges between agricultural research and development professionals from Africa and India. ICRISAT also shares its four-plus decade-long work experience in Africa and India mainly through the exchange of germplasm and breeding material, to develop new varieties suitable to the agro-ecologies of African countries and supports market orientation. In addition, it promotes agro-based entrepreneurship to improve the economic prosperity of smallholder farmers in the region and harness Africa's demographic bulge.

Smallholder farms could improve crop yields through enhanced agricultural methods such as climate-resilient crop varieties, but the small farm sizes limit their potential for profitability, and therefore, off-farm activities and breeding animals have been long-standing survival strategies in agriculture-based economies, for building 'better lives through livestocks' (Harris et al. 2019).

India and Africa have been collaborating for building value chains in livestock through organizations such as the International Livestock Research Institute (ILRI)[12] since its inception in the 1970s. Dror (Chapter 5) shares the institute's experiences and learnings from collaborative projects undertaken for food security and capacity development. The White Revolution in India, for instance, was a large-scale milk production strategy undertaken by the GoI in the 1970s to support the dairy industry through the development of a cooperative sector. Livestock economy is now an important part of the food grain economy. Yet, India's per capita milk consumption is much below the world standards. It is the main cause of malnutrition among children in India and the country's high ranking in the world hunger index. Farmers in India are working towards increasing milk productivity, efficient input delivery and marketing support for improved earnings.

Through a number of projects and initiatives, the ILRI has worked in Africa to equip farmers with the skills and tools to improve their livestock and thus contribute towards livelihood generation and better nutritional standards. It has enabled the successful transfer of stover varieties with improved fodder traits from India to Ethiopia. Other collaborative activities include the strengthening of goat value chains in India

[12] ILRI has an expansive mandate across 55 countries of sub-Saharan Africa and Asia that lie in the semi-arid regions with scanty little rainfall, degraded soils, poor social infrastructure and resource capabilities and thereby most vulnerable to climate change. Managing livestock in these regions is an ongoing challenge.

and Mozambique, active work in the informal milk market in Kenya and India and genetics research advancements. These projects have helped some of the most vulnerable members of the workforce achieve higher incomes per household. The lessons and experiences of the ILRI can help refine key insights on how to successfully set up and manage similar India-Africa collaborations.

The role of databases in developing livestock feed productivity, feed use efficiency and reduced feeding costs is the main focus of Chapter 6 (Angadi et al.). Through a detailed case study based in Ethiopia, the authors explore the collaborations between the ILRI and the Indian Council of Agricultural Research (ICAR) (est. 1929)[13] and the Ethiopian Agricultural Transformation Agency (ATA). The authors highlight the various innovative softwares developed for Feed Supply-Demand analysis of livestock in Ethiopia. ICAR's 'FeedBase-India' software tool uses secondary data sets to evaluate feed supply and demand for livestock in India. The supply is estimated from cropping, land use pattern, demand from livestock census and nutrient requirements for various categories of livestock based on their body maintenance, production and reproduction potentials. The database and tools were modified for Ethiopian conditions based on the data collected by ATA in two districts from each of the four main regions of Ethiopia. The tool relationally arranges these data sets using algorithms that connect feed quantity and quality to livestock maintenance and production requirements to calculate surpluses, deficits or sufficiency of feed biomass and of key nutrients such as dry matter, protein, total digestible nutrients and metabolisable energy. This enables users to compare and prioritize feed and animal interventions for impact and will also be immensely useful to multiple stakeholders for the development of the livestock sector and to governments, industries, agriculturists as well as policy makers (see Angadi et al., Chapter 6 and Dror, Chapter 5, this volume).

India and Africa work together at the G2G level as India has a vibrant small and medium enterprises (SME) sector for value addition to agricultural products. The Cotton Technical Assistance Programme (C-TAP), is one such example of cooperation in agriculture and agro-processing for food security and livelihood creation. In Chapter 7, Kumar and

[13] Set up under the Department of Agricultural Research and Education (DARE, GoI), ICAR is the apex body for managing research and education in agriculture including horticulture, fisheries and animal sciences.

Sharma trace the dimensions of the impact of this bilateral G2G capacity building initiative between the GoI and the seven major cotton producing countries in sub-Saharan Africa (which include the Cotton 4 or C4 countries).[14] The initiative is designed to address the constraints in the growth of cotton and upscale the capabilities of key stakeholders through training, exposure visits and the creation of critical infrastructure by demonstrating India's successful models in cotton and textile value chains. The chapter balances the merits of the C-TAP programme against a comprehensive analysis of the challenges it faces and offers a detailed assessment of its potential for scalability and replicability in forthcoming years.

In Chapter 8, Nanavaty underscores Women-to-Women (W2W) cooperation between SEWA and its partner countries on the continent for their empowerment as a collective and for achieving food security. In India, the marginal and smallholdings operated by women farmers constitute 27.9% of the total operational holdings cultivated by women (PIB 2019). Likewise, given that the bulk of smallholder agriculturists in Africa are women who face challenges similar to their counterparts in India, the role of SEWA in capacity building initiatives in Africa is notable. Gender empowerment is also a core commitment made by the partners at the India-Africa Forum Summits.

SEWA's approach towards collective economic organization and women-led value chains, especially in agro-food processing, has been lauded globally. Groups of African sisters from various organizations have visited SEWA for exposure-cum-training programmes since the early 1990s. It received an impetus in the aftermath of IAFS-II (2011) wherein the Ministry of External Affairs (GoI) took the initiative to empower women workers through rural development, poverty alleviation and clean energy use through collaborating with two not-for-profit organizations, one of which was SEWA. The IAFS-III (2015) has worked to assist women's groups access to credit for productive activities, support smallholder food producers and promote exchange of technology to enable growth in production and thus empower African farmers. SEWA's long-standing value-based work has been replicated in countries like Ethiopia, Mali, Ghana, Burkina Faso, Kenya and others. At several international forums, SEWA has reaffirmed the nexus between energy, agriculture,

[14] Benin, Burkina Faso, Chad and Mali (known as the Cotton Four or C4) along with Malawi, Nigeria and Uganda form the seven major cotton producers in sub-Saharan Africa.

work and women, and its impact on sustainable agriculture. SEWA-Africa relations are on an equal footing and offer opportunities with a potential for mutual learning. SEWA proposes a SEWA-Africa Women Economic Partnership which could potentially focus on three specific areas for the economic rehabilitation of women: access to ownership of ecosystem-based agriculture, ownership of renewable energy products, and access to capital to strengthen their livelihoods.

The third section of this volume explores capacity building in agriculture in Africa through private/public partnerships, for value addition to agro-commodities and contract farming. Venuprasad et al. (Chapter 9) foreground collaborations between India and Africa for value addition to agro-commodities through the Supporting Indian Trade and Investment for Africa (SITA) trilateral initiative. It is being implemented through the International Trade Centre (ITC)[15] and funded by the UK and Northern Ireland's Department for International Development (DfID)[16] in partnership with India. The authors contend that SITA's interventions in the agricultural sector have focused primarily on capacity building, facilitating market linkages and attracting investments in five East African countries: Kenya, Tanzania, Uganda, Rwanda and Ethiopia to develop value chains and obtain market access for agro-commodities such as pulses, spices, chilies and other agro-products. The paper also discusses how SITA aims to increase and diversify agricultural exports from East Africa and attract investments to promote sustainable economic development in the region. Since 2015, ITC (through SITA) has been working to improve competitiveness by leveraging Indian expertise through knowledge sharing, technology transfer and partnerships. With the introduction of the DFTP scheme for LDCs, India has strengthened trade and investment linkages with southern partners including in East Africa. In turn, East Africa offers opportunities for Indian businesses to expand their global reach through public–private partnerships (PPP) for developing these products in the region.

[15] A joint agency of the World Trade Organization and the United Nations set up in 1964. It is the only development agency that is fully dedicated to supporting the internationalization of SMEs in developing and transition economies, for building livelihoods.

[16] In September 2020, DfID was merged with the Foreign and Commonwealth Office (FCO) to create the Foreign, Commonwealth and Development Office (FCDO).

Saran, in Chapter 10, examines the trilateral cooperation for up-scaling agricultural production through joint ventures or contract farming/out-grower schemes. The stakeholders are three international private sector not-for-profit organizations, namely: Technoserve, USAID and IFAD (a UN agency). The project is situated in the town of Ribau in the Nampula province of Mozambique. Though the country is primarily an agricultural economy endowed with fertile land, only 16% of the arable land is cultivated. The farming sector is beset with challenges such as the lack of crop diversification, risk mitigation instruments, adequate skills/tools and/or knowledge regarding optimal farming practices. The multi-stakeholder contract framing project aimed to overcome the above-stated barriers, by using the innovative 'Hub and Spoke' model. It resulted in improved skills of smallholder farmers through the introduction of investments and technology which in turn enhanced agricultural productivity, organizational skills and assured markets for their agricultural produce.[17] Increased market access for the farmers has benefitted all the actors in the value chain. The Ribau model offers learnings for countries like India, where companies are looking for success stories as they learn about the advantages and disadvantages of outsourcing cultivation of certain agro-commodities, such as pulses and oilseeds for exports to India. The contract farming model is clearly an alternative mechanism to investments in land, more so against the backdrop of controversies around FDI in land and allegations of 'land grabbing', particularly in Kenya and Ethiopia, in East Africa. Today, India needs to collaborate with the world's land and resource-rich countries to meet her requirements for food.

Ensuring food security for a populous country like India has been an ongoing challenge, more so in the aftermath of independence. After the technological intervention of the 1960s and 1970s through the Green Revolution, India graduated from the 'ship-to mouth' mode of access to food grains and has been largely self-sufficient. However, there has been a shortage of certain agro-commodities, mainly pulses and oilseeds in the domestic market. Changing food preferences combined with rising incomes and population in the country has created a shortage of pulses. During periods of low output, India has been importing pulses from its traditional partners—Canada, Australia and Myanmar, among others, to fill in the production gap and keep prices in check. In the past few years,

[17] Agricultural productivity is measured by output per unit area of land and per unit of labour in the farming sector.

India has imported pulses from countries in Eastern and Southern Africa, including Malawi, Mozambique and Tanzania. This trade has been facilitated by the GoI's State Trading Corporations (STC) and some private traders in the two regions. The contract farming model can potentially secure India's supply of these essential products and thereby diversify her sources of imports and arrest volatility in prices.

Three chapters, which explore the challenges of cultivating pulses and its trade between India and Africa, constitute the fourth section of this volume. Pulses are a major source of protein and nutrition security for the bulk of the populace in India. Kulkarni (Chapter 11) provides an incisive coverage of multiple challenges faced by smallholder farmers who grow crops in mainly rain-fed conditions, subject to the vagaries of unpredictable rainfall patterns and deal with low productivity and price volatility. Pulses are an important subsistence and cash crop and its development could benefit all the stakeholders in the value chain. The output of the commodity has been monitored after a record jump in prices in the years 2015 and 2016 (see Kulkarni, Chapter 11, this volume). The fluctuations resulted in government intervention, though with limited success. Kulkarni also casts new light on the potential for export of pulses to India by four countries in East Africa—Ethiopia, Tanzania, Kenya and Malawi—and the challenges therein.

Since India's food demand is growing faster than its domestic production, imports are imminent. Tanzania and India have had bilateral trade since the early 1960s. In fact, during his recent visit to Tanzania, Prime Minister Modi expressed India's intent to 'deepen [India's] partnership in agriculture and food security, through enhanced export of pulses from Tanzania to India' (MEA 2016). He made this announcement at a time when there was a drastic decline in India's pulses production due to droughts. In 2015, India imported 5.4 MT of pigeon peas which increased to 6.2 MT the following year (Andrew 2019) (see also Kulkarni, Chapter 11, this volume).

For Tanzania's pulses industry, Prime Minister Modi's announcement came at an opportune time. At this point, the SITA project had identified the pulses value chain as a promising one and worked with smallholders in Africa [18] to upscale it (Andrew 2019). The lucrative business of trading in pulses with India through the DFTP channel encouraged many Tanzanian

[18] While there is no universally accepted operational definition of the term 'smallholder farmers', it is used in general to refer to those marginal farmers and sub-marginal farm

farmers to shift from the cultivation of cash crops to the cultivation of pigeon peas. This resulted in a surge in the production of the crop from 10,000 MT in 1961 to a projected 292,000 in 2017 (FAOSTAT 2017). Compared to major exporters like Canada, Australia, Myanmar, China and Argentina, the global share of Tanzania's export is not very high. India is a major market for Tanzania as it imports close to 25% of its pigeon peas from Tanzania (Khalil et al. 2017). Andrew offers a critical perspective on the unprecedented ban on bilateral trade in pigeon peas from Tanzania in August 2017 (see Andrew, Chapter 12, this volume).

The final chapter in this segment focuses exclusively on the pulses sector in Tanzania—a major producer of pulses in East Africa. Mushi and Doctor (Chapter 13) present the findings of a new field research conducted in the Kilombero district of south-western Tanzania. They distil the socio-economic factors and agricultural practices that determine the pulse production process of the Kamwene farmers' community. The study examines a broad range of agronomic practices that impede production. These include the lack of access to inputs, minimal access to credit, the presence of middlemen for accessing farm loans, underdeveloped harvesting/post-harvesting practices, value addition challenges, lack of standard branding strategies, unstructured trade and poor market linkages. The authors use feedback from the farmers' community to present an appropriate solution for these agricultural setbacks to identify specific parts of the value chain that require upgradation. It further recommends a 'Farmers' Organisation Model' which advocates working with smallholders' collectives that enable farmers to choose their own leaders, open bank accounts and apply for loans from financial service providers using the group's guarantee. Through the association's leader, smallholders can coordinate different services collectively and reach out to other farmers easily. Cultivation of pulses can be accelerated through the sharing of best practices in the agricultural sector and providing incentives such as better import-export policies and trading links with various countries like India.

The fifth and final section in this volume deals with the critical issue of financing Africa's agriculture development which is quintessential for bridging the continent's funding gap. The demand for infrastructure development in Africa is huge and necessitates a significant growth in the

households that own land or/and cultivate less than 2.0 hectares of land and have access to 'sub-optimal amounts of resources, technology and markets' (Khalil et al. 2017: p. 7).

volume and effectiveness of development resources. The African Development Bank estimates that the continent needs between $130 and 170 billion a year, with a financing gap in the range of $68–$108 billion (AfDB 2018: p. 63). In addition to G2G funding, private sources of financing are also gaining significance and can support the achievement of the SDGs and other projected targets. Research papers in this section are organized around three innovative funding modalities, namely: concessional LOCs; the multi-stakeholder India, Brazil and South Africa Facility for Poverty and Hunger Alleviation (IBSA Fund); and the Development Impact Bonds (DIBs).

Iyer and Mazumdar emphasize on the significance of the Lines of Credit (LOCs) to strengthen India's economic prowess and leverage her position in international diplomacy (see Chapter 14). This is corroborated by Vazquez and Kottam in the following chapter. Both papers examine the role of the EXIM Bank[19] of India in capacity building and bolstering food security in Africa. The Bank extends LOCs at the behest and with the support of the GoI. These LOCs are a mechanism of trade finance via concessional loans to build infrastructure—inter alia, agriculture, irrigation, food processing, rural electrification and IT—which have become a pillar of support for increased India-Africa partnerships. Indian companies sell tractors, drillers, harvesters, irrigation technologies, among other products at reasonable rates. Through these, India shares adaptable, appropriate and affordable (triple 'A') technologies in agricultural equipments, water management, climate-resilient seeds, micro-irrigation, fertilizer and agro-processing sectors, thereby creating mutual benefits for the partners. These are designed to build durable assets and share India's scalable and replicable developmental experiences through infrastructure development, trade and capacity building initiatives in consonance with the development priorities of the recipient country. However, Vazquez and Kottam also offer an extended analysis through the exploration of on-ground realities. Their concerns regarding the chasm between India's committed disbursements and the actual sums of LOCs extended are justified as this gap impedes the full realization of mutual gains and engenders scepticism about the potential of India-Africa agriculture partnerships in the future.

[19] Hereinafter referred to as 'the Bank'.

In the penultimate chapter, Simplicio and Jardim present a brief analysis of two unique initiatives, the IBSA Trust Fund and the Development Impact Bonds (DIBs), as a means to showcase the diversity and complexity of development cooperation. The authors bring out the novel features of these two funding mechanisms and highlight how they go beyond traditional financing mechanisms. The IBSA Fund is a unique southern initiative under the United Nations, constituting an institutional framework that allows for low-cost and high impact projects. It focuses on combating poverty and hunger, emphasizes local ownership and encourages capacity building in the beneficiary community through sharing of knowledge and experiences. DIBs, on the other hand, are projects in which the private sector contributes the capital upfront. Costs are paid back with interest by the donor agency once the agreed-upon impact is achieved, competently avoiding bureaucratic and ineffective management. The authors thus argue that the impacts have to be planned, measured, monitored and reported systematically. Furthermore, in the context of developing countries and institutions, the capacity to learn, react quickly, adjust, correct and ultimately adapt is also essential. These qualities must be a complementary part of the same process, more so because development cooperation projects are dynamic and often encounter unplanned or unseen situations. The possibility of input rearrangements and on-the-go learnings need to be factored in at the outset of the project to ensure greater resilience and overall success.

The concluding chapter re-emphasizes the key issues which define the ongoing debates on the subject and the contestations therein. It critically assesses, in particular, the outcome of about a decade of India-Africa alliances in the agriculture and allied segments. The key takeaways and way forward suggested is rather forthright. To further the common objective of up-scaling agriculture and achieving food security in both geographies, the partners need to potentially evaluate the successes and challenges of the ongoing initiatives. They could carry forward those programmes and policies that have borne results and experiment with newer initiatives which are sensitive to the dynamic political, social, and economic landscape of the geographies in which they are implemented.

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PART I

Collaborations for Food Security

CHAPTER 2

India and Africa: Is the Cooperation Sustainable?

Gurjit Singh

Abstract India and Africa share a long history of amicable political relations, which has led a partnership of diversified functionality and economic association between the two regions. The three India-Africa Forum Summits dispersed over the first two decades of the twenty-first century have strengthened India-Africa cooperation significantly. The framework of cooperation adopted at the inaugural India-Africa Forum Summit (IAFS-I) as well as the framework of enhanced cooperation adopted at the subsequent forum summit, just three years later, positioned agriculture at the top of the list of India-Africa collaborations. Indian Technical and Economic Cooperation (ITEC) programme has led bilateral efforts in a variety of fields and provided the framework for India's foreign policy engagement with the developing countries, including those in Africa. Under ITEC's sister programme, the Special Commonwealth African Assistance Program (SCAAP), several African

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countries such as Ghana, Kenya, Nigeria, Malawi, Tanzania, etc. are invited to share in Indian developmental experiences and technologies. India and Africa share mutually beneficial opportunities available for Government-to-Government (G2G) and Business-to-Government (B2G) cooperation in the field of sustainable agriculture. Initiatives under the ITEC programme and the IAFS processes aim to harness this complementarity and improve the standards of production, consumption, and input technology, as well as the acquisition and channelling of foreign direct investment (FDI) and technology from private investors into Africa.

Introductory Note

India and Africa share a long history of amicable political relations. This history has paved the way for present-day associations of diversified functionality and economic partnerships between the two regions. The engagement between India and Africa has moved from the transformational stage into one of functional consolidation.

The three India-Africa Forum Summits (IAFS) dispersed over the first two decades of the twenty-first century have significantly strengthened India-Africa cooperation. The Framework of Cooperation adopted at the inaugural India Africa Forum Summit (IAFS-I) as well as the Framework of Enhanced Cooperation which was adopted at the subsequent forum summit, just three years later, positioned agriculture at the top of the list of India-Africa collaborations (ITEC 2019). The third and most recent IAFS was held on a much larger scale in October 2015, under the theme, 'Partners in Progress: Towards a Dynamic and Transformative Development Agenda', for a reinvigorated partnership and a shared vision. The outcome document of the Summit prioritized economic cooperation through trade and industry, while collaboration in agriculture was allocated the third place.

Parallel to the forum summits, the Indian Technical and Economic Cooperation (ITEC) programme, in operation since 1964, has led bilateral efforts in a variety of fields and provided the framework for India's foreign policy engagement with developing countries, including those in Africa. Under ITEC's sister programme, the Special Commonwealth African Assistance Program (SCAAP), several African countries such as Ghana, Kenya, Nigeria, Malawi, Tanzania, etc. are invited to share in Indian developmental experiences and technologies (ITEC 2019).

India and Africa share evident complementarities in the opportunities available for Government to Government (G2G) and Business to Government (B2G) cooperation in the field of sustainable agriculture. Initiatives under the ITEC programme and the IAFS processes aim to harness this complementarity and improve the standards of production, consumption and input technology, as well as the acquisition and channelling of foreign direct investment (FDI) and technology from private investors into Africa.

The State of African Agriculture

The construction of an agricultural system that is sustainably productive will propel African development and transform its rural homesteads. Over the last 40 years, the importance of agriculture in African economies has risen manifold for a multitude of reasons, namely, employment generation, economic progress, food security and health and nutrition. However, the agricultural sector remains underdeveloped in almost all parts of Africa. The yields of crops per hectare are low compared to other parts of the globe and have remained so even in the period post the IAFS engagement, i.e., since 2008. The per capita rate of agricultural development, thus, also remains at a low level due to insufficient investments in land, inputs, technology and the general inability of marginal farmers to articulate their concerns.

There are multiple other factors that contribute to sub-optimal production levels in African countries. Some of these include the restrictive use of fertilizer and its poor local availability, high petroleum and transport costs, inept logistical handling of inputs and movement of produce, poor quality of road infrastructure and weak domestic and regional trading arrangements for agricultural products. Climatic factors like inclement weather conditions, flooding and desertification add to the challenges in farming.

Statistics from the Food and Agriculture Organization (FAO) show that hunger in Africa grew from 17 million people in the 1980s to 333.2 million by 2010s (FAO et al. 2017). This was perhaps the only region of the globe where absolute numbers of food insecure people rose to such an alarming degree (Cleaver 2018: p. 69). The level of malnourishment among the people living in Africa continues to be alarmingly high. As of 2018, 58.7 million children on the continent were stunted (UNICEF 2018).

In such an agro-economic climate, Africa's growth in the future can be secured by building the technical capabilities of its vast human resource

to maximize the productivity of its agricultural sector. In addition, better terms of production can be created by encouraging higher investment in collateral factors. Analysts believe that the low rate of agriculture-related technical and vocational training is a notable hindrance. The way forward could be an improved policy framework to invite private investments in agriculture and agro-processing, along with upgraded policies for the provision of inputs and marketing. Partners also need to be better coordinated to synchronize what they can offer in terms of national priorities rather than transplanting parochial methods (Cleaver 2018: p. 69).

Besides Egypt and South Africa, most African countries are dependent on a few commodities for three-quarters of their exports (Broadman 2006). The African continent, which imports most of its food requirement, is ironically an important exporter of specific agricultural commodities. These have a demand among Africa's partners and in turn generate export earnings. Export earnings form a vital part of revenue generation, since the local tax revenues imposed on domestic production are often low.

These trade patterns raise an important question of whether national developmental priorities should be compromised in favour of the export of marketable agro-commodities like fruits, vegetables, tea, coffee, sesame, etc. Governments are often tempted to incentivize products that earn foreign exchange through exports. However, the emerging rules of international trade and duty-free concessions under the Africa Growth Opportunities Act (AGOA), the Lome/Cotonou conventions, and their successor Economic Partnership Agreements (EPAs), as well as the Duty-Free Tariff Preference Schemes (DFTP), lead to asymmetrical trade flows (see Andrew, Chapter 12, this volume). In other words, African countries are often compelled to import basic staple foods and export coffee, exotic vegetables, cocoa and flowers.

It is against this backdrop that cooperation in the agricultural sector continues to have significant relevance. At the IAFS-III held in 2015, specific areas were identified for collaboration. These include:

1. The pursuit of joint cooperation in the field of agriculture and food security, to support the implementation of the Comprehensive Africa Agricultural Development Programme (CAADP) for enhancing productivity, conserving land and environment and bolstering food and nutritional security;

2. The increased cooperation for improving farming techniques through relevant and affordable technology, appropriate use of irrigation, improving crop varieties and other similar measures;
3. The promotion of investments in agri-businesses and food processing industries to generate employment and greater revenue;
4. A segment on the blue ocean economy, added to promote cooperation and management of sustainable development of marine food resources, mainly through fishing;
5. A commitment to collaborate for capacity building, education and skill development in sunrise technologies such as remote sensing to be deployed in the agriculture, water, forest and marine sectors; and
6. The awarding of doctoral and post-doctoral scholarships in the field of agriculture and the ITEC programme—both of which are strong components of the ideas detailed towards agricultural cooperation (IAFS 2015).

The potential frameworks of cooperation identified in the summit were integrated into programmes which either were envisaged or were already in operation. The partners also agreed to enhance market opportunities for agricultural products by establishing an integrated food processing cluster and an integrated textile cluster in select countries on the continent. The key highlights of the three IAFSs are as follows:

i. India-Africa Forum Summit I, 2008

In 2008, IAFS-I concluded that:

> Africa and India agree that agricultural development is an effective approach to ensur[ing] food security, eradicating poverty and improve[ing] peoples' livelihood, and agree to strengthen Africa and India cooperation in this sector in order to improve the food security of Africa and to increase its exports to world markets. (IAFS 2008)

To this end, the two regions emphasized the sustainable development of agriculture, livestock, land and environment. The main focus of cooperation has been to augment the capacity of smallholder African food producers and enable them to comply with the required quality and safety standards. The efforts also include educating smallholders on extension activity and agricultural credit policies, sharing experiences and information on appropriate storage and building access to processing technologies. This would help to establish linkages between agriculture and

industrial development in order to support and nurture agro-processing industries and upscale cooperation between agricultural training centres and relevant research institutes.

Based on the Plan of Action under the Framework of Cooperation of IAFS-I, both regions decided to bilaterally enhance agricultural education, mainly scientific collaborations and research. India provides 25 Ph.D. and 50 masters' level scholarships per annum in Indian agricultural institutions to African students. In order to ensure the equitable distribution of these opportunities, the African Union Commission coordinates the process of selecting prospective candidates in conjunction with the Government of India (GoI) and its embassies in Africa (IAFS 2008).

ii. India-Africa Forum Summit II, 2011

At the second IAFS in 2011, India and Africa committed to agricultural cooperation in order to increase their output and achieve the Millennium Development Goal (MDG) of halving the proportion of people who suffer from hunger and malnutrition by 2015. They emphasized the importance of integrating scientific research and agricultural practices to boost productivity, conserve the environment and achieve food security. As a part of this endeavour, the partners agreed to collaborate in the implementation of the Comprehensive Africa Agricultural Development Programme (CAADP) (IAFS 2011).

At the second summit, India also expressed its desire to establish agriculture-related institutions at various levels in Africa. The India-Africa Institute of Agriculture and Rural Development was proposed as a pan-African level Institute to be set up in consultation with the African Union (AU).

Further, three institutions at the regional level were to be set up in consultation with the Regional Economic Communities (RECs). These were the India-Africa Regional Soil, Water and Tissue Testing Laboratories; Agricultural Seed Production-cum-Demonstration Centres; and Regional Farm Science Centres (IAFS 2011). These institutions were offered to all the eight RECs in Africa, and some nominated host countries. It was proposed that scientists and experts from the Department of Agricultural Research and Education (DARE) and the Indian Council of Agricultural Research (ICAR) would visit Africa to train over 600 participants. Sharing of skills was proposed to build capacity across Africa for increasing crop and fishery production, as well as post-harvest processing of food grains and marine products.

Yet another novel institution, the India-Africa Institute of Agriculture and Rural Development (IAIARD), was patterned on the experience of the National Bank for Agriculture and Rural Development (NABARD) in India. It was proposed to help augment and enrich human resources in Africa by sharing the knowledge and expertise acquired in India. The institute aimed to implement its plans through the NABARD Consultancy Services (NABCONS) and was to be a pan-African institution wherein the African Union would decide the location.

Further, eight Soil and Water Testing Laboratories (SWTL) in consultation with the eight RECs of Africa were to be established. Each SWTL was to be associated with two mobile soil-testing laboratories to augment efforts in soil fertility assessment. Eight Agricultural Seed Production-cum-Demonstration Centres in Africa were also proposed. These centres were recommended to increase the availability and quality of the rapeseed-mustard and pulse crops in eight African countries. Exploratory trials to identify appropriate cultivators of oilseed (rapeseed-mustard) and pulses through farmers' participatory varietal selection were to be carried out. Seed production of the most appropriate varieties would be taken up at each centre.

The institutions that India proposed to establish would help regional and national-level support systems in many African countries. They would also provide a basis to link productive assets with processing facilities and encourage FDI in agriculture.

iii. India-Africa Forum Summit III, 2015

At the third and most recent Summit in 2015, India and Africa agreed to pursue joint cooperation in the agricultural and food security fields. India reiterated its support for the ongoing implementation of the Comprehensive Africa Agricultural Development Program (CAADP) to increase productivity, conserve land and environment as well as ensure food and nutritional security. The two regions deliberated on measures to increase cooperation for the improvement of farming techniques through appropriate and affordable technology, appropriate use of irrigation, improving crop varieties and other measures. A special emphasis was placed on promoting investment in agri-businesses and food processing industries to generate employment and greater revenue. Further, the partners expressed the need to collaborate in capacity building and the use of remote sensing technologies for natural resource mapping in agriculture.

At the summit, India promised to continue its efforts to facilitate the access and enrolment of African students and academicians to India's premier institutions of higher learning. These exchanges would significantly boost Africa's human resource capacity in areas such as engineering, medical technology and agriculture. Although these ideas were well-placed, they did not fructify for the various reasons, which are elaborated in the latter part of the paper (see also Modi 2017: pp. 157–158).

The Agricultural Dimension of Trade Between India and Africa

The India-Africa Forum Summits have led to a growth in the trade between India and Africa. It now stands at about US$ 30 billion from eight agricultural commodities that contribute substantially to the non-oil trade. The largest export earnings are from cashew nuts, followed by pigeonpea (*arhar dal*), cotton, cloves, tea, roots, barks and coffee. Up to 5% of India's agro-imports come from Africa (Africa Trade Policy Centre and Confederation of Indian Industry 2018). Several African countries have recorded a rapid increase in their exports to India, with some even running trade surpluses. India unilaterally offered the Duty-Free Tariff Preference (DFTP) scheme to the LDCs of Africa. The scheme was initiated by India during IAFS I in 2008 (PwC and FICCI 2016). Under it, 85% of the tariff lines were made free of customs duty for LDCs, and 33 African countries could avail the benefits. Nine per cent of tariff lines had a marginal rate while 6% were reserved for no concessions. By 2014, the scheme was amended with 4994 products under 96% of tariff lines becoming duty-free, while 2.2% with 114 products obtained preferential rates. Only 97 lines or 1.8% remain under duty structures. These 97 items include coffee, tea, some spices, fruits and vegetables, and wheat flour. The amendment was designed to incentivize investments in specific agricultural commodities of interest to India. While the scheme can be criticized for the same reason that the EPAs incentivize agriculture in Africa, African farmers in turn have expanded their agricultural productivity to cater to an increased demand from India. This surge is similar to the case where sesame farming grew largely due to a high demand from China. It is also pertinent to note that the fruits, vegetables, flowers and cocoa produced were exported to Western countries. The continent's existing agricultural production has little reciprocity for access to the

Indian market. India exported cereals worth US$ 1.4 billion and sugar and confectionery worth US$ 0.93 billion to Africa in 2019.

However, there is demand in India for agro-products such as cashew and pulses grown on the continent. African countries can tap into the growing demand for cashew nuts and pulses, in the Indian market. Several African countries such as Malawi have already capitalized on this demand. In 2010, India imported US$ 1148.97 million worth of agricultural commodities from Africa. Of these, the top eight products (fresh fruits, nuts, melons, fresh vegetables, coffee, tea, spices and cotton) added up to 71% of the total agro product imports to India. The percentage of agricultural products imported as a percentage of the total import basket was at only 3.59% in 2010 (Sankalp Africa Summit 2019). In 2019 India imported about US$ 1 billion worth of African fruits and nuts and US$ 400 million worth of vegetables. They are among the top ten imports but with small shares in the trade. Indian investors have contributed to the increased production and export of such zero-tariff commodities from India to Africa but their primary focus continues to be the local and regional markets on the continent. To better utilize the export opportunities that India offers, African countries need to develop an export strategy to improve the supply of targeted produce.

Market requirements in India and the implementation of rules of origin issues still need attention. The effective execution of such a strategy and the capacity building offered by India and other stakeholders could potentially help the growth and development of the African agricultural sector. Early implementation will also prove advantageous as India is in the process of negotiating Free Trade Agreements (FTAs) like the Regional Comprehensive Economic Partnership (RCEP)[1] since 2012. These will, however, be a cause of concern as the incentive to invest in the Association of Southeast Asian Nations (ASEAN) countries could be higher. If the terms of the proposed RCEP[2] are acceptable to India in terms of the cost–benefit analysis and come into operation ahead of the AfCFTA,

[1] The RCEP aims to create a free trade zone of 10 ASEAN countries, Australia, China, India, Japan, South Korea and New Zealand. This will create a zero-customs duty zone in a geography that contributes 34% of global gross domestic product (GDP) and 40% of world trade. The region accounts for about 50% of the global population (Sharma 2019).

[2] India has reservation to the signing of the proposed RCEPs is that it would entail the opening of her markets, services and investments, etc. to the RCEP member countries which could prove detrimental to her national interest. Therefore, the RCEP will need to reconcile the concerns of all the member countries.

then India will find it more beneficial to import from the RCEP countries rather than from Africa (FTSE Global Markets 2018). However, in November 2019, India withdrew from the RCEP for now.

In such a scenario, African exports to Asia could fall by a third, up to about US$11 billion, as the Asian countries will gain through lower tariffs. African LDCs, who are the intended beneficiaries of the DFTP scheme, would subsequently reduce their exports to India by 18.7 % as the RCEP members could potentially use tariff reductions among themselves to expand trade (PwC and FICCI 2016). Africa needs to think about a trading arrangement with India.

Lines of Credit to Support Agriculture

Lines of credit (LOCs) are offered by the EXIM Bank of India to aid the development of infrastructure and provide integrated support to African countries and regions (see also Iyer and Mazumdar, Chapter 14, this volume). Under these LOCs, African countries choose the projects based on their development priorities and use the demand-led borrowing to finance it. An analysis of LOCs to African countries between 2005–2006 and 2017–2018 shows that about 30 countries presented proposals for agriculture-related support and received LOCs accordingly (see Table 2.1). One of the biggest projects financed by India was for the development of the sugar industries in Ethiopia, worth US$ 640 million (see also Vazquez and Kottam, Chapter 15, this volume). It was approved in 2008 and progressed over a period of 6 years in several tranches. Other countries such as Burkina Faso, Gambia, Guinea-Bissau, Senegal, Sierra Leone, Swaziland and Tanzania sought India's assistance to acquire tractors and other agricultural equipment (Singh 2011: p. 11). Indian LOCs also helped raise crop productivity levels in four of the Team 9 countries of West Africa. These are—Cameroon (for maize and rice), Chad (for cotton), Côte d'Ivoire (for cocoa, rice and coffee), Togo and Mozambique (for maize and wheat crops).

Investments in Agriculture

Africa has several pull factors such as arable land and manpower that attract investment from its global partners. Conversely, the push factors for India include her expertise and interest in energy, food security and its demand for resources. India has extended agriculture-related FDI in

Table 2.1 Agricultural projects funded through LOCs from EXIM Bank India (2003–2018)

Year	*Country*	*Project*
2004–2005	Ghana	Rural electrification and agriculture
2004–2005, 2014–2015	Senegal	Agri-machinery supply, irrigation project, cereal and fruit processing, fishing. fisheries abattoir and rice production
2005–2006	Gambia	Tractor supply
2005–2006	Burkina Faso	Agro-processing equipment
2005–2006	Chad	Mango, tomato processing and cotton yarn
2005–2006	Côte D'Ivoire	Agro-processing
2005–2006	Guinea-Bissau	Food processing
2005–2006, 2009–2010	Mali	Tractor assembly and food processing
2006–2007, 2007–2008	Sudan	Agricultural inputs, sugar project
2007–2008	Côte D'Ivoire	Processing of coconuts and fisheries
2007–2008	Ethiopia	Sugar industry
2007–2008	Tanzania	Supply of tractors
2007–2008	Malawi	Agro-processing
2008–2009	Burkina Faso	Rural electrification
2008–2009	Cameroon	Maize and rice plantation
2008–2009, 2011–2012	Ghana	Fish harvesting and sugar processing plant
2008–2009	Madagascar	Rice productivity
2008–2009, 2013–2014	Sierra Leone	Tractors, threshers and irrigation
2009–2010	Côte D'Ivoire	Rice production
2009–2010	Democratic Republic of Congo	Irrigation pumps
2009–2010	Eritrea	Multipurpose agro-project
2009–2010	Mauritania	Milk processing
2010–2011	Malawi	Cotton processing
2010–2011	Mozambique	Food productivity and rural electrification
2011–2012	Cameroon	Cassava cultivation

(continued)

Table 2.1 (continued)

Year	*Country*	*Project*
2011–2012	Malawi	Sugar processing plant
2011–2012	Republic of the Congo	Rural electrification
2011–2012	Swaziland	Agricultural development and mechanization
2011–2012	Togo	Rice, maize and sorghum project
2012–2013	Benin	Tractor assembly
2012–2013	Burundi	Farm mechanization
2012–2013	Burundi	Detailed Project Report (DPR) for integrated food processing park, sugarcane, mechanization
2013–2014	Rwanda	Integrated agro-projects
2013–2014	Benin	Water supply
2015–2016	Kenya	Agricultural mechanization
2015–2016	Zambia	Agricultural mechanization

Source Compiled by the author from data available on the EXIM Bank website, 2019

Uganda, Ethiopia, Rwanda, Kenya, Malawi and Mozambique. The overall Indian FDI in Africa between IAFS-I in 2008 and IAFS-III 2015 grew from US$ 11.9 to US$ 15.2 billion (Africa Trade Policy Centre and Confederation of Indian Industry 2018). Among the major recipients of agricultural FDI, only Ethiopia and Uganda have signed the Bilateral Investment Promotion and Protection Agreements (BIPPAs) with India. Uganda has ratified it, while Ethiopia has yet to do so despite signing it in 2007. Such delays reduce the confidence of investors who fear takeovers by the host governments.

Agriculture-related FDI's in African countries originate largely from the Indian private sector and thus demands that its requirements be met. Some of the main Indian players are the Jayshree Group in tea, several diasporic Indian companies in coffee and plantations, Karuturi in roses and farms and others in floriculture. The success of these companies has often been due to them seizing opportunities in markets other than India. They can, however, contribute to intra-regional trade if incentivized. In this context, official Indian capacity building efforts in collaboration with the private sector can prove fruitful. The success of these collaborations

will encourage private sector companies to venture into agro-processing and thus add value to the African agricultural sector.

The development of backward and forward integration in the value chains of India will benefit investment and trade in agricultural products. The Indian diaspora in Africa often show a more heightened awareness of emerging opportunities and are willing to grasp them as they are better placed to understand the local cultures of land ownership and cultivation. Indian diasporic investors in Kenya and Uganda, for instance, are engaged in the production of sugar, wheat, floriculture and cultivate vegetables with packaging and processing facilities.

The early establishment of agricultural value chains by an India-Africa partnership could benefit from the wider market access that Indian companies will gain in the new FTAs that India seeks. Also, the African Continental Free Trade Area (AfCFTA) 2020 opens new opportunities which Indian value chains in Africa can expand and access. Due to such determinants, intra-African trade is envisaged to expand to the tune of about US$ 40.6 billion (Africa Trade Policy Centre and Confederation of Indian Industry 2018). That will be an incentive to new Indian FDI.

Non-Governmental Capacity Building Initiatives

There is a growing demand and appreciation for Indian agricultural consultancy, start-up support and social entrepreneurship. One such illustration is that of Sankalp Africa (an event organized by Intellecap, a social entrepreneurship and impact investment consultancy firm). The steady success of social entrepreneurship efforts of Sankalp Africa over the past six years has led to various small investments, some of which are agriculture-related. The US$ 150 million Aavishkaar Africa Fund, which was launched in December 2018, will further support such initiatives in Africa (Kiernan 2017).

Intellecap of the Aavishkaar group have helped the digitization of the financial transactions in the agricultural value chains of Madagascar. With support from the International Finance Corporation, Sankalp Africa has also assessed smallholder crop farming value chains, financial inclusion and the potential of agri-finance and digital financial services in the country. The assessment has led to an understanding of the opportunities in this space and has contributed to innovative digital financial services which cater to smallholder farmers. The implementation of a pilot programme is expected as well. Similarly, Intellecap provided business development

services for the finalists of a competition on post-harvest technologies in East Africa. Under this scheme, drawing, storage, ICT, logistics and post-harvest technologies were identified. The winners were mentored to develop and scale-up their small enterprise to enter the international market.

With the support of *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ), Intellecap has designed a self-sustainable agribusiness incubator in Ethiopia. It is meant to assist early-stage companies in the value chains of agri-businesses. The incubators also reviewed business models and provided recommendations. Further, a financial model based on the South-South agribusiness incubator network was envisaged. It would aid the transformation of a grant-based project to a financially sustainable institution. Innovative business models in agriculture and waste management impact fund performance measurement, and reporting tools were developed for the African market. Due to the positive responses that these efforts have received, Intellecap is working towards seeking funding partners for its African platform.

Enhancing India-Africa Agricultural Cooperation: Towards a Sustainable Future

Building Capacity

India has added value to the agricultural sector in Africa by supporting research through a number of agricultural capacity building institutions. Nearly 50,000 scholarships and training opportunities for graduate, post-graduate and postdoctoral studies in India have further strengthened the spirit of exchange between the two regions. India's intention to establish clusters was driven by the aim to impart value-creating skills and merge private sector investments and integrated industries. For instance, private Indian investments and projects supported by LOCs have had integrated approaches like a sugar factory for a sugar plantation, cotton growing with yarn and textile factories and palm oil plantation with oil mills in Eastern, Western and Southern Africa. However, a number theoretically fruitful mergers have not translated into increased production due to several constraints on both sides.

Over the period of the IAFSs, capacity building training positions in India under the ITEC programme or other specially curated programmes have fallen into place and have been well utilized. The Indian side has

overcome various challenges of implementation and has granted many agricultural scholarships to deserving aspirants.

Challenges in Implementation

Offers to set up institutions in Africa, bilaterally, regionally, and on a pan-African basis however have met with little success. There is a possibility that the Indian executing agencies were not sufficiently adjusted to the culture of doing business in Africa, or that there were unachievable expectations from each side about how such institutions would be established. For the proposed regional and pan-African institutions, political agreements at the level of the AU often led to indecision, when nominating a host country. Some of the pan-African and regional institutions thus did not fructify.

Further, a lack of internal coordination, budgetary allocation and a stable implementation policy often impedes the successful establishment of any institution. In some instances, the Indian stakeholders expected that the host country would have an empowered representative committee for liaising with the Indian agency—to consult with them and find appropriate locations, buildings, local sustainable budgetary support, etc. The Indian stakeholders envisioned their involvement as a partnership model, and not as a donor-driven engagement. However, many countries seemed to expect a complete 'gift' set-up, where the responsibility of establishing the institution would lie entirely with India. This misunderstanding took India by surprise as its model was of an equal partnership, and not a donor-driven one. The two regions are working collaboratively to close such gaps in communication and understanding of the modalities involved and resolve them bilaterally by providing innovative solutions.

One viable solution could be to integrate these proposed institutions with related private sector investments. For instance, the Farm Science Centres or Soil Testing Laboratories could be allocated to civil society organizations or investors who have an interest in contract farming. They could provide the basic local support, budget, manpower, etc., which the Indian agency could frame while establishing the centre.

The most distressing stories, however, relate to the proposal for the textile and the food processing clusters. Some proposed projects have been unsuccessful due to bureaucratic challenges. Multiple African countries have demonstrated an interest but have been unable to work the levers at the African Union to obtain certain projects. Contradictions

within Indian implementing agencies, inter-ministerial financing regulations and unclear procurement rules also seem to have thwarted the establishment of some special institutions like the Food Processing and Textile Clusters that would have attracted investments. The implementation of these projects can be taken up through a private sector or public–private partnership (PPP) route. However, the feasibility studies for such clusters must then be offered to potential partners in Africa for implementation outside the IAFS grant commitment. This could become a basis to augment processing capacity and infrastructure development in African countries and subsequently attract foreign investment.

The social enterprise route and the growth of start-ups can also be integrated into India's grant offerings in the agriculture sector. For instance, social entrepreneurship and start-ups between India and Africa are already supporting initiatives through the Aavishkaar Africa Fund. The beneficiaries often work with international or bilateral development cooperation institutions in Africa.

It is imperative for established partnerships to be implemented through diverse and open partnership programmes, especially while executing the various grant institutions that were committed to in the three IAFSs. The budget for such institutions as offered by India was generally budgeted at the time of making that commitment. Typically, these funds are to be paid to Indian implementation agencies in India, along with the projected escalation in costs. The difficulty, however, lies in finding appropriate hosts. Even when the hosts are finalized, Indian agencies find that they lack the financial and implementation capacities that are required, a direct linkage to business enterprises whether public, private or social would make the institution more relevant. While the training and establishment would be carried out by India and its agencies, the sustainability and carrying-forward could potentially be done by the local owners on behalf of the partner governments in Africa.

Trilateral Cooperation

India is also steadily developing partnerships with other countries on a trilateral basis in Africa. Collaborations with Japan under the Asia Africa Growth Corridor (AAGC 2019), with Germany under the Compact for Africa and with countries such as France and the EU are under discussion. The Development Cooperation Agencies of these countries such as GIZ, Japan International Cooperation Agency (JICA) and *Agence Française*

de Développement (AfD) have a strong presence on the ground in many African countries. By coordinating between the Indian offer and some of these agencies, the local expertise that host Governments often find lacking could be duly incorporated. India could further build its initiatives by asking partnerships thus developed to create new avenues for agriculture-related training in Indian institutions, as it has done with USAID in the past.

Challenges and Opportunities in Land

The sustainability of India-Africa cooperation also depends on the enhancement of Indian investment in agriculture and other related sectors in African countries. The euphoria of investments in agriculture, floriculture, specific cultivation of crops, and investment in plantations between 2005 and 2010 (Singh 2009) ran into various challenges. Ethiopia had set up a model for large-scale commercial farming in low-population density areas. But subsequent to the death of Prime Minister Meles Zenawi, this model was under stress. It resulted in a combination of extractive revenue demand, a lack of fulfilment of on-ground facilities and adverse policy changes in the five years that followed, making many such new investments unviable. Many Indian investors lost their capital. This created a bad precedent and new investors were reluctant to invest in Ethiopia. Successful floriculture businesses also saw an exit of investment due to fluctuations in policy frameworks and tax heavy-handedness. Further, in the unrest of 2017–2018 in Ethiopia, several foreign investors were attacked in the investment-friendly Oromia region, leading to a further deflation of business interest (Sethi 2013).

Partly due to these reasons, Indian investors shifted their agricultural focus towards developed markets like Kenya and further used mergers and acquisitions to acquire tea estates in countries such as Malawi and Rwanda. They also forayed into other Eastern and Southern African countries but met with little success. In retrospect, large-scale commercial farming in Africa, although an attractive investment, is characterized by a lack of understanding of local culture and frequent policy changes. The role of some local civil society organizations in highlighting the perceived negative aspects of commercial farming on the continent has also contributed to the early slaughter of the potential golden goose. In a survey carried out by the Confederation of Indian Industry (CII),

Indian investors have also pointed out reasons that discouraged investments in land. These included the lack of skilled labour, poor regional market integration and the lack of reliable local business partners (Africa Trade Policy Centre and Confederation of Indian Industry 2018). Indian companies, as bigger players in domestic and regional trade, are affected more adversely by the aforementioned factors in their bid to transfer technology and employ a large number of local people.

The issues of land acquisition and the frequent changing of rules, particularly the interpretation of these rules, meant that large commercial farms could not sustain themselves. Efforts to support contract farming often did not take into account the cultural traits of many marginal farmers who were not familiar with the system of having tradable surpluses. Even if commodity traders were investing in seeds, inputs, and assured buying prices, many contract farmers sought short-term profits without referring to existing arrangements. This disrupted the supply of traders with forward contracts. For instance, some farmers were contracted to produce green gram and offered technical support and assured pricing. However, they would enter informal contracts with buying agencies and later easily renege in favour of new higher price buyers and ignore the input costs invested in them.

It is notable, however, that some efforts towards capacity building in agriculture did have a favourable outcome in some instances. The success of the Ethiopian commodity exchange was based on an Indian model, but funded by a consortium of traditional donors (Gustafson and Hernandez 2017). This accomplishment has become a benchmark that encourages other countries to employ similar solutions to facilitate their domestic trading and generate clearer market conditions for export surpluses.[3] Alongside these efforts, the Indian company Kirloskar, with a wide implementation of its pumps in water projects all across Africa, created a positive model for the triple A (appropriate, affordable and adaptable) technology model (Kirloskar 2018).

[3] Ethiopia had a surplus production of flowers and vegetables which were to be flown into Amsterdam and Dubai for marketing. Ethiopian Airways, the domestic carrier, stepped-up with increased cargo capacity to facilitate such heavy exports to international markets.

Conclusion

The industrialization of Africa will find sustenance in its agricultural development. However, the agricultural production in Africa is at present unable to keep up with the continent's rising requirements. An improved agricultural output will translate not only to economic benefits but also a healthier living standard. The development of the sector will actively aid employment generation measures in several parts of the continent. Some African countries have already graduated from primary exports to exports of packed and ready-to-sell agricultural produce like vegetables and flowers. Initiatives that support food processing and commercial farming with high technology will lead to improved productivity and a higher rate of employment generation.

Asian companies could have a much larger role to play in assisting such development, as Western companies are already focused on the processing market. At the same time, it is crucial for African countries to resolve internal contradictions in their policy frameworks, land use patterns and approval systems. The creation of land banks in low population areas, for example, would be a good preliminary step. In such land banks, the state and private owners or tillers could be brought under one umbrella. Appropriate land clusters can be accorded priority depending on infrastructure access and the fertility and quality of soil. In such places, clear and firm policies need to be in place for the value chain members, while the handling of domestic permissions could be delegated to a local agency with adequate outreach. Indian companies, along with numerous others, will find it more feasible to invest and collaborate without having to face shifting demands from local populations or quarrel with those who have traditional tilling rights on the land. Such an arrangement would also keep at bay the pressures of local non-governmental organizations and civil society organizations that are often instigated by overseas agencies.

The pressing need for investments in basic infrastructure such as roads, water and accessible markets can be met through policies that incentivize companies to invest in infrastructure alongside agriculture with annuity-based returns. Domestic and regional markets also need to be opened up and organized so that higher productivity leads to regional and intra-national trade. Commodity exchanges could be created in more original communities to provide good pricing inputs.

India has demonstrated an insightful understanding of the aforementioned exigencies and has developed several economic alliances with

Africa. A cogent PPP model can amplify trade and investment alliances between the two regions, where Indian governmental agencies discuss development plans with Indian investors and potential trilateral partners. Such deliberations will facilitate regional investment and trade matrixes that support infrastructure and capacity building initiatives along with promoting FDI in the private sector. A fruitful dialogue to combat risk factors and maximize the rewards of South-South cooperation will allow India and Africa to step into the future as formidable players in the global economy.

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CHAPTER 3

India, Africa and Global Climate Diplomacy

Renu Modi and Meera Venkatachalam

Abstract This chapter draws the reader's attention to the common minimum position adopted by India and African states, and the areas of divergence, on the critical issue of climate change. The 'climate emergency' affects India and Africa significantly through droughts, floods and unpredictable weather events, and has taken a toll on agricultural productivity. This could aggravate further, depressing the living standards of largely agricultural economies. This chapter looks at how India and Africa engage in the geopolitics of multilateral climate diplomacy, and the negotiating blocks with which they align for furthering their climate agendas. India and African states are part of the G-77/China negotiating block which includes all nations of the Global South, and India along with South Africa, is a member of BRICS, which has emerged influential in multilateral platforms. There are some convergences, in their positions; such as adherence to the Common But Differentiated Responsibilities (CBDR), and calls for transfer of finances from the industrialized nations

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to the developing world, to finance initiatives for adaptation and mitigation to combat climate change. There are also divergences: African states continue to complain that adaptation funds achieve greater impact in countries with more developed markets, such as India. They also point out some of the largest emitters—India and China; have not taken adequate action to curb their greenhouse gas (GHG) emissions. Further, this chapter also details the Indian capacity building initiatives in Africa for clean energy through the International Solar Alliance, Lines of Credit and aid to combat climate change.

Introduction: Challenges in the Anthropocene

In recent decades, there has been a consensus that global climate and weather systems are changing. Human activities such as industrialization, burning of fossil fuels and destruction of natural habitats are largely responsible for climate change, giving rise to the suggestion that the current geological period is best categorized as the 'Anthropocene'[1] (Lewis and Maslin 2015). One of the symptoms of climate change is global warming, or the rise of average surface temperatures of the earth, which is accompanied by changing weather patterns such as; increased risks of unseasonal flooding, droughts and melting of polar and highland glaciers which could cause sea-levels[2] to rise dramatically, altering coastlines, threatening human settlements and economic activity such as agriculture.

The impacts of climate change are being disproportionately felt in the hotter and less developed parts of the world at lower latitudes (IMF 2017: p: 118; Department of Economic Affairs [Vol I] 2018). The think-tank, Germanwatch, ranks countries affected by climate change by their Climate Risk Index (CRI) score, by analysing the quantifiable impacts of extreme weather events—in terms of fatalities and economic losses that occurred. In the list of countries most affected by climate change in 2018,

[1] From the Greek words, *anthropos* = human; *cene* = the standard suffix for epoch in geologic time.

[2] For instance, some projections indicate that by 2050, over 570 low-lying coastal cities will face sea level rises by at least 0.5 metres, which will put 800 million people at risk from storm surges and loss of property. The global economic costs to cities could amount to US$ 1 trillion by 2050 (C40, n.d.).

Madagascar, India, Kenya and Rwanda are ranked 4th, 5th, 7th and 8th, respectively (Eckstein et al. 2019: p. 6).

Climate change in India will cause an increase in inter-annual and intra-seasonal variability of monsoon rainfall, or frequent droughts and flooding in large parts. In 2018, a World Bank Report predicted that India's average annual temperatures are expected to rise by 1°C–2°C by 2050 even if preventive measures are taken as per the recommendations of the Paris Agreement of 2015.[3] Approximately 600 million people live in locations that could either become moderate or severe 'hotspots' (where changes in average temperature and precipitation will have a negative effect on living standards) by 2050 under a business-as-usual scenario. Some states—Chhattisgarh, Madhya Pradesh, Rajasthan, Uttar Pradesh and Maharashtra—could register up to a 9% decline in living standards. These developments could cost India 2.8% of its GDP by 2050, and depress the living standards of nearly half the country's population (World Bank 2018).

A sample of 30 African countries shows that two-thirds of them are warming faster than the rest of the world (Africa Growth Initiative 2017: p. 78). Sub-tropical southern and northern Africa have experienced a rise in temperature at double the global rate over the last few decades, at 2–4°C (Pereira 2017: pp. 5–6). This will result in a wetter climate in eastern Africa and a drier spell in southern Africa, western Sahel and the coast of Guinea (James and Washington 2012; Gbegbelegbe et al. 2017: p. 1). According to IFPRI, climate change will severely affect the agricultural sector, which employs more than half of the African labour force (OECD/FAO 2016: p. 60). Agriculture, which accounts for approximately two-thirds of GDP in the African continent, is the only segment with scale and growth linkages to influence aggregate growth and impact the economy as a whole (Diao et al. 2010: p. 1376), as industrial, manufacturing and service sectors are poorly developed. The adverse effects of climate change could manifest through: lower agricultural output, depressed labour productivity, reduced capital accumulation and poorer human health (IMF 2017: p. 119). Climate disasters will also keep people

[3]The result of negotiations at COP21, the Paris Agreement's long-term goal is to keep the increase in global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5°C, which would substantially reduce the risks and impacts of climate change.

in the cycle of poverty by making it harder for them to build assets (Hallegatte and Rozenberg 2017: p. 250).

Since both India and Africa are primarily agriculture-based economies, the adverse impacts of climate change that have now reached a point of 'climate emergency' necessitate urgent action at an individual and collaborative level.

India, Africa and the Geopolitics of Climate Change

A number of multilateral organizations have addressed the emergent threat of climate change, notably the United Nations Framework Convention on Climate Change (UNFCCC). There are two pathways for combating the effects of climate change: mitigation and adaptation. Mitigation entails human intervention to reduce the emissions of greenhousegasses (GHGs) in the atmosphere in two ways; by reducing the source of GHGs—for example, through the burning of fossil fuel; or enhancing the 'carbon sinks'—like oceans, forests and soil, that absorb such gases (NASA 2018). On the other hand, adaptation is the act of making the necessary adjustments to align them with changes in climate—actual or in the future—to reduce vulnerability to the adverse impacts of climate change such as low crop yields. It also encourages people to take advantage of the beneficial opportunities associated with climate change: longer growing seasons, conducive temperatures and increased yields in certain regions of the world (NASA 2018).

Within the framework of the UNFCCC, India and African states have largely been concerned with achieving a balance between adopting climate-friendly policies and 'development' attained by nurturing industries largely dependent on fossil fuels (NEPAD 2016). India and Africa have also addressed the issue of climate change through coordinated stances at multilateral summits; and the three India-Africa Forum Summits (IAFSs)—the official platform for India-Africa diplomatic relations, for greater cooperation, trade and investments.

On the global stage, India has been a part of three significant negotiating groupings, with overlapping agendas:

1. The Brazil, South Africa, India and China (BASIC) countries;
2. The Brazil, Russia, India and China and South Africa (BRICS); and

3. The Group of 77 (G-77) countries of the Global South.[4]

All African states are part of the G-77/China coalition. Some African nations are also represented through:

1. The Alliance of Small Island States (AOSIS),
2. The Organization of Petroleum Exporting Countries and, more recently,
3. The Coalition of Rainforest Nations,
4. The Least Developed Countries (LDC) Group, and
5. The Like-Minded Developing Countries.

The most significant African coalition, the African Group of Negotiators (AGN), is the only regional (and not issue-based) developing country coalition that has consistently operated in the climate negotiations since their inception at COP1 (1995) in Berlin (Roger and Belliethathan 2014). A closer look at the position adopted by India and Africa reveals complex contours of overlapping interests, some divergent priorities based on regional and national interests, and the emergence of 'climate geopolitics'—where climate initiatives are leveraged to peddle influence and consolidate soft power.

Convergences

Since COP1, India has maintained that the developed nations must shoulder the responsibility of reducing the GHG emissions since they contributed disproportionately to its increase. Industrialized countries have been responsible for three-quarters of the cumulative global emissions released into the Earth's atmosphere since the start of the Industrial Revolution, and continue to have much higher per capita emissions even today (Hurrell and Sengupta 2012: p. 470). India's declared goal was to 'establish an effective, cooperative, and equitable global architecture based

[4]The Group of 77 (G-77) was established in 1964 by seventy-seven developing countries with the aim of promoting their collective economic interests and improving their negotiating capacity within the United Nations System. It has 135 current members as of 2019. China is an affiliate, so the group is often called the G-77/ China bloc (G-77, n.d.).

on climate justice and the principles of Equity and Common But Differentiated Responsibilities (CBDR), under the UNFCCC' (GoI, n.d.: p. 3). The principle of CBDR focuses on two aspects: firstly, the necessity for all states to take responsibility for their emission rates and environmental problems, and secondly, the importance of recognizing the differences in levels of economic development between states (Epstein 2018). CBDR, which found acceptance in the G-77/China block, was rejected by some developed countries, notably the USA in Rio de Janeiro in 1992 (known as the Byrd-Hagel Resolution).

Africa's position is somewhat similar to India's basic position. Africans' agendas have found articulation in the 'Common African Position' (CAP).[5] The CAP asserts that climate change is an 'additional burden' hindering Africa's sustainable development and the attainment of the Millennium Development Goals (MDGs) (Vickers 2013: pp. 687–688), and now, the Sustainable Development Goals (SDGs). The CAP prioritizes economic development, improvement to quality of life and reduction in poverty over environmental considerations. It maintains that food and energy security are vital and affirms African nations' sovereignty over the use of natural resources.

Both India and African states have consistently maintained that massive investments of a financial, technological and educational nature, for adaptation strategies in developing countries, are more important than mitigation. Both parties have historically argued that mitigation, which is focussed on curtailing emissions, impedes industrialization, thereby affecting the economic prospects of their citizens (AfDB, n.d.). Following the 1992 Rio de Janeiro Treaty, it was feared that fossil fuel-based development by heavily populated developing countries would prevent the stabilization of GHG concentrations—the agreed upon 'ultimate objective' of the UNFCCC—because much of the global emissions budget has already been exhausted by emissions from developed countries. The question of the costs entailed in switching to a sustainable development path, particularly for large but poor countries with very low per capita emissions and little access to finance also became a contentious

[5] The Common African Position is constantly being redefined in Africa, as intra-continental politics often come into play. South Africa's membership of the BRICS and BASIC groupings have historically created tensions among AU member states, who have been uncomfortable with the South African alignment with other 'emerging economies', and its attempts to portray itself as a leader in Africa (Hochstetler 2012).

issue (Climate Nexus 2019). In accordance with this stance, India and all African nations endorsed the Kyoto Protocol (COP3) in 1997 as non-Annex B parties[6]—with no responsibility to mitigate emissions. The Kyoto Protocol recognized the fact that the developed countries are primarily responsible for the current high levels of GHG emissions in the earth's atmosphere and place a heavier burden on developed nations under the principle of CBDR (UNFCCCa, n.d.). At COP7 (2001) at Marrakech (Morocco), India called for the developed world to aid the adaptation needs of developing countries by providing them with finances and easy access to technologies to combat climate change. A few years later, at IAFS-I (2008), in New Delhi, India and Africa endorsed the Bali Action Plan (2007)[7] of the UNFCCC in accordance with CBDR. Both parties agreed that accelerated economic and social development is the best form of adaptation, and that adaptive measures should be financed through additional resources provided by the developed world, and not from development funds (IAFS-I 2008a, b).

The transfer of funds and technical know-how from the Global North to the South conceived at the UNFCCC negotiations was initiated through two multilateral initiatives outlined below:

1. Fast-Start Climate Finance

In December 2009, during the Conference of the Parties (COP15) held in Copenhagen, developed countries collectively pledged to provide new, additional resources and investments worth US$ 30 billion for the period 2010–2012, with balanced allocation for both mitigation and adaptation. This commitment is known as 'fast-start finance' (FSF). At COP16 in 2010 (Cancun, Mexico), the parties reaffirmed their pledge. They added that funding for adaptation would be prioritized for the most vulnerable countries, i.e., Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Africa (UNFCCCb, n.d.). At

[6] Parties of Annex I consist of the industrialized nations which were part of the Organization for Economic Co-operation and Development (OECD) in 1992, as well as the Economies in Transition (EITs), such as the Russian Federation and Baltic States. Annex II parties consist of OECD countries, obliged to provide developing nations with climate finances. Parties listed in Annex B of the Kyoto Protocol are Parties with first or second-round Kyoto greenhouse gas emissions targets. Non-Annex B parties do not have binding targets (UNFCCCa, n.d.).

[7] The Bali Action Plan charted a long-term plan of cooperation to combat climate change until 2012.

IAFS-II (2011), India and Africa agreed that developed countries should operationalize the institutional arrangements included in the Cancun decision in 2010, which included the most comprehensive package ever agreed by governments to help developing nations deal with climate change. A report by the Open Climate Network and its partners in 2013 states that the countries in question reported mobilizing funds worth US$ 35 billion for the Fiscal Stabilization Fund (FSF), thus contributing more than the original commitment of US$ 30 billion (Nakhooda et al. 2013: p. i).

An evaluation of FSF at the end of the commitment period demonstrated some of the weaknesses in the operationality and efficacy of such flows of funding. Germany, Japan, Norway, the UK and the USA were the top five contributors over the commitment period (2010–2012) (Nakhooda et al. 2013: p. ii–iii). Schemes that dealt with adaptation received US$ 5.7 billion, but mitigation (including initiatives to address emissions from forests) received US$ 22.6 billion, more than 70% of the total funding (Nakhooda et al. 2013: p. i). In absolute terms, sub-Saharan Africa received US$ 5.6 billion, while Asia and the Pacific got 13.7 billion (Nakhooda et al. 2013: p. 31). About 45% of FSF has been directed to lower-middle-income countries (LMICs) (such as India, Indonesia and Vietnam). High-income and upper-middle-income countries (HICs and UMICs) (such as Brazil, China and Colombia) received 22% of the total spending analysed. In turn, LMICs (e.g. Chad, Eritrea and Guinea Bissau) received only around 15% of the total (Nakhooda et al. 2013: p. 31). Three of the top ten emitters, namely India, Brazil and Indonesia, received 44% of mitigation finance (Nakhooda et al. 2013: p. 38). Such an allocation clearly does not meet the objective of FSF, as the constituency that most required the funding was underfunded.

2. The Green Climate Fund

The Green Climate Fund (GCF) is a multilateral global climate fund set up in 2010 by the 194 UNFCCC party countries with the aim of reducing GHG emissions and implementing climate change adaptations. It was adopted at COP17 in 2011, in Durban, South Africa. The GCF promotes a new paradigm of low-emission, climate-resilient development, through both adaptation and mitigation. The GCF aims to mobilize US$ 100 billion per year by 2020. This fund will cater to the needs of countries that are especially vulnerable to the effects of climate change, the LDCs, the SIDS and countries in Africa. Public and private sectors of advanced countries have jointly committed to mobilize a bulk of these

financial resources. In 2014, GCF initially gathered pledges worth US$ 10.3 billion, mainly from developed but also from developing countries. The fund's investments are in the form of grants, loans, equity or guarantees (GCF, n.d.). To date, the GFC has committed US$ 5.2 billion to 111 climate action initiatives across the world (GCF 2019c). As of 2019, the GCF had granted India US$ 177.8 million for 3 projects (GCF, n.d.), while US$ 2.2 billion had been awarded across Africa, accounting for 39% of the fund's total commitments (GCF 2019b). In October 2019, 27 countries pledged to replenish the GFC by US$ 9.78 billion equivalent for the next four years (GCF 2019a).

Divergences

India and Africa have also adopted slightly differing positions, based on regional loyalties and memberships of different negotiating blocks. For instance, while the AGN largely supported the agenda of the G-77/China group, sometimes their interests divulged from the group, especially with regard to issues pertaining to the African continent. The CAP emphasized the connection between global warming, drought and desertification, arguing for an international afforestation and reforestation initiative north and south of the Sahara and Kalahari deserts, known as the 'Great Green Wall',[8] which could potentially halt desertification and reduce GHG emissions.[9]

In 1997, the AGN became concerned by the Clean Development Mechanism (CDM) framework which emerged after Kyoto. The Clean Development Mechanism (CDM) allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement emission-reduction projects in developing countries. The AGN argued that the CDM prioritized emerging economies with better-developed markets, such as India and Indonesia. It argued that the CDM was conceived without regard for equitable

[8] The Great Green Wall aims to combat desertification in the Sahara and the Sahel region. It was launched in 2007 by the African Union; a 'Green Wall' of trees are being planted in a stretch of about 8000 kilometres across the width of the Sahara (UNCCD, n.d.).

[9] At IASF-II In 2011, India declared support for Africa's Great Green Wall Project, which is the continent's flagship initiative to combat the effects of climatic change and desertification (IAFS-II 2011a, b).

geographic distribution, which meant that most African economies would not benefit adequately from suggested measures. During COP17 in Durban, a number of industrialized countries resisted a second Kyoto commitment period. Many emerging economies objected to a more comprehensive, binding agreement. The AGN played a mediatory role, due to their collective position as one of the most vulnerable regions and because of South Africa's position as host of COP17. The AGN strongly favoured a second commitment period and a comprehensive legally binding agreement—along with European states, Alliance of Small Island States (AOSIS) and the LDC Group, to which India and China were opposed. This move paved the way for the adoption of the Durban Platform for Enhanced Action (Roger and Belliethathan 2014). The Durban Platform was significant because it included countries such as India and China (which wanted industrialized countries to bear the bigger burden of mitigation); and the USA, which had refused to ratify the Kyoto Protocol. The Durban Platform for Enhanced Action advocated the need to draw up the blueprint for a fresh universal, legal agreement to deal with climate change beyond 2020, and proved to be a stepping stone for the landmark Paris Agreement of 2015 negotiated at COP21 in Paris, which aims to coordinate the global response to climate change by keeping temperature rise in this century to below 2°C above pre-industrial levels.

Another significant divergence between India and Africa's stance is visible in the aftermath of Durban in 2011, where parties agreed for countries to individually determine their contributions to addressing GHG emissions. This new climate agreement is to be 'applicable to all' and approaches differentiation through the implementation of a bottom-up scheme to determine a global effort. In the 2014 negotiations in Lima (Peru), parties agreed on a new phrase, 'Common But Differentiated Responsibilities and Respective Capabilities' (CBDR-RC), in the light of different national circumstances (Climate Nexus 2019). India's stance on climate justice argues that the per capita emissions of emerging economies are overlooked: for instance, India's per capita emissions are barely 1/10th that of the USA.[10] Instead of the top-down legally

[10] The USA is the world's second-biggest emitter of greenhouse gases, with China at the first spot, and is also the largest cumulative GHG emitter in history. In 2015, during his presidential campaign, Donald Trump announced that he would pull the USA out of the Paris Agreement, citing that it was at odds with his 'America First Policy' and

enforced global emission target for developed countries, India enthusiastically supported the position that all countries should be required to put in place a bottom-up Intended Nationally Determined Contributions (INDC) (Gupta and Mandal 2015: p. 6). The INDCs combine the top-down system of a United Nations climate agreement with bottom-up system-in elements through which countries put forward their agreements in the context of their own national circumstances, capabilities and priorities, within the ambition to reduce global GHG emissions enough to keep global temperature rise to 2°C. The INDCs contain steps taken towards emission reductions and also aim to address steps taken to adapt to climate change impacts, and what support the country needs, or will provide, to address climate change (World Resource Institute, n.d.).

India submitted its INDC to the UNFCCC in October 2015, committing to cut the emissions intensity of GDP by 33–35% by 2030 from the 2005 levels. On submission, India wrote that it needs 'at least US$ 2.5 trillion' to achieve its 2015–2030 goals, and that its 'international climate finance needs' will be the difference over 'what can be made available from domestic sources' (UNFCCCb, n.d.). In 2015, Prime Minister Modi welcomed the fact that 159 countries have submitted INDCs to the Paris Agreement, covering over 88% of global emissions. India supported global stock takes, covering both action and support, periodically in order to achieve the objectives of the Convention (MEA 2015).

African institutions have been sceptical of actionability based on INDC targets. They have argued that INDCs are notoriously difficult to define as well as meet, because of the variables involved in determining them. All African INDCs have incorporated two targets: an unconditional target that will be met by African countries with their own resources (about 15%), and a conditional target, subject to financial support from the international community (about 85%). In mapping current commitments, there is no distinction between these targets, which makes it difficult to mobilize resources to achieve both targets, and the global goal. This could put African nations at a disadvantage in future, in the proposed

was detrimental to businesses and the economy. The formal withdrawal notice was meant to be served three years after the adoption of the Agreement in any country, which was November 2016 in the USA. The Trump administration officially announced their intention to withdraw in November 2019, a process which would take a year to complete. With the USA outside the Paris Agreement, the pact will now cover only about 80% of GHG emissions, down from 97% previously (Johnson 2019).

'carbon market',[11] which would enable countries to trade carbon emissions to enable them to meet their INDCs (Outlined in Article 6 of the Paris Agreement, the workability of a future carbon market is a key stumbling block at COP25 [2019] in Madrid). Although the Paris Agreement has established a global goal on adaptation with a view to contribute towards sustainable development, current efforts at implementing INDCs, including those in Africa, have not been able to attach importance to adaptation and resilience building, which also puts Africa at a disadvantage (AfDB, n.d.).

Indian Initiatives for Combatting Climate Change

Since 2015, India has sought to fashion itself as a leading voice of the Global South in climate change negotiations. Commensurate with its stance on 'climate justice', India declared at COP25, that it would not submit new reduction targets for GHG emissions until the pre-2020 pledges of industrialized nations (which emerged out of the Kyoto Protocol and COP16, Cancun) had been met (Goswami 2019). India also criticized developed countries for not honouring their 2015 pledge which committed US$ 100 billion to developing countries for mitigation and adaptation under the GCF. As of 2017, the OECD has made only US$ 54.5 billion available (Khadka 2019). India has attempted to turn the lack of commitment from industrialized nations into an opportunity to extend its own influence in the Global South, by offering technical, capacity-building, and monetary schemes linked to climate-smart infrastructure. Three ambitious initiatives have been launched by India, and are supported by African nations.

1. International Solar Alliance

At COP21 (2015) in Paris, the Indian Prime Minister Narendra Modi along with the then French President François Hollande announced the International Solar Alliance (ISA), an initiative to develop infrastructure and technical capacity for harnessing solar energy between the Tropics

[11] Under Article 6 of the Paris Agreement, countries with low emissions would be allowed to sell their exceeding allowance to larger emitters, with an overall cap of GHG emissions, ensuring their net reduction. Supply and demand for emissions allowances would lead to the establishment of a global carbon price that would link the negative externalities of GHG emissions to polluters. In other words, by paying a price on carbon, states exceeding their NDCs would bear the costs of global warming (ICC, n.d.).

of Cancer and Capricorn. The ISA is envisioned as a platform for cooperation on solar energy, promoting new technologies and financing. It targets sun-rich countries between the Tropic of Cancer and the Tropic of Capricorn, but has a global reach as it engages international organizations, companies and other stakeholders to facilitate the transformation to sustainable energy. Initially drafted as part of India's National Action Plan on climate change, the alliance also aims to respond to the Indian energy challenge by creating economies of scale and mobilizing investments (Hakala 2019: p. 4). As of October 2019, 79 countries have signed the ISA and 57 have ratified it (ISA, n.d.). Half the member states of the ISA are from Africa (Kaul 2019).

That the ISA is headquartered in New Delhi is of enormous geopolitical significance. The ISA has increased Indian involvement in renewable energy projects in Africa, where solar energy has vast growth potential, given the availability of sunshine. India recognizes that African countries are in a unique position to 'leapfrog' ahead of industrialized nations because of a lack of polluting and inefficient infrastructure. They are less handicapped by having to upgrade or repurpose existing buildings, such as factories and power plants, and can build greener infrastructure from scratch (Deutsche Welle, n.d.).

India has earmarked a credit line of up to US$ 2 billion with 15–20% of the amount to be earmarked for 19 solar-related projects in Africa (Hakala 2019: p. 5; EXIM Bank, n.d.). The ISA has also partnered with the African Development Bank to develop 10,000 MW of solar power systems across the Sahel, which aims to provide electricity to approximately half of the 600 million Africans who remain off-grid (Kaul 2019: p. 3).

Prime Minister Modi, in his address to the first Assembly of the ISA in October 2018, described this development as 'One World, One Sun and One Grid'. In the same summit, Modi declared that this is going to be the 'alternative OPEC' (Mohapatra 2019). This statement indicates that India envisions this move as one which could potentially reverse the advantage of energy-exporting countries and achieve global energy equity: countries dependent on energy-exporting nations could potentially have access to an alternative, cleaner and cheaper option. At Madrid in 2019, India has called for the speedier expansion of the ISA (ISA, n.d.).

2. Coalition for Disaster Resilient Infrastructure (CDRI)

The CDRI was launched by Prime Minister Modi in September 2015, at the UN's Climate Action Summit in New York. It is supported by the United Nations Office for Disaster Risk Reduction (UNDRR), to facilitate knowledge exchange, technical support and capacity building to develop resilient infrastructure and fortify existing infrastructure for resilience. The CDRI will work in areas of governance and policy, emerging technology, risk identification and estimation, recovery and reconstruction, resilience standards and certification, finance and capacity development, taking important steps towards climate adaptation. There are twelve founding members and Rwanda is the sole African nation (Paul 2019).

3. Leadership Group for Industry Transition

India and Sweden have jointly launched the Leadership Group for Industry Transition. This is a multinational effort, which involves the private sector (Dalmia Cement, DSM, Mahindra Group), and research organizations (World Economic Forum and Stockholm Environment Institute) (PIB 2019). It aims to promote transition from hard-to-decarbonize and energy-intensive sectors, to ensure heavy industries and mobility companies can find a workable pathway to deliver on the Paris Agreement (Energy World 2019).

Africa-Specific Initiatives Undertaken by India

In 2018, Prime Minister Modi announced India's 10 Guiding Principles for engagement with Africa at the Ugandan parliament (MEA 2018: p. 20). Point six of this ten-point plan states that India's partnership will address the challenges of climate change and work with Africa to ensure a just international climate order; to preserve biodiversity; and adopt clean and efficient energy sources. India has recently undertaken a series of initiatives at a continent-wide level and aimed at specific countries of Africa, which are yet to be evaluated. Some of these are:

– Under IAFS-II, with funding from the government, India has set up the 'India-Africa Women Solar Engineer Vocational Training Centres' through the Barefoot College, Tilonia, Rajasthan, in Senegal, Tanzania, Burkina Faso, Liberia and South Sudan (IAFS-II 2011a, b). The rural women are trained to become solar engineers.

Further, India facilitates solar electrification projects in 22 African countries; to solar electrify houses for domestic lighting in African villages. These measures are a part of India's initiatives concerned with decarbonization and promoting sustainable, renewable forms of energy at home and overseas (IAFS-II 2011a, b).

- India has extended LOCs worth US$ 1 billion to ensure the implementation of 23 solar energy projects across 13 African countries. These LOCs are as per the MEA's decision to earmark 15–20% out of the total US$ 10 billion LOC, extended under IAFS-III, for undertaking solar energy projects in Africa. This focus on investing in renewable energy and sustainable development projects is a shift from its earlier focus on traditional areas of cooperation between India and Africa such as information technology (IT), science and technology, agriculture, and pharmaceuticals (IAFS-III 2015a, b; Misra 2018).
- India has set up solar multi-utility (SMU) Centres in Kenya, Ethiopia and Malawi. The Energy and Resources Institute (TERI), India, is implementing the project (Saran and Chakrabarty 2015).
- India has supplied and installed solar home systems in Seychelles under a US$ 25 million grant by the Ministry of External Affairs (MEA 2017b).
- India and Africa also work together through the India-Brazil-South Africa (IBSA) Trust Fund. In 2009, US$ 830,000 was earmarked for renewable energy and capacity building in the agricultural sector in Guinea Bissau, an LDC country. A team from India visited Guinea Bissau to assist in a solar power project (MEA 2017a). Through IBSA's Support, low-lying coastal lands for rice cultivation were rehabilitated and better varieties of rice seeds were distributed to increase agricultural productivity. The anti-erosion measures introduced in this project are an effort at climate change-mitigation as they reduce continuous deforestation resulting from shifting cultivation (Tofalo 2017: p. 44).
- India has placed special emphasis on climate change technology transfer in its climate pledge and has an annual Research and Development (R&D) budget of US$ 15 billion. In Africa, the African Climate Technology Centre, co-created by the AfDB, is spearheading climate change research projects across the continent. Both regions have also entered into technology cooperation partnerships through technical assistance to African institutions engaged

in research and development by sharing technological know-how. Additionally, India has signed agreements with South Africa, Tunisia, Egypt and Mauritius, and funded 74 joint projects which address common development goals including renewable energy and agriculture (Kaul 2019: p. 5).

- Under the framework of the ISA, in 2019, teams of Indian experts had conducted feasibility studies and held multistakeholder meetings in Guinea, Mali, Uganda, DR Congo, Niger and Malawi. The aim of these field visits was to raise awareness of the ISA's member-driven programmes, which involve:

  i. Scaling solar applications for agriculture use,
  ii. Affordable finance,
  iii. Scaling solar rooftop panels,
  iv. Scaling solar mini-grids, and
  v. Solar e-mobility and storage.

  These teams also accessed how the finance and energy ecosystems of these nations could be deployed to transition to solar energy through the vision of the ISA (ISA, n.d.).
- Sharing of research by ICRISAT on the six mandated crops that require less rainfall; move to crops with less carbon footprints and use indigenous knowledge systems (IKS) for water harvesting (see Chakravarty et al., Chapter 4, this volume).
- EXIM Bank's operative Lines of Credit (LOCs), as of 18th September 2019, included several solar energy and infrastructure building projects in Africa amounting to US$ 260.65 million (Table 3.1).

Conclusion: Beyond COP25

India's efforts at introducing climate-smart initiatives and regulatory frameworks were recognized at COP25 (2019) in Madrid. The Climate Change Performance Index (CCPI), published by New Climate Institute, Germanwatch and Climate Action Network, analyzed the progress towards the 2°C goal in 57 countries and the EU, based on: GHG emissions; share of energy generated by renewables; energy consumption per capita, and current climate policy. The CCPI ranked India as among the top 10 performers for the first time. India was the only major economy

Table 3.1 EXIM Bank of India's Lines of Credit for clean energy

Sr. No.	*Region*	*Country*	*Amount of credit (US$ million)*	*Projects covered*	*Project value (US$ million)*	*Available for procurement*
1	Africa	Democratic Republic of Congo	33.29	15 MW solar photovoltaic power project in Karawa province	33.29	Yes
2	Africa	Democratic Republic of Congo	25.27	10 MW solar photovoltaic power project at Lusambo province	25.27	Yes
3	Africa	Democratic Republic of Congo	24.55	10 MW solar photovoltaic power project in Mbandaka, Province—Equator	24.55	Yes
4	Africa	Mauritius	500.00	Construction of 8 MW solar power plant at Henrietta	10.00	No
5	Africa	Mozambique	13.00	Solar photovoltaic module manufacturing plant	13.00	No
6	Africa	Niger	34.54	Solar electrification of 30 villages	34.54	No
7	Africa	Nigeria	100.00	(i) Supply and commissioning of transmission lines; (ii) 132/33 kV substation, solar mini-grid electrification and solar street lighting in the state of Kaduna; and (iii) Construction of gas-based power plant in the Cross River State	100.00	Yes
8	Africa	Regional Development Bank (Multiple countries)	100.00	Solar street lighting project in Sierra Leone	20.00	

(continued)

Table 3.1 (continued)

Sr. No.	*Region*	*Country*	*Amount of credit (US$ million)*	*Projects covered*	*Project value (US$ million)*	*Available for procurement*
Total					260.65	

Source EXIM Bank, n.d.

to feature on the list. China climbed the rankings compared to last year, but is still in the bottom half of the table, and ranked at the 30th spot (Deutsche Welle, n.d.).

At COP25, the positions of both India and the AGN were coordinated in their calls for greater adaptation of finances from the industrialized world. India also stated that 'not even 2 per cent' of the promised 'US$ 1 trillion in the last 10 years' had been delivered to developing countries to address climate change (Subramanian 2019). A UN study has estimated that sub-Saharan Africa alone would need climate adaptation finance of around US$ 50 billion annually by 2050. An analysis by the OECD in 2017 found that of the total climate finance mobilized by rich countries, less than 20% went towards adaptation projects in Africa. Both India and the AGN also called for the Warsaw International Mechanism, a special forum established in 2013 to deal with the 'loss and damage', to be properly funded within the UN set up. They envision the mechanism as a form of insurance which could potentially compensate developing countries for climate-related losses which occur in spite of the adoption of mitigation and adaptation strategies (Khadka 2019; Subramanian 2019). The AGN also stressed that several African countries are now at high risk of debt distress following financial losses to property, livelihoods and industry from climate disasters (Future Climate 2019).

But Indian and African positions diverged with reference to the question of emission pledges. African negotiators at COP25 have been demanding that major carbon emitters (such as the USA, EU, China and India) make significant cuts in their emissions to prevent dangerous warming (Future Climate 2019). But in keeping with its 'climate justice' stance, India called upon industrialized countries to first fulfil their pre-2020 commitments agreed at Copenhagen, Cancun and Kyoto to reduce GHG emissions (Goswami 2019), before it could raise its ambitions

for the next round of Paris Agreement targets. India also objected to developed countries' demands to set new targets in 2020 after the Paris Agreement comes into force, arguing that this would favour industrialized countries, and place an additional burden on developing countries to abruptly cut their emissions. In order to pressurize industrialized countries into action, India has not declared its own emission targets, a requirement before the Paris Agreement comes into force next year. Article 6 of the Paris Agreement proposes to introduce a system of carbon trading, by which large emitters will be able to trade carbon credits with nations with lesser emissions, a mechanism aimed at keeping global emissions in check. India will potentially be able to trade carbon credits with African nations with smaller carbon footprints. How this position will affect the India-Africa climate compact and relations in a future carbon market remains to be seen.

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PART II

Sharing Knowledge

CHAPTER 4

Benefitting Smallholder Farmers in Africa: Role of ICRISAT

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Abstract Smallholder farmers across the drylands of Africa and Asia face similar challenges—low agricultural productivity, lack of profitable alternative livelihoods, lack of access to technology, capital, and markets, low resilience to face climate change and other issues. The challenge before African countries is to transform agriculture from the predominantly subsistence orientated smallholder systems to more sustainable, efficient and market-orientated ones which create jobs for the youth on a rapidly

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growing continent. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) provides a global platform for regular knowledge exchange between agricultural research and development professionals from Africa and India. We share some of our experiences over four decades of work in Africa and India mainly through:

i. Exchange of germplasm and breeding material to develop new varieties suitable to the agro-ecologies of African countries and
ii. Supporting market-orientation through entrepreneurship and innovations in the agribusiness sector in Africa.

ICRISAT uses crop improvement as a core approach to providing crop varieties that are adapted to the ecologies of sub-Saharan Africa. These include varieties that are resistant to a wide range of biotic and abiotic stresses and acceptable by farmers and markets. These successful crop improvement programmes have been underpinned by the genetic resources available in the ICRISAT gene banks in India and Africa, resulting in the development and release of over 452 varieties and hybrids of cereals and legumes in 34 African countries. Agri-based entrepreneurship promotion is another key approach towards improving the economic prosperity of smallholder farmers in the region and harnessing Africa's youth bulge. Through its Agribusiness and Innovation Platform (AIP), ICRISAT has developed and implemented novel agribusiness entrepreneurship promotion models in twelve African countries in partnership with a diverse set of stakeholders from the agricultural and rural development ecosystem. Other areas of intervention which are not discussed in this paper include the natural resource management programmes that have created knowledge, technologies and practices that enable resilience in the farming system. In addition, the socio-economic programmes are key to understanding the potential for adoption of technologies including new varieties.

Background

International Crops Research Institute for the Semi-Arid Tropics' (ICRISAT's) work in Africa started in the 1970s with the establishment of crop improvement programmes. A cooperative programme of research and training for the improvement of sorghum and millet in the

Sahelian-Sudanian zone of West Africa was initiated in January 1975, with the support of the United Nations Development Programme (UNDP). Around the same time, Tanzania and Kenya in East Africa expressed an interest in ICRISAT's sorghum and millet improvement programmes. In 1981, ICRISAT signed an agreement with the Government of Niger to set up the ICRISAT Sahelian Center (ISC) on a 500-hectare site at Sadore, near the capital city of Niamey. The Agribusiness and Innovation Platform (AIP) of ICRISAT started the development of linkages with African partners in 2010 that resulted in a partnership with Forum for Agricultural Research in Africa (FARA) for the development and implementation of the Universities' Business and Research in Agricultural Innovation (UniBRAIN) project in partnership with other sub-regional organizations of Africa. This was also followed up with ICRISAT's engagement with the Government of India (GoI) in 2013 under the India-Africa Forum Summit II (IAFS-II) and later in 2015 with the IAFS-III towards enhancing South-South cooperation (SSC). Thus, ICRISAT's support of African agricultural development goes back more than four decades.

Development of Crop Varieties for Africa

ICRISAT has a global mandate for the improvement of dry land crops, namely—chickpea, pigeonpea, groundnut, sorghum, pearl millet and finger millet. These crops are grown predominantly under rain-fed conditions by resource-poor farmers of the dry land areas. During 2014, the global area of chickpea, pigeonpea, groundnut, sorghum and millet was 124 million ha, of which 90% was in Africa and Asia (see Table 4.1).

Overall, Africa accounts for 51.49% of the area and 34.91% of the production of these crops, while Asia accounts for 39.97% of the area and 44.62% of the production. Chickpea and pigeonpea are largely grown in Asia (88.6% of the area), while Africa has a larger share in the area of sorghum (65.3%), millet (62.8%) and groundnut (54.3%) (FAOSTAT 2017). The average yield of sorghum, millet and groundnut is very low in Africa as compared to the average yield in Asia and the world. The major factors contributing to poor yield are low adoption of improved cultivars[1] and lack of production technologies. The crop

[1] A plant variety that has been produced in cultivation by selective breeding.

Table 4.1 Area, production and yield of ICRISAT mandate crops in Africa, Asia and the world

Region	*Parameters*	*Chickpea*	*Pigeonpea*	*Groundnut*	*Sorghum*	*Millet*	*Total*
World	Area (million ha)	14.56	7.02	27.94	40.67	31.24	121.43
	Production (million tonnes)	14.78	6.81	47.10	57.60	28.46	154.75
	Yield (kg/ha)	1014	969	1686	1416	911	
Africa	Area (million ha)	0.45	0.79	14.65	27.1	19.53	62.52
	Percentage of global area	3.09	11.25	52.43	66.63	62.52	51.49
	Production (million tonnes)	0.67	0.97	12.30	27.22	12.87	54.03
	Percentage of global production	4.53	14.24	26.11	47.26	45.22	34.91
	Yield (kg/ha)	1482	1221	834	1004	659	
Asia	Area (million ha)	11.97	6.06	11.83	7.51	11.17	48.54
	Percentage of global area	82.21	86.32	42.34	18.47	35.76	39.97
	Production (million tonnes)	10.87	5.69	29.45	8.34	14.70	69.05
	Percentage of global production	73.55	83.55	62.53	14.48	51.65	44.62
	Yield (kg/ha)	906	938	2490	1114	1316	
Africa + Asia	Area (million ha)	12.42	6.85	26.48	34.61	30.70	111.06

(continued)

Table 4.1 (continued)

Region	*Parameters*	*Chickpea*	*Pigeonpea*	*Groundnut*	*Sorghum*	*Millet*	*Total*
	Percentage of global area	85.30	97.58	94.77	85.10	98.27	91.46
	Production (million tonnes)	11.54	6.66	41.75	35.56	27.57	123.08
	Percentage of global production	78.08	97.80	88.64	61.74	96.87	79.53

Source FAOSTAT (2017)

breeding programmes of ICRISAT have been building African capacity in crop improvement through germplasm exchange with the National Agricultural Research System (NARS). It has built capacity in those systems and in regions where such capacity was non-existent and established breeding programmes.

ICRISAT's Genebanks—with one global Genebank located at Patancheru in Telangana, India and three regional Genebanks located in Nairobi (Kenya), Bulawayo (Zimbabwe) and Niamey (Niger)—serve as a repository for the germplasm of ICRISAT's six mandated crops. They function under the International Framework for Conservation of Plant Genetic Resources. Over 120,000 accessions of these crops from 144 countries have been assembled through donations by various Genebanks, national programmes and joint explorations (see Table 4.2).

These genetic resources have contributed significantly in strengthening breeding programmes in Asia and Africa and of the National Agricultural Research Systems (NARS) globally. Close to 1.2 million samples of these crops have been distributed so far (ICRISAT 2019). The breeding programmes are making extensive use of the germplasm in developing diverse breeding materials. For example, the chickpea breeding programme at ICRISAT-India has made over 40,000 crosses utilizing about 10% of the germplasm accessions (>2000 accessions), available in the ICRISAT Genebank (Gaur et al. 2018; ICRISAT 2019).

The genomics research programme at ICRISAT aims at developing genetic and genomic resources and tools for crop breeding. This encompasses structural, comparative, translational and functional genomics

Table 4.2 Germplasm chickpea, pigeonpea, groundnut, sorghum and millets conserved in ICRISAT Genebanks

Crop	*Number of germplasm accessions available*			
	Global Genebank	*Regional Genebanks*		
	Hyderabad, India	*Niamey, Niger*	*Nairobi, Kenya*	*Bulawayo, Zimbabwe*
Chickpea	20,602		289	
Pigeonpea	13,771	205	319	
Groundnut	15,446	7004	749	
Sorghum	39,553	2249	3202	3070
Pearl millet	23,092	3795	2518	5611
Finger millet	7179		2433	2577
Foxtail millet	1542			
Proso millet	849			
Little millet	473			
Kodo millet	665			
Barnyard millet	749			
Total	123,921	13,253	9510	11,258

Source ICRISAT (2019)

approaches for mapping, analyses, dissection and characterization of target traits. This leads to marker/allele[2] discovery and validation for deployment in crop breeding to accelerate the rate of genetic gains in ICRISAT's mandate crops. Reference genome sequences of all the ICRISAT mandate crops have become available in recent years, as ICRISAT is a leader and participant of a global sequencing consortium. The re-sequencing of diverse germplasm sets of these crops is underway. Genomic regions/Quantitative Trait Loci (QTLs)/Marker-Trait Associations (MTAs) have been identified and characterized for agronomic, quality, nutrition, biotic/abiotic stress tolerance and other important demand-driven traits. Molecular markers have been identified and developed for several important traits in these crops. Some of these have been validated and are being used in breeding programmes.

The crop improvement activities are conducted at ICRISAT's locations in India and Africa, jointly with many national programme scientists

[2] An allele is a variant form of a gene.

globally, wherever the mandate crops are cultivated. In African regions, development of varieties in all five crops continues to be the primary objective, while in Asia (specifically for India), the present emphasis is towards the development of varieties in chickpea, groundnut and finger millet; hybrids in pearl millet; and both hybrids and varieties in pigeonpea and sorghum. In order to achieve this, ICRISAT develops segregating materials, populations, advanced breeding lines and hybrid parents and supplies these to scientists in NARS. They also supply this to the private sector for evaluation and selection at their locations as well as utilization in their breeding programmes. The breeding materials are developed while considering the traits preferred by farmers, industries and consumers and the traits required for the adaptation of the crop in different geographies and cropping systems.

The crop breeding priorities and strategies at ICRISAT have been dynamic. They are guided by the changing scenario of agriculture and development of new technologies and are reviewed and revised periodically based on the feedback from NARS scientists, extension personnel, farmers, consumers and industry. The major crop breeding objectives for Africa are as follows:

1. Improved yield potential: High grain yield in all crops and also high fodder yield in sorghum, pearl millet and pigeonpea.
2. Resistance/tolerance to abiotic and biotic stresses: The major objective is yield stability through genetic enhancement of resistance/tolerance to abiotic stresses,[3] diseases,[4] insect-pests[5] and parasitic weeds.[6]
3. Adaptation traits: Early maturity in chickpea, pigeonpea and groundnut.
4. Labour saving traits: Suitability to machine harvesting in chickpea and finger millet; herbicide tolerance in chickpea and pigeonpea.

[3] Drought in chickpea, groundnut, sorghum, pearl millet and finger millet; heat in chickpea; salinity and acidity in sorghum.

[4] Fusarium wilt and Ascochyta blight in chickpea; wilt and sterility mosaic in pigeonpea; rosette and stem rot in groundnut; grain mould, anthracnose and charcoal rot in sorghum; downy mildew and blast in pearl millet; and blast in finger millet.

[5] Helicoverpa pod borer in chickpea; Helicoverpa and Maruca pod borers in pigeonpea; shoot fly, stem borer, midge and head bug in sorghum.

[6] Striga in sorghum and finger millet.

5. Improved grain and fodder quality: Market-preferred physical quality of grains (size, shape and colour) in all crops; cooking time in chickpea and pigeonpea; nutritional quality of grain (high and low oil and high oleic in groundnut; high iron and zinc in sorghum, pearl millet and finger millet), and fodder quality (in sorghum, pearl millet and pigeonpea) (Gaur et al. 2012).
6. Based on performance in local, regional or national trials, varieties/hybrids are released or notified by the various national/private programmes according to their own protocols and procedures. A total of 1030 varieties and hybrids have been released in 81 countries from the breeding materials and germplasm supplied by ICRISAT. Out of these, 469 varieties have been released in 36 African countries (see Table 4.3).

All breeding materials developed by ICRISAT remain as International Public Goods (IPGs). Crop breeding programmes also work with the NARS partners on developing effective seed systems and enhancing adoption of improved cultivars/hybrids along with integrated crop management practices. Knowledge sharing with partners is an integrated part of all research areas (ICRISAT 2019).

The crop breeding programmes of ICRISAT provide an excellent example of South-South cooperation among developing countries in the transfer and utilization of germplasm and breeding materials. Several varieties have been released in Africa from the breeding materials developed in Asia at ICRISAT-India (Shiferaw et al. 2004). Some examples are given below:

Chickpea

The breeding materials developed at ICRISAT-India and from the ICRISAT-International Center for Agricultural Research in the Dry Areas (ICARDA) Collaborative Chickpea Improvement Program at Aleppo, Syria have led to the release of 51 chickpea varieties in Africa. Adoption of improved varieties and production technologies has shown high impacts on chickpea productivity in Ethiopia and Tanzania. During the past 10 years (2005–2014), these countries obtained an annual growth rate of 6.4% for chickpea yield (Gaur et al. 2018).

Table 4.3 Number of varieties released from ICRISAT-bred materials in Africa

Sr.No.	*Country*	*Chickpea*	*Pigeonpea*	*Groundnut*	*Sorghum*	*Pearl Millet*	*Finger Millet*	*Total*
1	Algeria	4						4
2	Benin			1	1	2		4
3	Botswana			1	4	2		7
4	Burkina Faso			1	7	5		13
5	Burundi				2			2
6	Cameroon				1	2		3
7	Chad				1	3		4
8	Congo			2				2
9	Cote'd Ivoire				2			2
10	Eritrea				7	4		11
11	Ethiopia	22		5	14		6	47
12	Ghana			7	2			9
13	Guinea-Conakry			2				2
14	Kenya	10	6		21	1	4	42
15	Malawi		7	12	2	2		23
16	Mali			10	54	7		71
17	Mauritania					3		3
18	Mauritius			5				5
19	Morocco	3						3
20	Mozambique		5	9	3	3		20
21	Namibia				1	4		5
22	Niger			8	2	14		24
23	Nigeria			3	10	6		19
24	Rwanda				5			5
25	Senegal			1	1	9		11
26	Sierra Leone			3				3
27	Somalia				3			3
28	South Africa			4				4
29	South Sudan				2			2
30	Sudan	8	1		10	2		21
31	Swaziland			1	3			4
32	Tanzania	4	7	8	6	2	2	29
33	Togo				3			3
34	Uganda		2	6	5			13
35	Zambia		3	13	9	4	2	31
36	Zimbabwe			3	8	4		15
	Total	51	31	105	189	79	14	469

Source ICRISAT (2019)

Pigeonpea

A short-duration pigeonpea variety ICPL 87091, developed in India to meet vegetable pigeonpea needs, has been adopted in Kenya, Malawi, Mozambique, Tanzania and Uganda (Saxena et al. 2010).

Groundnut

Six groundnut varieties from India have been released in Eastern and Southern Africa (ESA) and eight in West and Central Africa (WCA). The variety CG 7 (ICGMS 42) bred at ICRISAT-India was released in Malawi, Zambia and Uganda to improve productivity. Variety ICGV 87157 was introduced from India to ICRISAT-Mali in 1981 and released to farmers in Mali in 2001 in order to improve yield and develop resistance to diseases and pests. This variety was popular among farmers in Kolakani region of Mali because of its high pod yield, resistance to foliar diseases, large seed size and preferred taste by farmers (Shiferaw et al. 2004).

Sorghum

Sorghum varieties and 13 germplasm accessions from ICRISAT-India have been released in African countries. A survey conducted on cross-regional spillovers of sorghum varieties indicated the large-scale adoption of three varieties, S 35, ICSV 111 and SV 2, from Asia to African countries. The variety S-35 was adopted in Cameroon and Chad, the variety ICSV 111 was adopted in Nigeria and Ghana, and the variety SV 2 was adopted in Zimbabwe (Shiferaw et al. 2004)

Pearl Millet

In addition to Indian germplasm, ICRISAT-India's breeding programme has used pearl millet germplasm accessions from several African countries such as Togo, Nigeria and Uganda. Indian landraces[7] and breeding lines generally provide excellent sources of desirable traits like resistance

[7] A landrace is a domesticated, locally adapted, traditional variety of a species of animal or plant that has developed over time, through adaptation to its natural and cultural environment of agriculture and pastoralism, and due to isolation from other populations of the species.

to diseases such as downy mildew and smut, large panicle size and bold grains. West African germplasm improved at Patancheru in Telangana, in India has adapted well to the Eastern and Southern African region (ESA). Six varieties bred in India have been released in ESA and one in WCA. The major impact of these varieties is visible in Namibia from Okashana 1, primarily constituted from germplasm accessions from Togo. An impact study showed that in 1996–1997, about half of the total pearl millet area in Namibia was under Okashana 1 (Shiferaw et al. 2004).

Promoting Agri-Entrepreneurship in Africa

Agribusiness in Africa can become an engine of socio-economic transformation. Given that Africa will have the youngest population in the world and that the agricultural sector employs more than 65% of the continent's population, rapid urbanization and income growth can lead to diversity in food systems, increasing penetration of Information & Communication Technology (ICT) based tools, and heightened interest in the private sector to invest in the economic development of Africa (WEF 2017).

ICRISAT's efforts to promote entrepreneurship are meant to complement its work in Africa for agricultural development through crop improvement and natural resource management. To that end, AIP-ICRISAT programmes have partnered with local research institutions, universities and business entities in creating sustainable agribusiness incubation models that could tap the potential of African youth, market opportunities, and output of research and development projects initiated by ICRISAT (see Fig. 4.1).

The UniBRAIN Project

The UniBRAIN project used a unique business incubation model that enabled universities, businesses and agricultural research institutions to come together under a tripartite arrangement to commercialize agricultural technologies and support agribusiness enterprises through public-private partnerships (PPPs). The project was implemented by the Forum for Agricultural Research in Africa (FARA) and supported by the Royal Danish Ministry of Foreign Affairs (DANIDA). The three objectives of the project were: to support and commercialize agribusiness innovations;

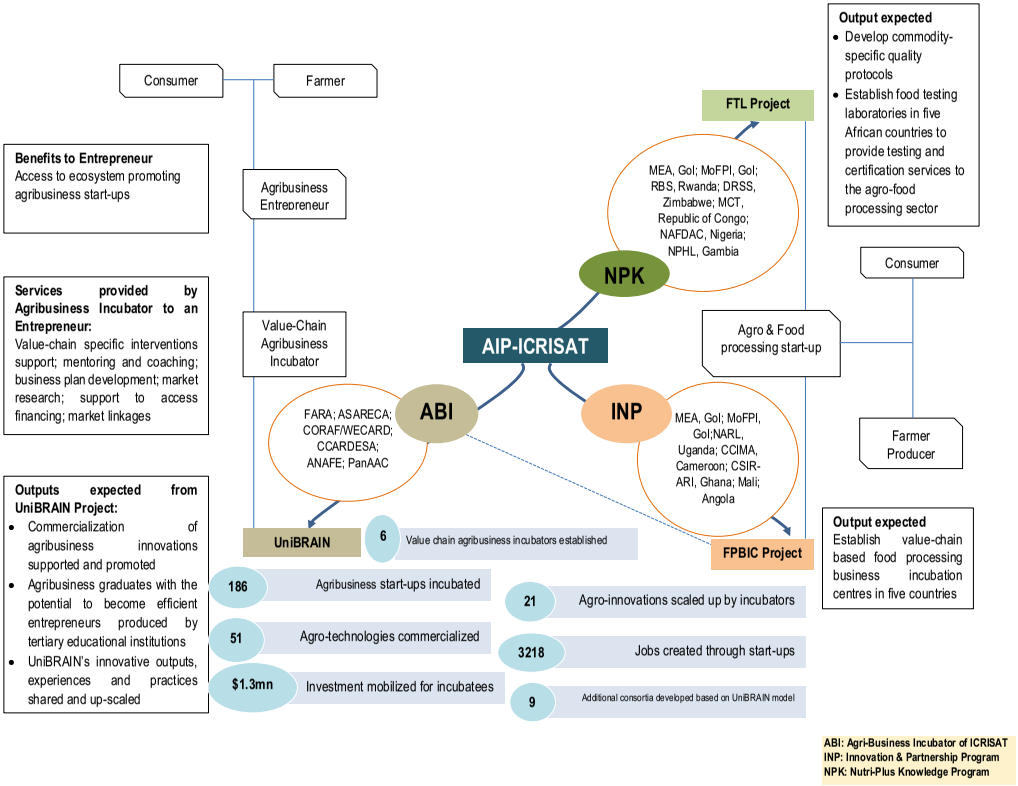

Fig. 4.1 Connecting the dots: ICRISAT's PPP initiatives promoting agri-entrepreneurship in Africa (NPK: Nutri-Plus Knowledge Program; ABI: Agri-Business Incubator of ICRISAT; INP: Innovation and Partnership Program) (*Source* Author's creation)

to enhance entrepreneurial skills and employability of university graduates; and to scale-up the project outputs, experiences and best practices (UniBRAIN Facility 2016).

The UniBRAIN project was implemented in two phases: the inception phase of 2010-12 and the implementation phase of 2012–2016. In the inception phase, the UniBRAIN facility focused on setting up six Agribusiness Innovation and Incubation Consortia (AIICs), each consisting of a business partner, a research institution and a university in five African countries (see Table 4.4). The uniqueness of the model was its multi-stakeholder composition and the fully developed value chain.

During the same period, the UniBRAIN Facility also brought together seven core institutions to act as facilitators to the AIICs and as project

Table 4.4 Agribusiness Innovation and Incubation Consortia under UniBRAIN project

Sr. No.	*Name of the incubator*	*Focus crop value chain*	*Host Institute*	*Location*
1	Sorghum Value Chain Development Consortium (SVCDC)	Sorghum	Jomo Kenyatta University of Agriculture and Technology	Nairobi, Kenya
2	Consortium for Enhancing University Responsiveness to Agribusiness Development (CURAD)	Coffee	Makerere University College of Agricultural and Environmental Sciences	Kampala, Uganda
3	Afri-Banana Products Ltd (ABP Ltd)	Banana	Kyambago University	Kampala, Uganda
4	Creating Competitive Livestock for Entrepreneurs in Agribusiness Consortium (CCLEAr)	Livestock	Council for Scientific and Industrial Research-Animal Research Institute (CSIR-ARI)	Accra, Ghana
5	West African Agribusiness Resource Incubator (WAARI)	Forestry	Agro-Industry Development SA (AID-SA)	Sélingué, Mali
6	Agribusiness Business Incubation Trust (AgBIT)	Horticultural crops	Frontier Development Associates	Lusaka, Zambia

Source UniBRAIN Facility (2016)

partners to help UniBRAIN achieve its stated objectives. The Agri-Business Incubator of ICRISAT (ABI-ICRISAT) was entrusted with the task of handholding and mentoring of the AIICs and its incubated agribusiness ventures and start-ups. The role of ICRISAT was cited as very important in the post-project evaluation process (Hjortso et al. 2017). ICRISAT contributed through:

- Training and sensitization workshops for Board members and the management team of AIICs and its partners,
- Working with FARA to develop its ecosystem of mentors, investors and technology providers,
- Developing value-chain specific AIIC business plans, incubate and incubator operations manual,
- Developing customized AIIC specific operation and service models for revenue generation,
- Mentoring AIIC team and incubatees on different business aspects and review of targets on a monthly, quarterly and annual basis along with UniBRAIN Facility,
- Facilitating transfer of agro-technologies from Indian NARS,
- Implementing recognition models for best performing incubator and incubatees at the annual agribusiness conference,
- Providing exposure for UniBRAIN and AIICs through various publications,
- Business development and network facilitation for AIICs and its incubatees,
- Joint project development and scaling-up activities with FARA, and
- Facilitating creation of the African Agribusiness Incubator Network (AAIN).

The UniBRAIN project was able to achieve considerable success during its four-year implementation phase (2012–2016). The project successfully achieved its targets with regard to number of start-ups to be incubated (186 against 120), technologies to be commercialized (51), number of jobs created (3218 against 3000). Together with AIICs, it was able to connect the start-ups farm families as suppliers and mobilized an additional funding of US$ 1.3 million to incubatees. A major outcome was the large number of entrepreneurs who got trained with the AIICs and the internship programmes (see Box 4.1) (Table 4.5).

Table 4.5 Agribusiness Innovation Incubator Consortia (AIIC) performance during implementation period

Key Metrics	*ABP*	*AgBIT*	*CURAD*	*CCLEAr*	*SVCDC*	*WAARI*	*Total*
Agribusiness start-ups incubated	32	38	52	23	10	31	186
Agro-technologies commercialized	12	6	14	4	8	7	51
Agro-innovations supported	7	3	8	0	3	0	21
Entrepreneurs trained	1033	494	430	2548	30	NA	4535
Employment generated by start-ups	460	300	1885	203	300	70	3218
Number of farm families benefited	682	690	12,189	925	600	1642	16,728
Funding mobilized to incubatees (US$ '000)	200	30	250	810	50	NA	1340

Source UniBRAIN Facility (2016)

Box 4.1 Promoting Agribusiness Among the Youth

Martin Simunchembu is an agribusiness management graduate who enrolled in the internship program of AgBIT that aimed at providing graduates with hands-on practical experience and enhancing their entrepreneurial capacity. Following the internship, Martin established *Simunchembu Agriprise Limited*, a jumbo quail breeding agro-enterprise in 2015. AgBIT supported the enterprise with: mentoring, business plan development, market research, access to financing and market linkages. AgBIT also provided a platform for this start-up to network with other market players both locally and internationally, and facilitated registration of the company in Zambia.

The support provided by the incubator helped the start-up improve its quail production, besides diversification into production of horticultural seedlings and supplies, and converting quail droppings into an organic fertilizer. By end of the year, Martin was able to increase production of quails from 200 to 8000 per month and started a quail franchisee operation. He was also selected as the Winner in the Best Incubatee Category during the First AAIN Conference organized by FARA and ICRISAT.

Source AgBIT, n.d.

Following its completion, the UniBRAIN project has now transformed into a commercial entity known as the African Agribusiness Incubator Network (AAIN) which continues to expand the agribusiness entrepreneurship development model initiated under UniBRAIN to newer countries in Africa.

Efforts Under the India-Africa Forum Summit (IAFS-II and IAFS-III)

The India-Africa Forum Summit (IAFS) is the official platform hosted by the Government of India to strengthen its Africa relations. This summit is held every three years, and the most recent one, IAFS-III, was held in October 2015, where all 54 African countries participated (see Singh, Chapter 2, this volume).

Based on the outcomes from IAFS-II in 2012, ICRISAT was chosen for implementing two projects on behalf of the GoI to: establish five Food Processing Business Incubation Centers (FPBICs) in Uganda, Cameroon, Ghana, Angola and Mali; and five Food Testing Laboratories (FTLs) in Rwanda, Zimbabwe, Republic of Congo, Nigeria and Gambia (MOFPI 2015).

FPBIC Project

The objective of this project is to facilitate the establishment of food processing related business incubation platforms. These platforms can assist entrepreneurs with scientific support and technical know-how on the latest technologies and equipment used in the food processing domain. It also provides them with access to food processing equipment that can be used for initiating and scaling up their business.

As the implementing agency, AIP-ICRISAT identified host institutes, and carried out feasibility studies in 2013, prepared business plans related to the scope of proposed FPBIC and facilitated the Memorandum of Agreement (MoA), between the GoI and the government of the host country. As part of the agreed outcomes from the IAFS-II, the GoI would help the host institute to set up its FPBIC including equipment listing, call for tenders and provide necessary support on operations of the Center. The FPBICs are under establishment and the process for the installation of equipment is in progress.

Table 4.6 Expected overall impact from deliverables of FPBIC Project over 5 years

Deliverable	*Impact/Increase*
No. of incubators established	5
Expected additional farmers income	US$ 250,000
Total start-up capitalization	US$ 2 million
No. of farmers benefitted	2500
No. of jobs created	250
No. of technologies commercialized	20
No. of food businesses incubated	50

Source Author's projection/compilation

The National Agricultural Research Laboratories (NARL), Uganda; the Chamber of Commerce Industry Mines and Crafts (CCIMA), Cameroon; and the Council for Scientific and Industrial Research (CSIR)-Animal Research Institute (ARI), Ghana have been confirmed as the host institutes, and MoAs have been signed in 2013 and 2014. Feasibility study and business plan for setting up FPBIC at NARL, CCIMA and CSIR-ARI has been completed in 2013, with the GoI finalizing equipment and call for tenders. In Angola and Mali, while the host institute has been identified, the documentation is still under process since 2015 (Table 4.6).

FTL Project

The objective of this project is to develop commodity-specific quality protocols for the selected country, as well as providing testing and certifying services for agribusiness enterprises operating in the food and agri-export domain.

As part of the establishment of Food Testing Laboratories, the personnel in respective host countries have been trained on the documentation and management aspects of running ISO/IEC 17025 certified laboratory. They have also learnt about designing laboratories as per international standards. ISO/IEC 17025 is the standard that laboratories must obtain accreditation, in order to be deemed technically competent to carry out food testing and the said standard specifies the general requirements for the competence, impartiality and consistent operation of laboratories.

Under the IAFS-II and IAFS-III training component, AIP-ICRISAT with support from the Ministry of External Affairs (MEA), GoI had organized training programmes, with the participation of about 30 participants in each programme. These programmes aimed at:

1. Development of Agribusiness and Food Processing Business Incubation Centres in Africa: for incubator staff and government officials (18 February–1 March 2014),
2. Knowledge and skill development of Food Testing Laboratory personnel from African countries (30 March–12 April 2014),
3. Training programme on analytical techniques in nutrition, food safety and bio-safety; for food processing laboratory personnel (1 September–14 September 2014),
4. Training programme on technology and business opportunities in Food Processing for SMEs; for various stakeholders in the food processing sector (8 October–21 October 2017),
5. Training programme on entrepreneurship and marketing skills development for various stakeholders (12 November–25 November 2017).

Mr. Adams Sapeho from Uganda, one of the participants who attended the 'Technology and business opportunities in food processing' programme held in Patancheru, Hyderabad (India) from 8 to 21 October 2017 stated that,

> After the training, I got the courage to concentrate on my food business. I add value to millet by processing it into a beverage, and an instant composite food for babies and the elderly. Your training awakened me so much, and I hope at end of this year, I will be reaping. (ICRISAT 2019)

Overall, these programmes have received a very good feedback from the participants, with an average rating of 4.5/5. Under the India-South Africa joint call for proposals by the Department of Science and Technology, GoI; National Research Foundation, Republic of South Africa; the Nutri-Plus Knowledge (NPK) Program of AIP-ICRISAT and the Institute of Food and Nutritional Well-being, University of Pretoria,

South Africa are working on a project titled, 'Nutritional and Nutraceutical[8] properties of cereal and legume-based traditional foods from India and South Africa and their role in addressing malnutrition, hidden hunger and chronic Non-Communicable Diseases' (2017–2020). This partnership has enabled team of scientists at the ICRISAT, India and the University of Pretoria, South Africa to leverage each other's strengths, knowledge and experience in the areas of agriculture, nutrition, and food science and technology towards understanding, documenting and validating the indigenous knowledge on traditional foods in both countries and thus benefit society and smallholder farmers in particular.

The project is funded by Department of Science and Technology (DST). The project focuses on studying the effect of the respective cooking/preparation methods on the nutraceutical, nutritional and functional properties of the food products sorghum, pigeonpea, chickpea, cowpea, Bambara groundnuts and other local crops and development and commercialization of standardized product prototypes as per industry/market requirement. The products with validated claims will be made available to entrepreneurs for commercialization, especially local women and youth, resulting in promotion of general health and well-being of consumers and economic benefit to local communities. The outcomes of the on-going project will leverage the growing demand for health foods and need for global food security and tap the rich cultural heritage of traditional foods of India and South Africa. This will increase the demand for production of indigenous grains and result in enhanced income and improved livelihood for the smallholder farmers (Alavi et al. 2019).

Conclusion

Agriculture in India and Africa ranges from subsistence to commercial farming. Poorly endowed farmers struggle to cope with the vagaries of the weather, production risks, and a lack of access to quality inputs, credit and markets. A majority of the youth are moving away from

[8] Fortified food with medicinal value.

agriculture towards urban cities. In such a socio-economic climate, South-South cooperation can augment agricultural practices through governmental collaborations, private sector investments, research associations and conducive policy frameworks.

ICRISAT's initiatives to encourage knowledge sharing have forged partnerships between multiple agencies. ICRISAT works with many African national governments and NARS partners for exchanging germplasm and sharing genetic resources available in ICRISAT's gene banks. This has helped ICRISAT establish crop improvement programmes, and also exchange knowledge, technology and resources for natural resource management. It has also augmented capacity building efforts for setting up and running agri-based entrepreneurship and other allied activities. These efforts have enabled a wider contextual understanding of the myriad challenges that the African agricultural sector presents. The efforts have also resulted in the development of ecosystems that promote innovation and entrepreneurship at the grass-roots level to benefit smallholder farmers.

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CHAPTER 5

Food Security and Capacity Development: The ILRI Experience

Iddo Dror

Abstract The International Livestock Research Institute (ILRI), a CGIAR (formerly the Consultative Group for International Agricultural Research) Research Center is headquartered in Kenya. It has sixteen country offices across Africa and Asia. Since its inception in the 1970s, it has been engaging in South-South collaboration projects with different organizations across India and several African countries. Through these projects and initiatives, the ILRI has participated in the coordination, management and execution of various activities with the aim of equipping farmers with the skills and tools needed to improve their livelihoods, better their nutritional and environmental situations, and provide 'better lives through livestock'. Over the years, India has frequently been the setting of different projects in which the ILRI played an active role alongside other Indian and global partners. Although the nature of these projects varied in range from development of prototype tools, value

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chains, genetic research, etc., their goal remained unchanged—to help vulnerable members of society build better lives for themselves and their families by assisting them in developing new skills, introducing them to new approaches and techniques and providing them with innovative resources to implement in their daily lives. This paper provides a summary of six different projects that involved India-Africa collaboration highlighting key initiatives and lessons learnt, while also discussing how these can help inform further initiatives with regard to the design and implementation of successful South-South collaborations.

Keywords South-South cooperation (SSC) · International Livestock Research Institute (ILRI) · Africa · Asia · Food security

Introduction

Countries in the 'Global South' often come together in order to benefit from each other's experiences, learnings and practices under what is termed South-South cooperation. Such alliances have been gaining importance over the past few decades, especially in the development of large emerging economies like India—a country that has strongly focused on collaborations with a number of African countries.

The International Livestock Research Institute (ILRI), a CGIAR (formerly named as the Consultative Group for International Agricultural Research) Research Center is headquartered in Kenya and has 16 country offices across Africa and Asia. Since its inception in the 1970s, it has been engaging in South-South collaboration projects with different organizations across India and in several African countries. Through these projects and initiatives, the ILRI has participated in the coordination, management and implementation of various different activities with the aim of equipping farmers with the skills and tools needed to improve their livelihoods, better their nutritional and environmental situations, and provide 'better lives through livestock'.

This paper delves into the details of past collaborations between the ILRI and India while also suggesting opportunities for similar partnerships in the future. The projects draw upon Indian strengths and skills, which can be learned and adapted as guidelines into African contexts. This will provide a blueprint based on cumulative knowledge gained in Indian

and African contexts and will see projects that hitherto ran only in Africa introduced to regions in India, and vice versa.

What these projects have in common—besides their aim of helping the most vulnerable population—is the ultimate goal of achieving a better quality of life and higher income per household. The ILRI-India collaboration sets the context that will eventually lead these projects to success. Without the invaluable expertise, insights and wisdom that Indian scientists, researchers and organizations have to offer, all these projects would have gone down a very different path.

Transferring Dual-Purpose Stover Varieties from India to Ethiopia

Between 2008 and 2010, the ILRI, along with the International Center for Tropical Agriculture (CIAT) and the International Center for Agricultural Research in the Dry Areas (ICARDA), participated in the implementation of the Fodder Adoption Project (FAP)—an International Fund for Agricultural Development (IFAD) funded research project. The project engaged with a wide range of rural stakeholders to strengthen the capacity of poor livestock keepers in Ethiopia, Syria and Vietnam. It aimed to select and adopt fodder options, as well as access markets, in order to provide the beneficiaries with opportunities to improve their livelihoods.

Part of the project focused on devising better feed options for the focus areas to help improve the livelihoods of the local population. An example of a better feed option is cereal stovers.[1] Cereal stovers are major feed resources in mixed crop-livestock systems as there is an increasing demand for crop cultivars that produce good grain yield, crop residue quantity and fodder quality. These are termed as dual-purpose cultivars.[2] In India, for example, the cost of the sorghum stover in fodder trading is only about half the price of the grain (Sharma et al. 2010). Higher quality stovers achieve better prices, with a difference in digestibility of about 5% units (47–52%) associated with price premiums of 25% and higher (Blümmel and Rao 2006). Having observed such results in a country whose environmental conditions are quite similar to those in Africa, twelve potential

[1] Stover is the leaves and stalks of field crops, such as corn (maize), sorghum or soybean that are commonly left in a field after harvesting the grain.

[2] Cultivars are a plant variety that has been produced in cultivation by selective breeding.

dual-purpose sorghum cultivars providing high grain and stover yield with superior quality were selected and transferred from India's International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) to the Ethiopian Institute for Agricultural Research (EIAR) Sorghum Improvement Program.

Taking into consideration the advancements and past research on the subject in ICRISAT, India and the cultivars were planted in Melkassa, Miesso and Showarabit in Ethiopia in 2008 and 2009. They were planted in four replications using standard agronomic practices of the EIAR. Once ready, the stover samples were analysed by near infrared-spectroscopy (NIRS) for crude protein (CP), neutral detergent fibre (NDF) and acid detergent fibre (ADF), acid detergent lignin (ADL), in vitro digestibility (IVOMD) and metabolizable energy[3] (ME).

The results showed highly significant cultivar differences found for all analysed traits. Broad-sense heritabilities[4] revealed a moderate to strong genetic determination of stover quality traits across the two years in all three locations. These differences were highly significant nutritionally and key nutritional stover traits (such as IVOMD) varied by 8%.

Based on these positive and highly encouraging results, the cultivars have been proposed for release in Ethiopia. This suggests that superior dual-purpose sorghum cultivars exist and can be exchanged across crop-livestock systems from South Asia to East Africa. However, they might need to undergo new cultivar release and registration procedures.

FeedBase

As a part of the CGIAR Research Program (CRP) on livestock in Ethiopia, the ILRI, along with the Ethiopian Ministry of Livestock and Fisheries, the Ethiopian Agricultural Transformation Agency (ATA) and the Indian Council of Agriculture Research (ICAR) are working on the development of various approaches and tools to estimate feed supply and demand. These efforts also included the development of an Ethiopian FeedBase prototype by ICAR based on their previous experience in both design and construction of feed supply-demand tools in India. However,

[3] Energy available for growth or reproduction and for supporting metabolic processes.

[4] Heritability is a statistic used in the fields of breeding and genetics that estimates the degree of variation in a phenotypic trait in a population that is due to genetic variation between individuals in that population.

to make the prototype relevant and usable in Ethiopia, ICAR took as its base the regional and district sample data collected by the ATA.

FeedBase is essentially a feed balance sheet used to match available feeds needed to support the livestock population in a production system (see Angadi, Chapter 6, this volume). It can be adapted to virtually any context as long as relevant and accurate information is provided and specific aspects of the context are taken into consideration. On the one hand, the context-specific database lists feed resource availability and requirements in a particular district/region by using crop production statistics and land use data. This data is then used to calculate feed availability from district to national levels. On the other hand, livestock census data is used to estimate the feed demand. This information is then shared with policymakers, agricultural extension officers, researchers, feed producers, etc., in order to make better and more well-informed decisions in terms of allocating animal feed resources for livestock production benefits.

For Ethiopian farmers, access to adequate animal feeds represents a crucial challenge. This is because livestock is an integral part of the livelihoods for a large part of the local population and feed constraints often lead to low productivity. Having the Ethiopian prototype of FeedBase at the disposal of local institutions, policymakers, organizations, etc., different supply-demand scenarios can be developed to find effective solutions to help increase the productivity and by extension the quality of life of Ethiopian farmers. However, the usefulness of FeedBase in Ethiopia is heavily dependent on the accessibility of harmonized data from all across the country, as well as on the availability of sufficient financial resources needed to properly maintain, manage and periodically update the tool.

MilkIT

The ILRI was a part of a three-year research for development project, funded by the International Fund for Agricultural Development (IFAD) and managed by ILRI itself. This project, known as MilkIT, focused on improving dairy production with the help of improved feeding practices and better milk marketing arrangements. To achieve the project's three main objectives—institutional strengthening, productivity enhancement and knowledge sharing—innovation platforms were established and implemented. These platforms brought together different stakeholders to

address the constraints related to the dairy value chain in Uttarakhand in India, and Morogoro and Tanga in Tanzania.

During the dialogues that took place as part of the innovation platforms in each region, core issues were identified and further steps were agreed upon. In India, for example, it became increasingly clear that from the farmers' perspectives, the low milk prices did not justify any major investments in feed technologies or improved cow breeds. A similar issue was detected in Tanzania wherein farmers felt exploited by buyers—a perception that could not have been altered without establishing a dialogue between all concerned parties.

As a result of these dialogues, different interventions were implemented to improve pastures for dry season feeding. These included feed choppers/chaff cutters as well as improved feed troughs, forages and linkages to provide better access to concentrated feed in India. In Tanzania, it involved introducing and improving forages and pastures, as well as defining adequate feed rations, all with the purpose of providing useful solutions to farmers that would enable them to improve their quality of life.

With the project coming to an end in 2014, it is clear that several lessons have been learned in the implementation of the project in both countries. For example, it is now understood that context is extremely important and that solutions and approaches should not be standard or universal but adjustable to the local context and situation. Furthermore, the innovation platforms ought to be more seriously implemented and be relevant to each distinct situation in order to ensure maximum participation. The main purpose of the innovation platforms is to address issues and solve problems. When this primary goal is fulfilled and the most relevant stakeholders are brought to the table, the participation is most likely to yield desired results. What also became apparent in retrospect was the difficulty in identifying crucial problems that needed to be addressed. These issues could be identified only after including the right stakeholders at the right moments. However, when addressing these issues, what proved to be the best approach was the 'trial and error' method, i.e. trying out different solutions in order to determine which of them worked best in real situations and which could be dismissed as irrelevant. These so-called quick and dirty interventions also built a strong momentum that could serve as the basis of future collaborations.

To achieve the desired goal of widest impact, another important lesson was to align the efforts of said projects with other related interventions.

For example, the improvement of feeds and feeding practices needs to be aligned with general husbandry in order to avoid feed wastage and other related health issues. The innovation platforms need to take into consideration and address all factors that might cause disturbances in the path to achieving the desired goal by establishing and connecting multiple interventions at the same time.

One of the activities of the project was to introduce farmers and pastoralists to demonstration plots and show them the expected benefits of different interventions. Demonstration plots were thus created in India and Tanzania, but due to their small size (as a result of budgetary constraints), they failed to demonstrate potential benefits to the satisfaction of farmers and pastoralists.

Lastly, one of the most important lessons learnt was related to the innovation platform organization. Both in India and Tanzania, the institutions involved in the innovation platforms focused more on disseminating the technologies emerging from these platforms. Instead, they should have embraced the innovation platform themselves. In both countries, the project was faced with the challenge of having unaddressed issues due to its short-term nature, institutional priorities, mandate excluding various innovation platform related aspects, etc. On several occasions, the only solution to these issues was to involve players from higher levels.

However, even despite these lessons and challenges, the MilkIT project's innovation platforms demonstrated a new way of addressing feed issues. The producers were strongly engaged in designing and implementing interventions due to rapid assessments and platform discussions/dialogues. Furthermore, participatory action research and training helped address issues such as finding ways to introduce improved forages, pasture improvement, reducing feed wastage, feeding adequate rations and feed conservation. Apart from this, each innovation platform needed to be adapted to the local context and case-specific entry points need to be identified.

The positive outcomes of the activities conducted during the project are further illustrated in the enhancement of dairy productivity by improving forage availability through the *ololilis* (a traditional Maasai forage conservation system used by families to feed their cows during the dry period) in Tanzania. This activity was carried out after the completion of the project. By implementing gender-responsive forage improvement initiatives through *ololilis*, women were given the opportunity to secure food for their families—a feat that would have been impossible without the equitable governance of the *ololili*.

ImGoats

Another project that took place both in India and Africa (specifically in Mozambique) is the known as imGoats. This project worked on building strong small ruminant value chains to reduce poverty and increase food security in both countries between 2011 and 2012. It was based on the premise that in dry areas—typical for both India and Mozambique—marginalized groups, including women and children, often rely on small ruminants for their nutrition and livelihoods. The project's main aim was to help transform the lives of goat keepers in both countries by assisting them in turning their subsistence level goat production into a viable and profitable activity.

The imGoats project endeavoured to increase the household incomes, improve food security and reduce the vulnerability of poor goat keepers (especially women) by improving the performance of goat value chains. It developed and tested organizational and technical models for value chain development using multi-stakeholder mechanisms and processes like innovation platforms and producer hubs. After the completion of the scheme, a workshop was held in Mozambique, where the project's development in both countries was reviewed and presented to all the attendees in detail.

In Mozambique, the key successes, mainly based on IFAD-sponsored final review of project, included the innovation platforms that were crucial in identifying important activities and providing feedback about them. It entailed research and stakeholder interactions (enlarged reach of project) while also creating buy-in and awareness. Furthermore, it included the construction of six improved shelters by the model goat keepers and the functioning of the paravet[5] system. These paravets were paid for by the producers for their services. Three goat producer groups entered the process of becoming a legally recognized association and three demarcated communal pasture areas were officially recognized by relevant district authorities. Eight communal pasture areas were set up their own management committees. There was real ownership of activities by the groups in these management committees. The groups valued the goats

[5] The Paravet Training Project seeks to increase the numbers of trained paraveterinary officers/animal health and production specialists in the region by providing paraveterinary training through a distance learning programme using modular components.

as well as the participation of foreign and national students in applied research.

The project's implementation in Mozambique, however, presented its own set of challenges. One of the main challenges was the sustainability of the innovation platforms. Other issues included the transportation of members for an assured participation, the limited involvement of traders due to unreliable supply of goats for sale, declining female participation, the sustainability of retailer groups, commercialization (or the lack of clarity regarding its process) and the uncertainty concerning the benefit of women through communal pasture areas. Despite these areas proving successful in terms of production practice, the short implementation period proved to be a significant drawback, since two and a half years is not a sufficient period of time to achieve significant and long-term change.

In India, too, several challenges were addressed throughout the project. For example, the lack of knowledge about improved goat husbandry practices was resolved by providing training for goat keepers and field guides. There was also a shortage of genetically elite goats, which was resolved by setting up a distribution of Sirohi and Black Bengal bucks. Furthermore, the problem of infectious diseases causing high mortality rates was addressed through different interventions one of which was the regular deworming of goats. New methods of faecal testing and vaccinations against *Peste des Petits Ruminants* (PPR) (also known as sheep and goat plague) were introduced. These resulted in an overall decrease in goat mortality rates as well as a bigger flock size. The goats also showed low productivity as a result of poor husbandry practices. Thus, by training the beneficiaries in improved production practices, distribution of mineral licks[6] and the monitoring of kid's (baby goat's) weights the animals were seen to grow healthier and heavier. The understanding of the performance of the animals also improved.

Another major challenge the imGoats project faced in India was that of feed shortages. This issue was addressed by providing training for improved feeding and supplementation techniques, which resulted in healthier and heavier animals. The commercialization was also limited, often resulting in lower prices, which in turn led to the exploration of different commercialization options such as goat fairs, market visits

[6]A mineral lick (also known as a salt lick) is a place where animals can go to lick essential mineral nutrients from a deposit of salts and other minerals.

and discussions on different strategies at innovation platform meetings. The outcomes of these activities were reflected in increasing numbers of animals sold per household, further signifying a rise in household incomes as well. Finally, there was the issue of limited linkages with other institutions working within the goat sector. To overcome this challenge, several sharing visits were organized, which led to better coordination of activities and a Memorandum of Understanding (MoU) between BAIF Development Research Foundation, Rajasthan Rural Institute of Development Management (RRIDMA)[7] and the Centre of Microfinance under the scope of the Mitigating Poverty in Western Rajasthan (MPOWER) project.

Despite the challenges and limited duration of the project, imGoats brought positive change to the lives of the beneficiaries in both India and Mozambique. The lessons learnt during the two years of the project are still being implemented to this day. They serve as guidelines in the search for better practices to work on goat value chains in different countries.

Smallholder Dairy Project

The Smallholder Dairy Project was first implemented in Kenya between 1997 and 2005 under the management and supervision of the ILRI in partnership with the Ministry of Livestock and Fisheries and the Kenya Agricultural Research Institute (KARI). It was funded by the UK's Department for International Development (DfID).[8] Kenya is the biggest East African milk consumer with five times higher per capita milk consumption levels than any other East African country. Here, small-scale dairying—households milking their own cows (one or two, on an average)—is quite common, and sales are mostly to the informal market, making up for 85% of the entire milk market in the country. Raw milk is transported using whichever means of transportation is available (usually bicycles or pickup trucks). However, the Kenyan dairy sector has generally ignored the informal dairying and considers it to be illegal.

Scientists from the ILRI, the KARI and the Ministry of Livestock and Fisheries Development came together in 1997 to combine their scientific

[7] RRIDMA is an associate organization of BAIF Development Research Foundation.

[8] Merged with the Foreign and Commonwealth Office to form the Foreign, Commonwealth and Development Office as of 2020.

research, government policymaking, international development and social activism to shift local mindsets and push the milk sector on an upward and inclusive track. Following eight years of efforts, the project was finally completed in 2005 and the outcomes were as follows:

- For the first time, dairy production systems were systematically characterized with the help of accurate and up-to-date data. This characterization serves as the main point of reference today for government policy documents;
- New technologies and interventions, such as disease-resistant fodder varieties, research-based guidelines for milk hygiene, etc., were developed. Affordable milk containers for the poor were developed with private sector manufacturer, and feed allocation packages were also developed, and
- National policy changes were triggered which led to the training and certification of small-scale raw milk traders by the Kenya Dairy Board.

While all these outcomes are noteworthy, it was the policy change that had the biggest impact on the Kenyan milk sector and its various informal participants. By changing the policy to begin training and certification of small-scale milk vendors, the handling and hygiene of milk improved, thereby increasing profits margins as well. There was an increase in consumer milk access which led to the creation of new employment opportunities in the sector. This had a direct impact on the economy, estimated at US$ 33.5 million annually. This change came as a result of the research conducted by the project partners, indicating smallholder dairy farming as an important source of income for over 800,000 smallholder farmers in Kenya as it provided an additional 35,000 full-time jobs in milk collection, distribution, processing and sales (Muriuki 2003). These numbers generated an increased interest and convinced several policymakers and organizations to work towards policy changes.

Given the success of the project and the lessons learnt during its implementation, the ILRI established a similar Smallholder Dairy Project in Assam, India. Much like in Kenya, milk is a very important asset in India, as it contributes to the nutrition and livelihoods of millions of consumers, dairy producers, traders and cottage processors. Even so, milk quality and safety remain a pressing issue in the country. The smallholder dairy

sector in Assam is facing a number of challenges, including low milk yields and lack of basic marketing infrastructure. Consumers, especially in urban areas, have expressed concerns regarding the decreasing quality of raw milk supplied by informal dairy traders (ILRI 2007).

To better understand the setting, the ILRI first conducted a comprehensive study of the dairy sector in Assam. Based on the issues and gaps that the study identified, the ILRI along with local and non-governmental partners designed and developed a training and certification programme for dairy producers and traders in 2009–2010. This programme helped build up their capacity to produce, handle and sell hygienic and safe milk in the informal market circumstances typical of the province.

Over the course of the project, 265 traders along with 480 producers were reached out to and trained in the improvement of milk quality and hygiene. This covered most of the milk consumption in Guwahati—a city with a population of approximately one million (Lindahl et al. 2018). Specific topics of training included good animal husbandry practices, lessons on how to keep cows healthy, learning causes of milk spoilage and disease and hygienic milking, handling and storage practices.

To supplement the training, information campaigns were also launched using traditional media to targeting the general public. Furthermore, the scientists involved in the programme also assisted in establishing a platform for policy engagement which helped bring together different stakeholders including government, development, health and veterinary departments, as well as the municipal corporation. The purpose of this platform was to integrate and drive the initiatives implemented by each stakeholder towards a common goal.

There have been several positive outcomes of the project's implementation in India including a shift in the approach towards informal dairy sector work. The government has also appointed select officials as food safety officers to check milk quality and safety under the Food Safety and Standard Act (FSSA) of India. Furthermore, for the first time in the state of Assam, public funds were invested in the informal dairy sector work. The Assam Agribusiness and Rural Transformation (APART), for example, was set up with the objective to add value and improve resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of Assam. Following this successful implementation, 16 other districts in the state of Assam are replicating the project since 2017 with funding from the World Bank. These projects are estimated to run till 2024.

Dairy Genetics

Another area where the ILRI has been very active and has collaborated extensively with Indian partners in search of new techniques, practices and experiences is that of dairy genetics. Currently, there are two ongoing activities. The first is buffalo genomics—a programme involved in developing genomic references to initiate and support future genomic selection programmes in buffalos. The second programme is focused on developing a refined breeding and organization structure for the Gir cattle programme in the Saurashtra region of the state of Gujarat in western India. Its specific aim is to develop a genetic and genomic evaluation system for Gir cattle in order to select superior bulls and cows to sustainably deliver such genetic gains.

During this (and previous other) collaborations, several challenges have been identified. For example, the incubation periods were often too extensive due to the time-consuming nature of Indian institutions' processes of research/funding activity approval. This often led to the unnecessary postponement of certain activities, while waiting for official approvals. Furthermore, on several occasions, the Indian institutions failed to realize that the more ambitious research requests required much higher and flexible funding mechanisms to achieve desired outcomes. Thus, major challenges were faced in undertaking joint research due to inadequate funding. There was also a lack of flexibility in exchanging/moving Indian livestock genetic materials for research purposes. Finally, the different and often competing interests among species-focused Indian research organizations often made it difficult to identify key partners to collaborate with. However, this aspect has seen recent improvement as a result of newly established organizations like the Indian National Action Plans (the 'Rashtriya Gokul Mission' established in 2014[9]).

The India-Africa collaboration offers a number of different opportunities and approaches that can be extremely beneficial for all the countries involved. An example of such an opportunity is the fact that India is home to a multitude of diverse indigenous tropical livestock and poultry genetic resources. Given the similarity in environmental challenges faced in India

[9] The 'Rashtriya Gokul Mission' has been launched by the government for conservation and development of indigenous breeds in a focused and scientific manner. The mission also envisages establishment of integrated cattle development centres.

and Africa (i.e. extreme ambient temperatures, diseases and parasites, inadequate feed resources, climate change, etc.) the genes responsible for the adaptation of Indian livestock and poultry breeds to the local conditions are of great interest to the African continent.

Furthermore, new developments in genomics and reproductive technologies, such as genomic selection, gene editing and sexing of bovine semen, etc., would lead to great improvements in genetic gains; in creating productive and resilient synthetic livestock; and in poultry breeds and lines. The ILRI and India's ICAR have been exploring collaborations in capacity development and strengthening in the areas of cattle, buffalos and poultry. These collaborations would help advancements in Africa using the experiences in India as a learning tool (see ILRI 2019). Another area where Africa can base its efforts on the skills and past experiences of India is technology and communication. India's innovative use of technology as part of data crowdsourcing and equipping of livestock farmers with e-learning materials may be studied and introduced in African contexts. Opportunities of collaboration with Indian scientists, researchers, institutions and organizations are likely to open doors for advancements in dairy genetics in Africa.

Conclusion

During the 40 years of active participation in South-South cooperation, the ILRI has gained a considerable amount of experience working with Indian partners, in spite of its fair share of challenges. These collaborations have opened up channels for knowledge sharing and helped in capacity development, food security, technological advancements and the learning of new lessons and practices. However, the positive outcomes and successful implementation of projects in both India and various African countries are proof that such collaborations benefit the research development of the organizations involved, the lives of direct beneficiaries, as well as the level of knowledge obtained by the participants in the projects.

The ILRI took an active part in a recent project that involved the successful transfer of stover varieties with improved fodder traits from India to Ethiopia. These improved fodder varieties will offer a better feed option to Ethiopian farmers. The Ethiopian prototype of FeedBase is a tool that helps improve feed supply among the livestock and implements innovation platforms to develop and fortify the dairy value chain in India and Tanzania. It can potentially bring together stakeholders to identify

key issues and actively participate in finding the best possible solutions to them. The ILRI's varied activities include: innovation platforms, work on the goat value chain in India and Mozambique, active work on the informal milk market in the general milk industry in Kenya and India, as well as genetics research advancements. These endeavours will ultimately provide livestock farmers in India and Africa live a better life through livestock management.

Each project has opened doors to new ideas, initiatives and collaborations. Many questions related to research, food security and capacity development have been addressed by further building on previous knowledge, findings, approaches and techniques and applying them to local contexts. This can also help in finding innovative ways to reach the Sustainable Development Goals (SDGs) set by both India and Africa. The lessons and experiences of international organizations like the ILRI can help refine certain key insights on how to successfully set up and manage similar India-Africa collaborations.

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CHAPTER 6

FeedBase-Ethiopia: The Role of Database in Developing Livestock Feed

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Abstract The ICAR-National Institute of Animal Nutrition and Physiology, Bangalore, funded by Indian Council of Agricultural Research (ICAR), Government of India, New Delhi has developed a tool named FeedBase-India, using secondary datasets. The software assesses feed supply and demand for livestock in India. The Ethiopian Agricultural Transformation Agency (ATA) showed considerable interest in this innovative software, which resulted in a collaboration between ICAR, ATA

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and the International Livestock Research Institute (ILRI), to adopt and adapt the concept for feed supply–demand analysis of livestock in Ethiopia. The supply is estimated from cropping, land use pattern, demand from livestock census and nutrient requirements for various categories of livestock based on their body maintenance, production and reproduction potentials. Key stakeholders were familiarized with the concepts, approaches, and software at an inception workshop held in Addis Ababa, Ethiopia between 1st and 3rd August 2017 at the ILRI campus. The database and tools were modified for Ethiopian conditions based on the data collected by ATA in two districts from each of the four main regions of Ethiopia. The tool relationally arranges these datasets using algorithms that connect feed quantity and quality to livestock maintenance and production requirements to calculate surpluses, deficits or sufficiency of feed biomass and of key nutrients such as dry matter, protein, total digestible nutrients and metabolizable energy. This enables users to compare and prioritize feed and animal interventions for impact. This will support researchers, development agencies, governments, industry and farmers in constructive planning and decision-making, resulting in higher livestock production and productivity, feed use efficiency and reduced cost of feeding.

Keywords FeedBase-Ethiopia · Feed demand and supply · Feed and animal resources

Introduction

The livestock production system has a multi-faceted role in promoting livelihoods, alleviating poverty, building nutritional security and improving crop husbandry. At the same time, developing feed for farm animals exerts a significant impact on land, water and the environment.

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There is a great need for efficient management of feed and livestock resources in the livestock production sector. The systematic collection and analysis of data on livestock, crop production and land use statistics are required to provide knowledge about available resources for the planning and development of the livestock sector. Assessing the supply and demand of feed resources is a vital component in feed resource management as well as effective decision and policy making. Feed and fodder are major components of input into livestock value chains and are responsible for about 70% of the input costs in livestock production (Makkar and Beever 2013). Dynamic feed inventories and national feed assessment systems then help in the optimal usage of available feed and animal resources required to sustain livestock production.

India has made notable progress in livestock production since the days of the White revolution, also known as Operation Flood, which was a plan to revitalize India's dairy production for achieving self-sufficiency in milk. Since then, India produces 165.4 million tonnes of milk, 3.5 million chicken for meat and 88.14 billion eggs, ranking as the first, fourth and second largest producer of these products in the world, respectively (DADF 2018). India has consistently demonstrated valuable knowledge and technologies, as well as an openness to share them with developing countries on the continent of African (FICCI 2016; Cheru and Modi 2013; Ayyappan 2015; Bhutani 2014).

In view of this, and based on available secondary datasets, the ICAR-National Institute of Animal Nutrition and Physiology has developed 'FeedBase–India', a methodology for assessing the availability and requirement of animal feed resources in India. Feed availability is estimated through cropping, land use patterns, and feed requirements from the livestock census along with nutrient requirements for various categories of livestock based on their body maintenance, production and reproduction needs. The Ministry of Livestock and Fisheries, Government of Ethiopia and the Ethiopian Agricultural Transformation Agency (ATA) both expressed an interest in developing feed supply–demand scenarios. Collaborations were initiated between the ICAR, ATA and the International Livestock Research Institute (ILRI) (see Dror, Chapter 5, this volume) for the adoption and adaption of the concept to an Ethiopian Feed Supply–Demand scenario.

Key stakeholders were familiarized with concepts, approaches and the basics of the software at an inception workshop held in Addis Ababa, Ethiopia from 1 to 3 August 2017, at the International Livestock

Research Institute (ILRI) campus. During the workshop, various methodologies were presented, streamlined, adapted and modified for Ethiopian conditions. A pilot tool and database were developed based on the data collected by ATA in two districts from each of the four main regions of Ethiopia. Funding support for the pilot study of Phase-I and Phase-II was provided by the Agricultural Transformation Agency Cooperatives (ATA) and the ILRI.

The database is intended to be a decision-making tool with interactive features that enable the user to compare and prioritize feed and animal interventions for a greater effect and a wider impact in livestock production. It also aims to provide opportunities to assess the environmental footprints by quantifying water requirements and carbon-emission prints associated with the choice of feed resources and feeding interventions. This tool will support researchers, development agencies, the government, industries and farmers in planning and decision-making, which will result in higher livestock production and productivity, feed use efficiency and a reduced cost of feeding.

Feed as a Major Factor in Livestock Production

In India and Ethiopia, inadequate feed supply and low genetic potential of livestock are the primary factors responsible for low livestock productivity and consequently hamper the profitability of the sector (Anandan and Sampath 2012). The sector is highly dependent on the cropping and land use system, and is adversely affected by varying rainfall patterns. The genetic potential of livestock crucially impacts effective feed resource use and productivity.

Data as a Driver of Growth and Change

Data is an important requirement in the agricultural sector. It enables value chain members to understand interconnections between agriculture, livestock, international commitments and competitiveness in agricultural trade, livelihoods, human health, food security, nutritional security, natural resources, socio-economic practices and the like. Presently, the application of big data analytics to improve agricultural productivity is centred in the developed world. However, low- and middle-income countries (LMICs) are closing the gap by using Information and Communication Technology (ICT) tools to collect, analyse and apply data

that enables sustainable agricultural practices in the developing world. Such ICT-based information systems will improve decision-making and optimize available resource utilization and associated activities.

India has a fairly well-developed agricultural data management system. Within this system, government agencies, institutes and various departments collect and maintain a comprehensive data bank on agricultural production statistics, land use patterns, livestock population and trade at the district, state and national level. Such data provides an opportunity to assess the interventions of modelling systems that develop decision-making tools for sustainable development in agriculture and livestock production. Updated databases with effective decision-making tools would facilitate productive decisions and interventions at the same time that they would enable comprehensive solution sets to support sustainable development and solve global food challenges.

Data collection and the analysis of livestock production systems in developing countries are complex terrains. There are a number of factors at play in these databases, such as several types of species, multiple outputs from livestock and different production systems. Environmental parameters like the use of land, water and practices that cause greenhouse gas emissions are also taken into consideration, besides the financial and nutritional security of farming communities.

Methodology

Overall Data Processing Flow and Computational Tool

The decision-support system for the assessment of feed supply and demand was developed based on the concept of knowledge discovery from multiple data sources on decision-making. These were used in three steps. The first was aggregating, cleaning, compiling and engaging in quality improvement of the data. Second, an integrated database which elucidated methodology and analysis tools for the assessment of supply and demand of feed was developed. Finally, the results were presented to diversified stakeholders of the livestock sector. In this regard, the initiative taken by the ICAR-NIANP Institute resulted in many publications on the status of feed resources in India (Angadi et al. 2005, 2009; Ramachandra et al. 2007). The methodology has subsequently been streamlined and comprises of:

1. The collection of crop production and livestock census,
2. The collection and conversion of the ratios of available feed to its requirement,
3. The analysis of feed supply and demand, and
4. Final presentation of information in the form of specific computational processes calibrated in terms of data inputs and derived information as outputs.

Data Collection from Various Sources

Three major inputs used for the development of the database include crop production data, land use statistics and the livestock census. The crop production data is published regularly and is available for all the major and minor crops as per the cropping season. Crop production statistics and land use pattern data have been employed to estimate the potential availability of feed resources across different years and regions (see Table 6.1).

To assess the demand for feed in different livestock categories, the number of animals by age, category and average productivity is considered. Data in a similar pattern is available in the Indian livestock census from Department of Animal Husbandry, Dairying and Fisheries (DADF), Government of India. In Ethiopia, livestock census data was gathered from districts through an agreed modality of data collection (see Table 6.2).

Table 6.1 Example of crop production data

Districts	*Year*	*Crop*	*Production (000 tonnes)*
Mecha	2015–2016	Pearl millet	0.02
		Gram	0.30
		Ground nut	0.28
		Linseeds	0.50
		Maize	18.53
		Teff	0.00
		Red gram	4.30
		Rice	70.64
		Sesame	4.25
		Small millets	0.10

Source Author's compilation

Table 6.2 Example of livestock population data

Districts	*Year*	*Animal*	*Category*	*Population (no. of head)*
Mecha	2015–2016	Cattle	Dry	14,233.00
			Female < 1 year	28,388.00
			Female other	5608.00
			Female: 1–3 years	28,994.00
			In milk	52,094.00
			Male < 1 year	4724.00
			Male > 3 years	1683.00
			Male others	687.00
			Male: 1–3 years	6984.00

Source Author's compilation

Data Collection from Literature: Grain to Feed Conversion Factors and Nutrient Requirements for Various Categories of Animals

Crop products are available for human food, animal feed, seed and industrial production. The calculation of livestock feed availability from crop production data inevitably uses ratios, which convert the grain production data to actual feed biomass in terms of crop residues, grains, oil cakes, bran and husk. All of the conversion factors and ratios of different crops are calculated using the harvest index (grain to straw ratio) and extraction rates for various crop residues and by-products obtained from published literature, including proportions of grains, bran, husk and oil cakes from grain production (Anandan et al. 2005, Anandan and Sampath 2012; Angadi et al. 2009).

If information is found lacking, appropriate factors are used based on primary data and inputs from experts and the industry. For the estimation of green fodder production, factors such as the area of land under fodder cultivation, permanent pastures, cultivable wastelands, forests, current fallows, other fallows, miscellaneous tree crops, and biomass production per hectare of different land use categories are used. For this study, the dry matter (DM), crude protein (CP) and metabolizable energy (ME) contents of each feed category were obtained from the literature. Further, the feed demand, which is the animal energy and nutrient requirements for maintenance, reproduction and production, was calculated using standard nutritional requirements based on published literature from Indian and Ethiopian studies.

Integration of Data and Development of the Database

The assessment of the supply and demand of feed involves the collection and management of large amounts of data. A computerized data management and accessing system is necessary for a successful regional and national feed assessment. A major phase in the method is crowdsourcing, since the raw data obtained is from multiple sources and needs to be pre-processed, standardized and structured, as has been done. Crowdsourcing in data science is the practice of collecting data from a large number of people or different sources.

The database was developed based on a relational database model by creating various tables and integrating them after pre-processing the data. It is a relational database implemented in MySQL and MS Access. MySQL is an open source Database Management System (DBMS) and MS Access is also a Database Management System developed by Microsoft. Computational tools were developed for transforming primary input data into a standardized data format and uploading to the database. The database has a provision for continuous updates through semi-manual screening of feed supply statistics and the livestock census.

Analysis and Presentation Tools

The analysis of the supply and demand of feed resources is dynamic in nature and varies across seasons and years, creating the requirement for a regularly updated database. This requires computational tools for standardizing the input data, uploading the data into the database, calculating supply and demand and subsequently preparing a balance sheet to present the information in an easily understandable form to diversified stakeholders.

Two versions of the software have been developed. One is a standalone that uses Visual Basic (VB) as a front-end tool and MS Access as a back-end Relational Database Management System (RDBMS). Another is a web-based tool with an Apache internet server on a LINUX operating system. Web-based tools have been developed using HTML and JAVA as client-side scripting, PHP as server scripting language and MYSQL as RDBMS. The tool provides the information in tabular and graphical mode and Geographic Information System (GIS) thematic maps. The main screen of the standalone tool is shown in Fig. 6.1.

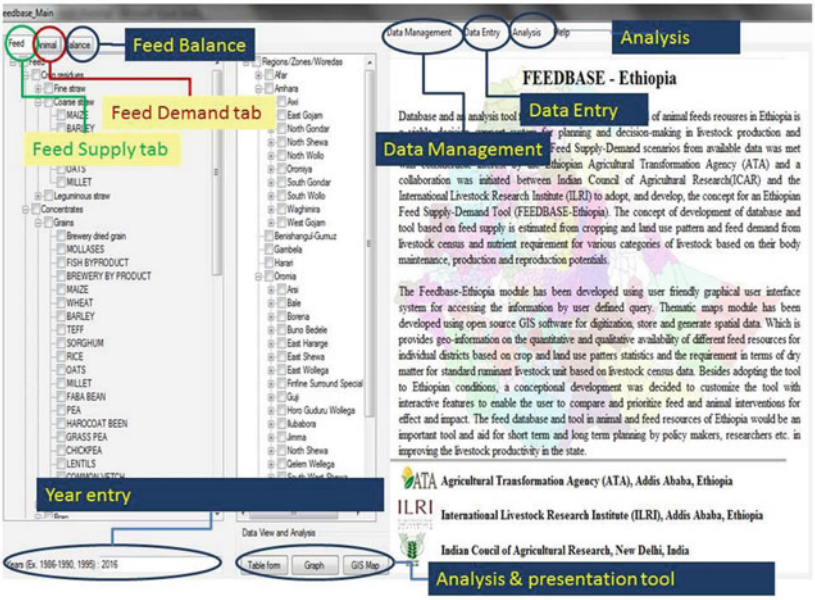

Fig. 6.1 Main screen of the analysis tool (*Source* Author's compilation)

FeedBase-India: The Demand and Supply of Feed Resource in India

Reliable assessments of feed demand and supply at different levels, such as the district, state and national levels, using an appropriate methodology, database and computational tools are streamlined by ICAR in India. To this end, it receives funding from the Ministry of Agriculture and Farmers' Welfare, Government of India. ICAR has made several efforts to assess the demand and supply of feed requirements of livestock at the state and national levels (Raju et al. 2002, 2005; Anandan et al. 2005; Ramachandra et al. 2005, 2007; Sampath et al. 2005). Based on the aforementioned approaches and the methodologies adopted, a database and visualization tool have been developed to manage the supply and demand of feed sources (Angadi et al. 2005, 2009).

The assessment of feed demand needs to be dynamic and flexible to accurately capture new information and map changing trends. Efficient

assessment helps in understanding past trends, emerging scenarios, foreseeable changes and their implications. Another important output of feed assessment is trend analysis. It entails synthesizing current assessment results and comparing them with those recorded in the past. The changes that are caused by unpredicted driving forces should also be identified and assessed.

Contents of the Indian Database

- A total of 637 districts within India were mapped into their respective states, union territories and agro-regions. These agro-regions belong to all districts of the country.
- Seven land use patterns and 42 crop conversion factors were used for calculating the availability of livestock feeds and nutrients from crop production systems and biomass.
- A total of 131 animal category-wise feed and nutrient requirements have been used for calculating the requirements of feeds and nutrients.
- Data from 1985 to 2014 on crop production and livestock was updated, and the updating of 2015–2018 data is in progress.

The Indian feed database information system has been used by both the Central and State government agencies for the planning and development of the animal husbandry sector. Apart from the government agencies, several development institutes and private feed industries make use of the information collected to develop the dairy sector. Some of them include the National Dairy Development Board, research organizations like ICAR-Central Coastal Agricultural Research Institute (CCARI), Goa; ICAR-Central Sheep and Wool Research Institute (CSWRI), Avikanagar; and the Compound Feed Manufacturers Association (CLFMA).

The database has also served as a model for developing and accessing feed resources in the Asia Pacific Region and was initiated by the FAO's South Asia regional office. The information generated by the feed assessment exercise will have multiple clients/end-users starting from crop/forage breeders, livestock development agencies, feed industries, and policymakers to decide on the livestock development schemes. These decisions will be made based on the suitability of different locations and

the export/import policies of feed resources. The opinions of environmental scientists on the water and carbon footprints associated with feed and livestock will also be taken into consideration. Further, the database can also aid in addressing natural calamities through its network of surplus and deficit areas as well as donors.

Collaborations Between India and Ethiopia

Ethiopia struggles with a lack of expertise in feed and livestock resource management, even though the livestock sector is a major contributor to the Ethiopian economy. The current initiative has been undertaken to build the capacity of the stakeholders in Ethiopia and strengthen the livestock sector to promote sustainable livestock production systems. The initiative could be scaled up with additional training programmes aimed at skilling smallholders and landless farmers to facilitate proper feed resource management and the optimum utilization of available feed as well. There are also additional opportunities that could address technical suitability issues with the environment, water utilization and greenhouse gas emissions.

FeedBase-Ethiopia: A Pilot Study on Feed Supply–Demand in Ethiopia

To kick-start the collaboration and familiarize key stakeholders with FeedBase features, an inception workshop was held in Addis Ababa, Ethiopia from 1 to 3 August 2017. In the workshop, the methodologies were streamlined, adapted and modified for Ethiopian conditions.

In 2016, a pilot study undertook data collection to develop software. Data was collected from eight districts in total (two districts of each of the four regions of Ethiopia),

1. Mecha and Gondar Zuriya from Amhara Region (see Fig. 6.2),
2. Ejere and Dugda from the Oromia Region (see Fig. 6.3).
3. Arba Minch Zuria and Arbegona from the Southern Nations Nationalities and People Region (SNNPR) (see Fig. 6.4), and
4. Laelai-Maichew and Kilte-Awlaelo from the Tigray Region (see Fig. 6.5).

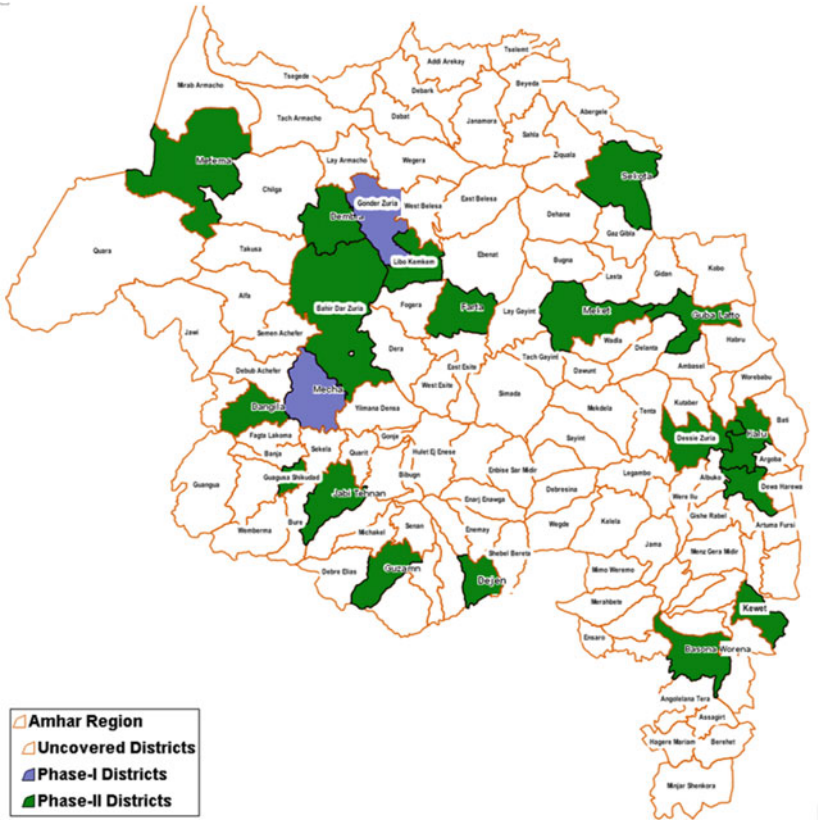

Fig. 6.2 Districts of Amhara Region selected for Phase-I and Phase-II studies (*Source* Author's picture)

Results based on these districts are discussed below. The process of data collection in Phase-II was extended to 20 more districts from Amhara Region (see Fig. 6.2), 20 districts from Oromia Region (see Fig. 6.3), 14 districts from SNNPRS (see Fig. 6.4) and 20 districts from Tigray Region (see Fig. 6.5).

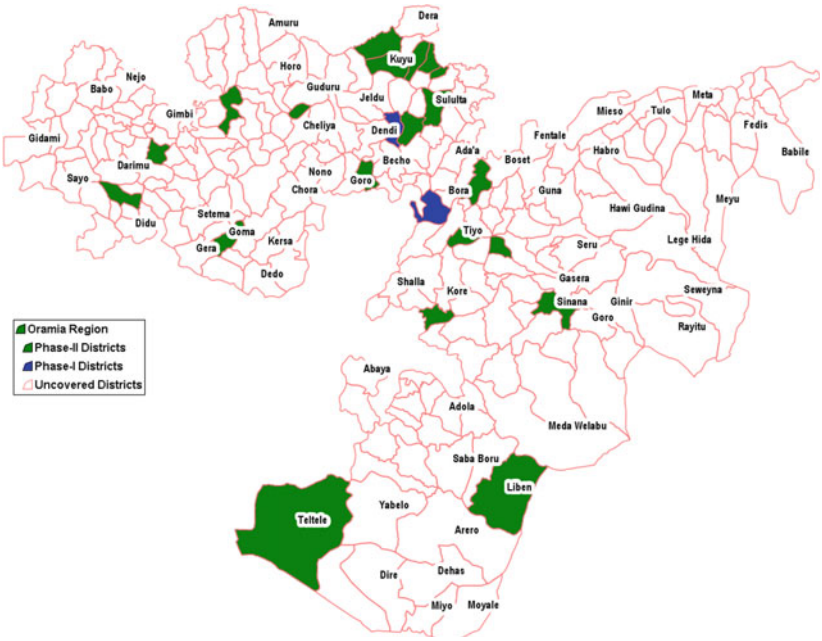

Fig. 6.3 Districts of Oromia Region selected for Phase-I and Phase-II studies (*Source* Author's picture)

Findings from the Pilot Study

A total of eight districts from four regions were studied to develop an understanding of the contribution of various feed resources to livestock production in Ethiopia. The feed resources were broadly categorized into five major categories:

1. Coarse straw (maize, sorghum, etc.),
2. Fine straw (rice, wheat, etc.),
3. Legume straw (red gram, green gram, etc.),
4. Concentrates (grains, cake, bran, *chana chunni*[1], etc.), and
5. Greens (cultivated fodder, grazing land, fallow land, etc.).

[1] Finely ground chickpea used as a fodder for cattle

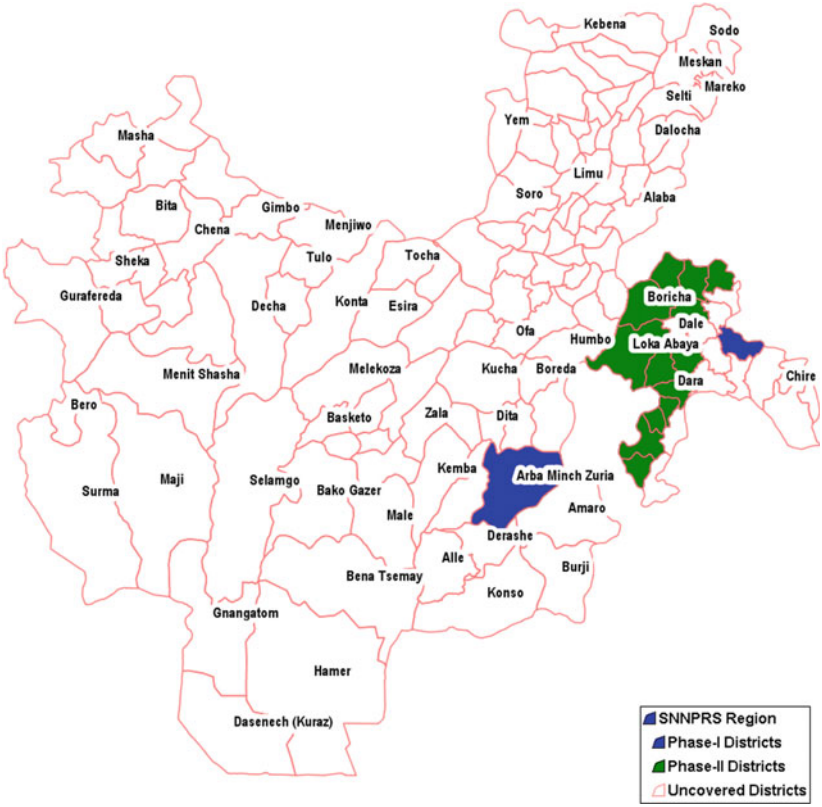

Fig. 6.4 Districts of SNNPRS selected for Phase-I and Phase-II studies (*Source* Author's picture)

The contribution of various feed resources in the eight districts was calculated. In the Dugda and Ejere districts, fine straw, coarse straw, concentrate and greens were the main contributors to feed resources. In Gondar Zuriya, legumes were seen to be an important feed resource, mainly substituting for the fine straw used in the Dugda and Ejere districts. In Laelai-Maichew, Arba Minch Zuria and Mecha districts, the contribution of maize straw to the coarse straw component was quite substantial, resulting in an increased overall contribution of coarse straw. This occurred particularly in the Arba Minch Zuria district where coarse

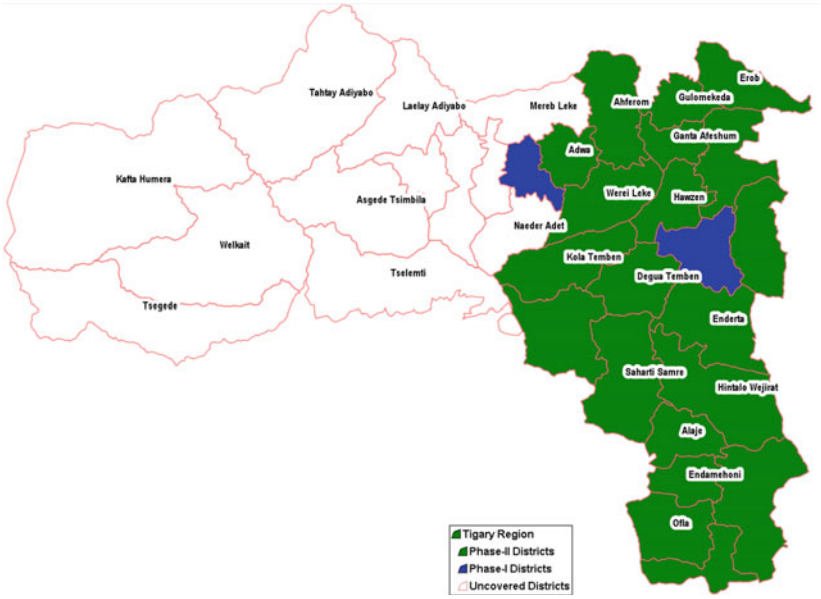

Fig. 6.5 Districts of Tigray Region selected for Phase-I and Phase-II studies (*Source* Author's picture)

straw and greens accounted for 49 and 48% of the feed resources, respectively. Fodder from the greens was the predominant feed resource in the Kilte-Awlaelo, Arba Minch Zuria, and Arbegona districts.

The contribution of different livestock resources to the farming systems has an important bearing on both the quantity and quality of feed resources required. Consequently, livestock distribution trends were studied and summarized across the eight districts to develop an understanding of the potential demand for feed resources. Cattle were the predominant resource in Kilte-Awlaelo, Arba Minch Zuria, Mecha and Dugda districts. Within this category, a majority of the cattle were local and non-descript breeds of low productivity, while the crossbreds with higher productivity represented a very small proportion. A large proportion of low producing animals are considered a drain on the available feed resources as significantly more feed resources are required for animal maintenance vis-à-vis production.

Gondar Zuriya and Laelai-Maichew are considered the poultry belts of Ethiopia. As a result, the demand for high quality concentrates in the regions is likely to be inflated. Small ruminants, comprising of sheep and goats, were predominant in the Ejere district where coarse and fine straw were the main feed resources.

Feed resource availability in a district, both in terms of quantity (DM) and quality (CP and ME), is assessed and compared with the requirements of different livestock species to maintain productive farming systems. Supply and demand are compared to determine the adequacy of feed resources, and deficits, if any, are quantified for different districts. The feed balance provides an important basis to develop strategies for better feed resource use and livestock management in order to augment the overall productivity of the farming systems. The findings of the preliminary study indicate that the demand for feed resources in terms of DM, CP and ME exceeds the supply in all districts, with the comparisons showing a quantitative feed deficit in all the districts varying from 48% for Mecha, 34% for Gondar Zuriya, 21% for Ejere, 15% for Kilte-Awlaelo, 14% for Arba Minch Zuria and 13% for Laelai-Maichew.

The findings of the preliminary study in all eight districts indicate that there is an acute shortage of feed resources, both in terms of the quality and quantity required for optimal livestock production systems. As the findings are based on a preliminary study, there is the need to build an adequate input data collection that has been used to generate the supply–demand scenarios before any concrete conclusions are to be drawn. A large number of variables are involved in the assessment of the feed balance, and it has to be ensured that the input variables used are realistic. This would allow the feed balance assessment to provide a more meaningful basis for planned interventions and further optimize feed resource utilization.

Notwithstanding the requirement for a more robust analysis, the findings from the available data indicate that feed shortages exist in the districts to varying extents. One major observation in the animal distribution is that the majority of available feed resources go to local and non-descript animals which are less productive and less efficient. As for feed resources, there is a scope to promote dual purpose crops, such as sorghum and maize, which can be used for both human and animal consumption.

A summary of the key findings and possible interventions of the study are as follows:

- An acute shortage of feed resources, both on a quantitative and qualitative basis. This could be addressed through a greater use of alternative non-conventional feed resources and by promoting dual purpose crops such as sorghum and maize;
- A reassessment of the large number of variables involved in assessing the feed balance,
- The optimization of feed resource utilization for better resource management,
- A majority of the available feed resources go to local and non-descript animal. These animals can be improved genetically or better management can be used to enhance production levels, and
- The extension of work to the entire country would aid the planning and framework for sustainable livestock production.

The long-term benefits of feed resource management include,

- A strengthening of the rapport with research scholars, government personnel and farmers to intensify sustainable livestock development,
- An imperative tool for planners, policy makers, animal husbandry departments and development agencies for efficient feed and livestock management,
- The development of optimal feeding strategies and the ability to cope with emergency feed shortage situations, and
- A dialogue on the environmental impact of deficits or surpluses of feed. Feed deficits can lead to increased environmental pressures, while the surplus feed supply can lead to increased stocking rates and adversely impact the environment. Such cases can be appropriately managed to prevent nutrient accumulations in the environment—on land, water and the atmosphere.

The analysis and visualization tool would be imperative for planners, policy makers, animal husbandry departments and development agencies for efficient feed and livestock management. It can additionally help farmers to determine whether to move, buy or sell animals, and assess the level of risk in decision-making.

The feed inventory data will facilitate planning within the livestock industry, especially in terms of determining how many animals can be

supported on existing feed resources. It can help identify new non-conventional feed resources and develop optimal feeding strategies to cope with emergency feed shortage situations. Further, such information can provide input data for country-level feed input-output analyses, import-export analyses and assessments of the environmental impact of livestock.

Initiating and Extending Cooperation with Other African Countries

In a similar form of collaboration within West Africa, Mali has initiated a charter for feed supply–demand inventory and optimum utilization of feed resources. This collaboration aims to understand the status of feed and animal resources at the district and block level in the country. The availability of such data will lead to a prioritization of researchers and catalyse policy decisions to narrow the supply–demand gap. This would in turn benefit individual farmers, the government and all the stakeholders concerned with the conservation and sharing of valuable feed resources and their management. An optimum use of feed resources helps small farming communities to minimize the cost associated with feed, feeding and nutrient management. Well-executed optimization techniques can lead to efficient management of feed and livestock resources when undertaken by the farmers and government departments; this would further result in improved productivity and sustainable livestock sector development.

Conclusion

India's formidable footprints in agriculture has propelled the country to the top of the agro-economies of the world. The Indian agricultural research system has generated vast knowledge on augmenting agriculture production, as evidenced by the Green and White revolutions in the country. As the Indian agricultural sector moves into the future, it meets new challenges, and consequently demands new and innovative solutions for them.

In this context, data collection and analysis using information and communication technology (ICT) emerges as a crucial tool for development. Data can be a driver of growth and change in agricultural production and research systems. It enables value chain members to understand interconnections between agriculture, livestock, international

commitments and competitiveness in agricultural trade. An ICT-based information system will help in decision-making for long-term and short-term planning in agriculture.

FeedBase-India is one such system. Through FeedBase, the ATA and ILRI showed an interest to adopt and adapt the concept for feed supply–demand analysis of livestock in Ethiopia and initiated work on it. In Phase-I, the work revealed an acute shortage of feed resources and the need for optimum utilization of feed resources. The analysis and visualization of feed demand–supply are crucial and elementary information for planners, policy makers, animal husbandry departments, livestock industries and development agencies. The database thus acts as an effective catalyst in the feed resource management that is essential in the growth and development of the livestock industry.

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CHAPTER 7

Developing Value Chains in Cotton Through Public–Private Partnerships

A. K. Krishna Kumar and Milan Sharma

Introduction

India and Africa have a lot in common although they are at different stages of development. Many countries in Africa recognize the suitability of Indian development strategies across different sectors which could help fast track their development process. India has made significant progress in achieving a relatively steady growth rate. Many countries in Africa are going through a rapid phase of growth with the help of Indian development experiences, capacity building initiatives and suitable technologies that could potentially help Africa move up the value chain. India overcame similar challenges a few decades ago and has successfully managed to become one of the leading economies in the world.

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India has successfully addressed many challenges in adopting and adapting technologies and practices relevant to the country. Thus, the endeavour has been to share India's experience and expertise in partnering with those economies that have a potential to add value, create jobs and ultimately attain a better quality of life—which is one of the main objectives of the Sustainable Development Goals (SDGs).

India–Africa Engagement in the Cotton Sector

Agriculture has significant potential for India–Africa cooperation and collaboration. Value addition is the key to developing and enhancing livelihood opportunities for the populace. Among the various crops that have potential for collaboration, cotton holds impressive prospects for value addition, as it could create jobs and reduce Africa's dependence on imports. About 37 out of 55 African nations are engaged in cotton production and trade, of which 25 have a sizable production and contribute about 6% of the world's cotton production (UN 2019). About 10–15 million people are dependent on cotton for their livelihoods. However, value addition of cotton continues to be low on the continent. Approximately 83% of sub-Saharan Africa's cotton (also referred to as 'white gold') is exported as lint to Asian and European countries (International Trade Centre) where it is spun, woven, stitched and exported back at higher rates. The growth of the sector is constrained by inefficiencies in production practices and technology, poor extension services, weak distribution and marketing, lack of well-developed infrastructure for research and quality standards, lack of access to finance, trade distorting subsidies and fluctuating prices. Cheap imports, less favourable factors of production and inadequacy of infrastructure (including logistics) have reduced the competitiveness of fibre and crop residue-based industries (textile and garmenting) (Table 7.1).

Table 7.1 Cotton production in Africa

Country	*Production in tonnes*	*Yield (kgs) of seed cotton per hectare*
Burkina Faso	256,500	1374
Mali	232,748	1017
Benin	102,600	941
Côte D'Ivoire	132,000	976
Sudan	95,000	2683
Cameroon	81,000	1250
Egypt	113,000	3386
Tanzania	81,000	790
Nigeria	105,000	682
Togo	37,000	815
Zimbabwe	75,000	507

Source FAOSTAT, n.d

India–Africa: A Technical Assistance Programme for Cotton

The Government of India's Cotton Technical Assistance Programme (C-TAP) was designed to support the Cotton 4 (C-4) group (coalition of West African countries consisting of Benin, Burkina Faso, Chad and Mali) who were seeking cuts in cotton subsidies and tariffs at the World Trade Organization (WTO).

While there are several initiatives by various governments and agencies to sustain the cotton sector on the continent, there is no coordination in the development of the sector as a whole. India has committed its assistance to cotton-producing African countries, mainly through capacity building initiatives (under the Indian Technical and Economic Cooperation, ITEC) and preferential market access to over 34 LDCs in Africa under the Duty-Free Trade Preference (DFTP) scheme (since April, 2008) (Ministry of Commerce 2017: p. 2) (see also Andrew, Chapter 12, this volume). It also extends concessional loans under EXIM Bank's Lines of Credit (LOCs) for infrastructure development. In addition to this, there are other initiatives under the aegis of the India–Africa Forum Summit (IAFS), which are being implemented by several ministries/agencies, to support the cotton sector in Africa (see Singh, Chapter 2, this volume).

African Initiatives on Cotton—A Review

Cotton, textile and apparel occupy an important place in many African countries. This sector is a source of income for millions of people, especially those living in rural areas, and is also an important source of foreign exchange earnings. The development of this sector is central to the policies of these countries because of its potential to create jobs and generate income. Though Africa has traditionally been an important cotton production base, over 80% of its cotton fibre is exported as raw lint for processing outside the continent, mainly to Asian countries. In order to enable Africa's cotton sector to realize its potential, it is necessary to strengthen the production systems and facilitate value addition.

The cotton, textile and apparel sector in Africa has been an active area for various international development and funding agencies, due to its direct impact on poverty alleviation and food security for African communities. To this end, the EU-Africa Partnership was established in 2004 for 'trade and development which aimed at establishing more equitable trade and enhancing the competitiveness and value addition of African cotton by optimizing the impact on producers' incomes. A Steering and Monitoring Committee of the Partnership, the 'COS-cotton', was established in September 2004, to manage the requirements of stakeholders and their alignment to the larger framework (European Commission 2012).

Financed by the European Union, the Food and Agriculture Organization (FAO) implemented a project titled 'Supporting competitiveness and sustainable intensification of African cotton sectors through capacity development on integrated production and pest management' (2013–2016) in Burkina Faso, Mali, Senegal, Tanzania and Zambia with the objective of increasing the income of cotton farmers (FAO 2019). The programme focused on training farmers, improved pest management (IPM) practices, and organized Farmer Field Schools (FFS). About 180 facilitators were trained on IPM, who in turn trained 4291 farmers through the FFSs.

The International Trade Centre (INTRACEN or ITC) implemented various African cotton development initiatives with the main objective of getting higher profitability for ginners. The profit would be met through the realization of higher lint and seed-cotton prices and/or through efficiency gains along the value chain. This was attempted through various soft interventions such as the preparation of strategic plans for the sector, cotton export guides, and capacity building of regional cotton related

associations (like the African Cotton Association, African Cotton Textile Industries Federation and the African Cotton Producers Association). At the national level, the ITC worked in Tanzania, Uganda and Zambia to build local capacities. It set up marketing tie ups with the ginning and spinning units (INTRACEN 2011). Further, the ITC launched the Supporting Indian Trade and investment for Africa (SITA) programme which was funded by the Department for International Development (DfID). It is being implemented in five East African countries; Kenya, Uganda, Rwanda and Tanzania. The programme aims to leverage India's expertise to build trade capacities in African partner countries; facilitate investments and transfer of Indian knowledge, expertise and technology to East Africa; and to enable access to the Indian market in the identified value chains—including cotton, textile and apparels (INTRACEN 2019).

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GiZ) implemented a programme for promoting cotton cultivation in sub-Saharan Africa, in partnership with the Bill and Melinda Gates Foundation (BMGF) in eight African countries (Benin, Côte d'Ivoire, Cameroon, Malawi, Mozambique, Tanzania, Uganda and Zambia), from 2009 to 2016. Under the programme, training courses were organized to enhance knowledge and skills at the producer level, strengthen rural services, promote coordinated agricultural policies and support strategies to help the farmers raise agricultural productivity and increase income. Under this project, the cotton produced was certified as per the Cotton made in Africa (CmiA) criteria (GIZ GmbH 2015).

The Cotton Expert House Africa (CHA) was founded in 2016 as the successor to the Competitive African Cotton Initiative (COMPACI). Up until its termination in 2017, the COMPACI programme supported 800,000 smallholder farmers and 22 cotton companies, sector groups and research institutes in 12 countries in sub-Saharan Africa to develop sustainable cotton production practices (CmiA 2019). As a non-profit organization, the CHA continues to foster sustainability along the cotton value chain in Africa—right from cotton cultivation to textile production.

The West African Cotton Improvement Program (WACIP) was launched by USAID after representatives from African countries (Benin, Burkina Faso, Mali and Chad) highlighted key areas for technical assistance to the cotton sector in a meeting in Cotonou in 2006 (USAID 2018). The programme, implemented by the International Fertilizer Development Center (IFDC), focused primarily on outreach to farmers

through existing extension services targeted to improve farmer productivity and practices, as well as efficiency in the ginning industry. The scheme reached over 900,000 trainees and helped them improved crop yields, adopt better farming practices and organize farmer credit and awareness (USAID, n.d.).

In 2014, USAID approved a new project for C-4 countries to increase agricultural productivity, strengthen partnerships and increase economic and social benefits for women in cotton-producing households. The USAID C-4 Cotton Partnership Project (C4CP) is a four-year project (2014–2018) worth US$ 14.8 million, aimed at improving food security in targeted areas of the C-4 countries (USAID, n.d.). The strategic objective of the project is to increase the revenue of men and women cotton producers and processors in targeted zones.

On 2nd December 2008, the United Nations Conference on Trade and Development (UNCTAD) organized a multi-stakeholder event on cotton, wherein trade ministers of six African countries voiced the difficulties that the crop faced in their respective countries (UNCTAD Annual Report 2008). It highlighted the need to address the problems of the cotton sector in African countries, specifically the low-income countries which are dependent on cotton exports. Following this, the Pan-African Cotton Meeting (PACM) was organized in Benin in 2011 which brought together multiple stakeholders and international institutions. As a part of the PACM, a ten-year 'Road Map' was drawn for the African cotton sector with the objective to align the different initiatives and give a general direction to the development of the African cotton sector at the pan-African level (UNCTAD 2014). The Road Map is thus a synthesis of existing regional strategies for the cotton sector in Africa and aims to increase productivity, improve marketing, and increase value addition. As the Road Map builds on existing regional cotton strategies, the expected role of regional and continental organizations is to develop appropriate structures and mechanisms for the implementation of the Road Map. Furthermore, the United Nations Conference on Trade and Development (UNCTAD) formulated a 'continental strategy to develop the regional cotton value chain for poverty reduction and food security' in 2014 (UNCTAD 2014).

Indian Interventions in Africa's Cotton, Textile and Apparel Sector

India has a flourishing textile industry, the second largest in the world after China. The sector has continued to play a critical role in the Indian economy. It contributes about 5% to India's Gross Domestic Product (GDP) and 14% to overall Index of Industrial Production (IIP). The textile industry employs about 40 million workers and benefits 60 million workers indirectly. India's overall textile exports during FY 2015–2016 stood at US$ 40 billion. The Indian textile industry, currently estimated at around US$ 108 billion, is expected to reach US$ 223 billion by 2021 (IBEF 2019). The success of the industry in India can be attributed to various factors, including good production systems, effective institutions supporting the sector, policy frameworks, experienced industry personnel, etc.

The textile sector is being looked upon as a trigger for development in many African countries and has found a place in their respective development plans/agendas with various initiatives being built around it. India is a credible and experienced partner in this sector, and multiple countries are working closely with India to develop their textile industry. As the two regions have similar conditions, Indian technologies often suit African needs with little modification and can be easily adopted. India has also supported various interventions through its grant-based and LOC projects. Facilities set up under the LOCs include textile projects inter alia, in Angola, Chad, Kenya, Ethiopia and Malawi. Similarly, various programmes have been initiated under grant assistance to help develop the sector in the African countries. These interventions include training and capacity building under ITEC, setting up of institutions/vocational training centres, and textile parks under IAFS and other such organizations. One such specialized initiative is the Cotton Technical Assistance Programme for Africa (C-TAP). The initiative, which is sector-focused and country-focused, is the first-of-its kind and serves as a 'proof of concept' which can be scaled up and replicated.

The Cotton Technical Assistance Programme—A Case Study

Background

Cotton plays a crucial and critical role in ensuring food security alongside economic security. The C-4 countries stated to the WTO that the cotton market faced trade distortions due to subsidies. This led to a drop in prices and, as a result, cotton producing African countries suffered. The C-4 group unanimously called for an end to this issue with support from all members and international institutions. The group also expressed a deep concern with regard to the lack of focused and predictable development assistance for this sector. The GoI committed its support to the C-4 group by working closely with them to realize the objectives of the Director-General's Consultative Framework Mechanism on Cotton Consultations, on the Cotton Development Assistance Session and on the issue of developing the cotton value chain.

In 2010, the GoI sent a high-level delegation consisting of cotton scientists, textile technologists, senior government officials, and policy makers to the C-4 countries, as well as Nigeria and Uganda. They aimed to chart out the contours of the cooperation program in these countries by understanding current upstream activities and assessing their status and potential for downstream activities. Acting on the recommendations of the Mission, the GoI decided to formulate a comprehensive 'Technical Assistance Program' to provide the necessary soft skills to the staff and professionals of the governments and catalyze improvements in the existing value chain. The C-TAP was implemented post-IAFS-II (2011), to primarily enhance the capacity of major cotton-growing countries in Africa.

Implementation Framework

The C-TAP was a pilot initiative to help the cotton-producing countries in Africa. The programme laid emphasis on capacity development and creating critical infrastructure for the training and demonstration of new technologies, which were finalized based on the specific needs of the partner countries. On the basis of relevant areas of intervention, the GoI identified leading institutions of national and international repute, such as Central Institute for Cotton Research (CICR), Central Institute for Research on Cotton Technology (CIRCOT), Directorate for

Cotton Development (DoCD), and National Centre for Integrated Pest Management (NCIPM) in India, to support the implementation of this programme. The implementation framework ensured the participation of research and development organizations and industry besides the government. Since many stakeholders were involved, the government decided to engage a professional Programme Management Agency (PMA) to be responsible for the coordination and implementation of the activities instead of an in-house Project Management Unit (PMU) under the Ministry of Commerce and Industry.

The PMA's scope of work included:

1. Engagement of all the stakeholders including African missions in India and Indian missions in the respective African countries,
2. Preparation of detailed component-wise reports and detailed action plans specifying timelines with regard to the release of funds,
3. Identification of nodal agencies and officers in the respective countries, who would act as a single point of contact and forge collaborations on a need-basis at the local level,
4. Facilitation of approval for the travel of scientists and officers; and arrangements for the visit of trainees and delegations from Africa to India,
5. Arrangement of translators/interpreters to assist the institutes in procuring equipment,
6. Responsibility for the framing of the eligibility criteria for the selection of trainees,
7. Follow up with the respective agencies to sponsor the right candidates,
8. Liaison with research institutes, Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and the Reserve Bank of India to speed up approvals and facilitate smooth and timely implementation of activities,
9. Play the role of a single point interface with the Department of Commerce,
10. Preparation of materials for creating awareness about the programme including the development of a website, periodic reporting on the progress, and publishing newsletters, and
11. Presence of a PMA representative during all training events to support the local institutions and obtain feedback. This arrangement was one of the distinguishing features which helped achieve

the envisaged results with limited resources. The Department of Commerce had engaged IL&FS Cluster Development Initiative Ltd. as the PMA at the commencement of the programme. However, it is important to note here that despite their best efforts, there have been significant delays in the project which are addressed in the latter part of the paper.

In order to effectively and efficiently implement the project and ensure ownership of the support extended by the GoI, nodal coordinating agencies (typically agriculture/trade ministry/a cotton body) were selected in the respective countries.

A multi-stakeholder Steering Committee with representatives from all concerned agencies and departments was constituted to supervise and monitor programme implementation. The committee was chaired by the Additional Secretary, Department of Commerce. The PMA reported to the Steering Committee for all approvals. This helped save time for many approvals. This implementation framework is unique, inclusive and has proved to be very effective for the timely delivery of programme activities.

A. Components

The programme was implemented in six African countries—Benin, Burkina Faso, Chad, Malawi, Nigeria and Uganda, with the objective to assist them in improving the competitiveness of cotton value chain through a series of interventions. These interventions were grouped into two components: capacity development; and creation of infrastructure to facilitate technology transfer through demonstrations and training. Some of the unique features of the programme were: a judicious blend of need-based training programmes, exposure visits, and the establishment of required infrastructure to enhance effectiveness and ensure scaling up of the pilot initiatives. A value chain approach was adopted and all the nodes in production, post-harvest as well as value addition were covered. The components were:

1. Capacity Development Programmes

Capacity development programmes under the project aimed at building capacities of all individuals who formed a part of the value chain, from policy makers to farmers. They also aimed to achieve some scale through training the trainers, conducting 'in country' trainings under supervision and using cutting edge technology in order to move up the

value chain. For this purpose, activities were oriented to help them bridge immediate gaps (e.g. saw gins vs. roller gins, models of training cum micro-production units in garmenting, etc.).

The training programmes were designed with a well conceptualized mix of practical work and theory. They were conducted using the Train the Trainer (ToT) model, where the 'master trainers' were trained at the institutes in India and in turn trained more people back home for wider dissemination with the help of technical support from Indian scientists. Based on the needs assessed, the technical institutions designed a curriculum for each training programme. They also laid down a criterion for the selection of candidates, which the coordinators used as a guideline to recommend participants for specific trainings. The tools for training were devised and the trainings were undertaken using the training manuals that were developed in English and French. An interpreter or a translator was engaged for the entire duration of all the programmes. There was a system of getting regular feedback from the trainees and an assessment was conducted through a structured questionnaire at the completion of each training session. The programme worked on the principle that a trained pool of manpower can further train more people.

2. Creation of Infrastructure

The infrastructure created under the programme in participating countries was finalized on a need-basis in order to bridge the vital technology gaps through demonstrations and trainings on a regular basis. The facilities created were;

a. Model ginning factory adopting roller gins: The facility is equipped with advanced double roller gin with capacity to process 576 tonnes of lint cotton per season and a provision for expansion to another 576 tonnes of lint cotton per season. The centre is expected to provide hands-on training to about 1000 people annually on ginning and other post-harvest handling methods (IL&FS, n.d.).
b. Bio-pesticide laboratory set up in Uganda: The laboratory established at the National Semi-Arid Resources Research Institute (NaSSARI), located in Serere, is the first-of-its kind in the country. It would facilitate the identification and efficacy testing of native bio-control agents (mainly entomopathogenic fungal isolates) as an alternative to the use of inorganic pesticides for managing cotton pests and diseases. It is being used not only for cotton but for other

crops as well. It can be scaled up for mass production of suitable bio-agents and act as a learning platform for widespread technology adoption by farmers.

c. Garment production unit for skill development and production: The garment sub-sector is crucial due to its associated employment and income generation opportunities. However, it is constrained by the lack of quality skills, inadequate training institutions, outdated syllabus, lack of modern equipment and facilities. In light of this, two pilot scale 'Training Centres on Apparel Manufacturing' have been set up under the programme, one each in Kaduna, Nigeria and Makoka Research Centre, Malawi. Each Centre is equipped with 20 modern sewing machines to provide training on garment stitching to cater to local industries and markets. Each centre has the capacity to train about 250 people per year (IL&FS, n.d.).

B. Activities

Overall, the activities can be organized into three categorized: production related, post-harvest and residue utilization, and development of downstream industry.

a. Production related: The Central Institute for Cotton Research (CICR), the apex cotton research institute in India was responsible for implementing the production-related activities. It included training programmes for farmers, scientists and researchers on strengthening production systems and practices with the use of biotechnology.
b. Integrated Pest Management (IPM) and Integrated Nutrient Management (INM): This was implemented by developing an information and communication technology (ICT) based disease and pest surveillance system which can be used for real-time monitoring of cotton pests and disease problems and speedy advisory issuance to farmers through SMS linked services (with the provision for sending up to 50,000 pest advisory alert SMSs to farmers) (IL&FS, n.d.). The Directorate for Cotton Development (DoCD) facilitated long duration trainings and Farmer Field Schools through specialized institutions like MANAGE (National Institute of Agricultural Extension Management) and the Acharya N. G. Ranga Agricultural University (ANGRAU) in Hyderabad. The bio-pesticide lab set up

at the National Semi-Arid Resources Research Institute (NaSARRI) in Serere, Uganda, would facilitate identification and efficacy testing of native bio-control agents (mainly entomopathogenic fungal isolates) as an alternative to inorganic pesticides for managing cotton pests and diseases. The facility may be scaled up for the production of suitable bio-agents and act as a learning platform for widespread technology adoption by farmers. Appropriate agricultural implements which have been indigenously developed by Indian research institutes were also shared with all the countries. These are expected to reduce drudgery in the field and improve productivity.

Post-harvest and by-product utilization: The Central Institute for Research on Cotton Technology (CIRCOT) is another ICAR institute that implemented activities with respect to post-harvest practices and ginning technology. The trainings focused on reducing post-harvest losses, utilization of plant residue for increased farm income (like seeds, plant stalk, etc.) and minimizing contamination. It is interesting to note that most countries in Africa continue to use saw gins whereas countries like India have shifted to double roller gins which is a better technology as it retains the fibre length and quality. The usefulness of this technology was demonstrated through setting up of 'Model Centre on Ginning and Crop Residue Processing' in Benin.

c. Development of downstream industry: This activity was aimed at encouraging large investments as well as developing small and medium-sized enterprises in the cotton/textile value chain. The activities included exposure visits of various stakeholders, including policy makers, to the Indian cotton and textile sector besides Entrepreneurship Development programmes conducted by the Entrepreneurship Development Institute of India (EDI) in India as well as in Africa. Two pilot scale 'Skill Schools for Apparel Manufacturing' set-up in Nigeria and Malawi aimed to impart skills on garment manufacturing to the local youth (with a special focus on women) and expose them to a micro garment production unit to encourage entrepreneurship. Each school has been equipped with facilities to train 20 trainees per course/country. The programme

also trained three 'master trainers' per country through an exhaustive 2-week ToT course in India. The programme also developed strategies for the development of the cotton and textile sector for each of the participating countries based on the Indian experience. The Indian experience was used as a common guideline for all participating countries to help in formulating generalized strategies for the sector.

C. Results and Sustainability

The programme has benefited India and its host countries as a unique platform for the sharing of knowledge, experience and transfer of technology as mentioned above. It was designed and implemented in tandem with the emerging demands of Africa's cotton sector. It is expected to help the Indian investors in the textile sector who are exploring opportunities for expansion and sourcing of raw materials. The project has also produced insights on the African cotton sector, valuable for Indian scientists and extension officers for research and development programmes. There has been a continuous demand from all the participating countries and from new countries to continue the programme.

The success of the programme as expressed by the host countries in various forums and meetings, as well as its affinity to Indian experiences, has gone a long way in generating goodwill between the participating African countries and India.

Under the programme, in 6 years, over 1000 stakeholders (including farmers, industry professionals, scientists and policymakers) have been trained on various aspects of the cotton sector in India—including how to bridge the gaps in the cotton value chain, best practices, and technologies and policy frameworks related to production and industry. Some of these aspects are:

a. The training of 240 researchers and government officials on good production practices,
b. The skill development of 130 industry representatives on post-harvest management practices, and
c. Training of 20 high-level delegates on policy formulation and planning.

The programme has also supported direct technology transfer from India to host African countries for value addition, quality improvement and skill development through the creation of pilot scale infrastructure of demonstration facilities.

The programme followed a mechanism of taking feedback on a regular basis—during and at the end of the programme—on its components, overall effectiveness and facilities through structured forms/questionnaires. Each element considered for evaluation was asked to be rated on a scale ranging from 1 to 10 (with 10 as the highest rating). To simplify the evaluation, the rating scale was sub-grouped into Good (8–10); Average (5–7) and Unsatisfactory (5 and below). In addition to getting the participant's feedback on each aspect of training, a mid-term assessment of the initiative was also conducted to evaluate the impact of activities completed under the programme. The assessment was undertaken for,

a. Evaluation of each project activity in terms of its intended objective,
b. Effectiveness of programme management and implementation arrangements, and
c. The project's financial management.

The assessment was based on:

a. Concurrent evaluations conducted and documented at the time of implementation of programme activities;
b. Feedback from participating countries; and
c. Assessment by the implementing agencies.

This is also supplemented with information and feedback documented from time to time during the course of programme implementation and review of the information in training reports, visit reports, monthly/annual progress reports, minutes of project Steering Committee meetings and other feedback and project communication documents. Most of the programme activities have been well-received and appreciated as demonstrated by the matrix presented in Table 7.2.

Furthermore, the programme had a positive impact as evidenced by the host countries' initiative to adopt the best practices, resort to collaboration and seek assistance from various international agencies.

a. *Institut National des Recherches Agricoles du Bénin* (INRAB) requested the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) to support research on the utilization of cotton stalk,

Table 7.2 Summary of stakeholder feedback: Training/exposure programmes conducted in India

Activity name	*Participants' overall rating on effectiveness (on a scale of 10)*	*Feedback from host countries*	*Feedback from implementing agency*
Training programme on Organic Cotton for Uganda	9–9.5	Training & exposure provided under the programme was highly appreciated by all the countries	Training should be more extensive and for longer duration to implement the practices on ground
Training on Modern Production technologies	8.24	Was appreciated but should be longer duration to cover topics like seed production, IPM, developing cost-effective and energy-efficient agri-implements	
Training on Developing Master Trainers' on Extension Technology	8.93	More emphasis should be given on concept application/capacity building through demonstrations & field practical	It was learnt that some of the topics covered under the training could have been more technical
Training on Farmer Field School	Participants were satisfied with the training content and unique methodology of the training programme	This gave participants insights and skills on how to pass or transfer the production technology, from research shelves to the end-users, the farmers, for adoption	Not Available

Activity name	*Participants' overall rating on effectiveness (on a scale of 10)*	*Feedback from host countries*	*Feedback from implementing agency*
Development of (ICT based) Pest & Disease Surveillance System	9.1	An innovative product and training on identification of insect pests and diseases and on use of software were very useful	There was an issue with respect to availability of server space and quality of internet for hosting the software application locally and hence the software was demonstrated offline
Fellowship Training on Cotton Biotechnology	9.23	Uganda & Nigeria tried to capitalize the learnings and integrate them into their broader policy framework and requested for greater support in their readiness to adopt Bt cotton technology & managing bio-safety issues	Workshops may be organized in African countries to sensitize them on Bt Cotton & bio-safety issues; and Specialized programmes on 'cotton seed breeding and varietal improvement'
Training cum Exposure on Post-Harvest Management & Value Addition of Crop Residues	9.04	Found to be useful to serve as a guide and reference for adopting better cotton processing technologies in respective countries. Countries requested for India's continued support for developing residue-based industry	There is need in these countries to improve post-harvest practices, upgrade ginning technologies and develop residue-based industries

(continued)

Table 7.2 (continued)

Activity name	*Participants' overall rating on effectiveness (on a scale of 10)*	*Feedback from host countries*	*Feedback from implementing agency*
Training on 'Entrepreneurship Development	9	The training was appreciated, however, requested for more advanced training & longer duration	Required sensitization of policy makers and support system on importance of entrepreneurship
Exposure cum Study Tour to Indian Textile Sector	9.2	Visit was appreciated and they expressed desire to emulate and replicate India's 'cluster approach' to improve infrastructural facilities in potential textile centres	Technical assistance in the form training and technology transfer should be provided to African countries to enable them in setting up of 'model production clusters' to build competitiveness of small enterprises
India–Africa Textile Industry Meet	NA	Was appreciated by all countries as it generated lot of interest in considering partnerships between the sector agencies in two regions	There is a potential to increase trade and investment between the two regions which will be mutually beneficial for which focussed interventions are needed
Exposure Program to India for Policymakers	8.9	The delegates appreciated the insights gained during meeting and discussions during the conference on policy framework, visit to organic cotton farm & visit to textile cluster	It was a useful platform for sharing and learning from each other's experience

Activity name	*Participants' overall rating on effectiveness (on a scale of 10)*	*Feedback from host countries*	*Feedback from implementing agency*
Workshop of strengthening value addition in Nigeria	NA	All stakeholders appreciated the approach adopted for the workshop which was based on value chain development	Nigeria has immense potential to develop the sector adopting value chain approach with suitable policy, capacity building and infrastructure development

Source Author's data

b. Centre for Agricultural Research—Cotton and Fibers (CRA-CF) of Benin, Rural Institute Economy (IER) of Mali and Institute of Agronomic Research (ITRA) of Togo requested CIRCOT for technical support to set up a demonstration plant to manufacture a particle board,
c. Nigeria explored cooperation with India to develop Bt cotton technology, and
d. Inputs for drafting country-specific development strategies by governments, including Uganda and donor agencies such as ITC, Geneva.

All the results achieved have adequately demonstrated the success of the idea and confirmed the effectiveness of the model. This programme has the potential to be replicated across not only the cotton-growing countries of Africa but also in other countries from CIS and South Asia. Some work has already been initiated in this regard by the GoI.

Subsequent to the India–Africa Forum Summit III of 2015 in New Delhi, India's rapid engagement seems to have tapered as many of the programmes committed under the IAFSs did not take off. Initiatives like C-TAP would go a long way in strengthening the partnership between the two growing regions that have been long-standing partners.

The major factors that have contributed to the success of the C-TAP initiative are multiple stakeholder involvement and management by a single agency. One of the key reasons for its success was because it was flexible enough to allow for changes and mid-course corrections.

Case Study: Uganda

Uganda is one of the participating countries under C-TAP. Though a smaller producer of cotton vis-à-vis the C4 countries, Uganda's advantage is the production of niche products through organic farming and value addition. An active participant in the programme, Uganda has institutionalized the learnings from the programme to achieve the stated objectives, such as productivity enhancement, improving quality organic cotton and value addition. Some of its success stories accomplished as a result of C-TAP have been cited in several publications. For example, an article entitled 'Boosting Yields in Africa-What Technologies Work?' was presented during the 6th Breakout Session of the 77th Plenary Meeting

of the International Cotton Advisory Committee (ICAC) held in Abidjan, Ivory Coast in December, 2018.

The cotton research institute (NaSSARI) brought out a 'Cotton Farmers Production Guide' (under publication), which captures the information on modern cotton production techniques based on learnings from the various training modules under C-TAP. The Cotton Development Organization (CDO) and the Uganda Ginners and Cotton Exporters Association (UCGEA) have been working together to improve the extension system. Based on the experience from Farmer Field School trainings, they have formed over 6000 cotton farmer groups between 2015–2018, thus increasing farmers' access to relevant technology and high-quality production inputs. The impact of this is visible as the cotton production in Uganda has risen from 110,707 bales of lint (at 185/- kg) in the 2015/2016 season to 208,622 bales in 2018/2019, mainly due to productivity enhancement through increased adoption technology, which boosted small cotton farmers' income.

The country also adopted the technology for value addition to the crop residue developed in India to produce by-products. Pilot facilities for the manufacture of briquettes from cotton stalks have been set up. Furthermore, as part of its effort to move up the value chain through downstream activities, a pilot plant for the manufacture of absorbent cotton wool for medical uses is also being established and funded by UNCTAD in Eastern and Southern Africa.

A bio-pesticide laboratory was established under C-TAP at the National Semi-Arid Resources Research Institute (NaSARRI) in a bid to promote the cultivation of organic cotton. The lab is being effectively used to formulate bio-pesticides for pest control from locally available plants like *Lantana camara*,[1] Neem (*Azadirachataindica),* Mahogany Species, *Khaya senegalensis*[2] and *Moringa olifera*[3]; and for the isolation of

[1] It is a species of flowering plant native to the American tropics.

[2] It is a species of tree native to Africa (commonly known as African mahogany).

[3] It is a fast-growing, drought-resistant tree native to tropical and subtropical regions of South Asia (commonly known as Drumstick tree).

fungi like *Metharhizium anasophliea*,[4] among others. These pesticides—known for the bio-control of major pests (especially the *Lepidopteran*[5] variety, which include Fall army worms, Cotton bollworms and Maize Stem borers)—were prepared and tested for efficacy in the farms in the country. The lab was also used for testing soil samples which reduced the testing costs for farmers. The setting up of a lab closer to the production site proved to be quite helpful. There have already been requests for these bio-pesticides from several other African countries.

Challenges Faced and Lessons Learnt

At the implementation level, the C-TAP programme faced various challenges at different points of time. Some of them are as follows:

- The budget/resources were limited with respect to the countries involved, activities undertaken and stakeholders engaged. The allocated budget was thus spread out thinly at times, which posed significant financial constraints. The reconciliation of the budget with various agencies resulted in time overruns.
- The duration of the programme was short given the nature and ambit of its outreach. Due to the complexity of the project and the need to bring all the stakeholders on board, an adequate preparatory period of at least 5 years was required.
- Working with linguistically and culturally diverse participating countries was a challenge. For instance, a number of them were French speaking and considerable time was spent in translation.
- While the participation of multiple institutions spread across six countries added value to the programme in terms of the quality of technical inputs, it also resulted in delays and posed challenges in coordination. The organizers faced huge gaps in capacity at all levels, including policymaking (in India and the African countries). A thorough understanding of the tax laws, export-import policies and local agency capacity to incur expenditure is required while preparing such projects. The PMA was confronted with extreme challenges in components where infrastructure was to be created as such initiatives require meticulous planning and a 360-degree feedback to achieve

[4] It is a fungus that grows naturally in soils throughout the world and causes disease in various insects by acting as a parasitoid.

[5] It is an order of insects that includes butterflies and moths.

the desired results. Infrastructural and logistical gaps often created delays and added to the cost of the programme.

- A follow-up system is necessary to ensure the sustainability of new initiatives. It is crucial in large-scale capacity building for infrastructure projects. In addition, stand-alone training programmes may not yield the best results. Besides, financial as well as technical support is also required for operations and management.
- The programme depended almost entirely on the host countries for the creation of infrastructural facilities such as land, building, water, power, manpower and last mile connectivity. However, there were difficulties in the availability of these amenities.
- A capacity development project of this scale and nature requires a larger budget and needs to be viewed differently from other routine training programmes.
- The programme was not adequately institutionalized and the implementation was more individual-centric. With the change of officers involved at senior levels in the Ministry of Commerce, External Affairs and several embassies, there was a shift in outlook of the officials towards the programme, mainly on the Indian side. This had an adverse impact on project implementation.
- The response time of participating countries was longer than expected and resulted in project delays. This included delays in the nomination of suitable participants for training, arrangment of infrastructure facilities to set up pilot facilities and to provide additional support like sending invitation letters for visas, etc. These issues could be remedied by a more intensive involvement of the Indian Embassies or High Commissions for effective programme implementation.

Conclusion

The C-TAP programme has been well appreciated and acknowledged by all the participant countries in Africa. The fact that there have been repeated requests for up-scaling and continuing the project in the same countries, alongside the demand for its extension to other African countries, stands testimony to the effectiveness of this programme.

The programme built stakeholder capacities in the cotton value chain through exposure to the latest technologies in the cotton production and post-harvest processes, and provided hands-on training. It also facilitated

the transfer of some of the best practices through capacity development as well as the creation of need-based critical infrastructure to provide practical training. Though the programme focused on production and post-harvest related activities, it provided policymakers an exposure to downstream activities as well. The sharing of the cluster-based approach adopted in India for the development of the textile industry and its potential for job creation and boosting exports was timely and relevant.

Africa imports a bulk of its fabrics and garments, which drains its foreign exchange and restricts domestic manufacturing. Therefore, any downstream activity that results in import substitution and employment generation is of immense significance. The C-TAP programme introduced innovative ways to develop entrepreneurship in the cotton sector through, for instance, the skill-development-cum-micro-production units for garment manufacturing in Nigeria and Malawi.

Despite the limited funds allocated to C-TAP, a one-time technical assistance programme, the feedback from the participating countries has been positive. However, the programme could be better leveraged and be more effective and sustainable through a follow-up activity such as a complementary project.

Finally, it is encouraging that there is a greater awareness about such programmes among the GoI officials. The project has also witnessed changes in the approach as well as the outlook among the implementing officials. There is a greater realization that such programmes need to be institutionalized to a greater extent, to gain tangible and intangible mileage, from the point of view of economic diplomacy. Despite the limitations referred to in this chapter, the project achieved very good results, notwithstanding these challenges, principally because of a robust implementation framework that allowed an external programme management agency to support the Department of Commerce. Further, when there are multiple agencies involved, the government ministry is in a better position to implement such programmes within a neutral framework. Summing up the outcome of the project, a policymaker from Malawi stated, '[It is] …an initiative in which money has been well spent'.

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CHAPTER 8

Women-to-Women Cooperation: Learnings from SEWA

Reema Nanavaty

Abstract SEWA's relationship with the sisters of Africa has been long standing. Groups of African sisters from various organizations have visited SEWA for exposure cum training programmes since the early 1990s. The African delegations learnt about SEWA's approach towards economic rehabilitation through the setting up of women's own economic organizations and women-led value chains, especially in agro-food processing. This has helped in replicating SEWA's long-standing value-based work in countries like Ethiopia, Mali, Ghana, Burkina Faso, Kenya, etc. The African Development Bank invited SEWA to be a part of the Annual General Meeting held in their home state, Gujarat, India, in 2017. SEWA shared their experiences with African organizations during the panel discussions as well as at the side events. SEWA has taken cognizance of the many similarities between the women it works with in India and Africa, in terms of the challenges they face for trade and improving

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their economic situation. SEWA organized a round table conference at the Annual General Meeting of the African Development Bank held in Gujarat, India in 2016 to establish the nexus between energy, agriculture, work and women, and its impact on sustainable agriculture. SEWA-Africa relations are on an equal footing and offer opportunities with a potential for mutual learning. SEWA proposes a SEWA-Africa Women Economic Partnership which can focus on three specific areas: women's access to ownership of ecosystem-based agriculture, women's ownership of renewable energy products and women's access to capital to strengthen their livelihoods.

Self-Employed Women's Association (SEWA)

The Self-Employed Women's Association (SEWA) is a member-based organization of poor women employed in the informal sector in Gujarat, India. It was established in 1972 by Ela R. Bhatt, an Indian cooperative organizer, activist and a Gandhian. According to her, poverty is the most vulnerable condition. The conditions of being poor, of being self-employed and of being a woman are all distinct yet interrelated states of helplessness. SEWA works towards achieving the twin goals of: full-employment and self-reliance alongside sustainability. A farmer growing food for the world but going hungry himself or herself demands a rethinking of existing social and economic organizations. Elaben strongly advocated the concept of '*Anubandh*'[1]—the idea of building holistic, mutually beneficial communities within a hundred miles of each other (known as the '100 Mile Principle')—a decentralized concept to cater to the basic needs of daily life, goods and services including food, water, shelter, clothing, primary education, primary health care and primary banking within a hundred miles from where one lives.

Bhatt further believes that a community is autonomous when it controls food, clothing and shelter, and loses control over their well-being when they go beyond the local (see Bhatt 2015).

[1] *Anubandh* is an old word used in Bhagwat Gita Chapter 15 Shloka 25. Gandhiji has used the word in reference to Education. Elaben has widened the word in terms of linking self, society and nature, as one. SEWA believes that the sense of *Anubandh* will guide us towards a path of communities that are local, sustainable and in harmony with the natural environment. They also advocate that 100-mile communities will be linked one day to give us a world without hunger, poverty, exploitation or environmental degradation.

The first twin goal of full employment of the community members helps achieve work, income, food and social security viz. health care, childcare, nutrition and shelter. The second twin goal of self-reliance enables members to become autonomous, self-dependent and capable of decision-making at the individual level as well as at the level of the community. These twin goals of SEWA are achieved through the strategies of struggle and development. The struggle aims to overcome the constraints and limitations imposed by poor socio-economic conditions, while development strengthens women's economic status, thereby fulfilling and enhancing their social security. SEWA's experience says that the foundation of development for women is stronger if built on four core pillars. These are:

1. Organizing;
2. Capacity building;
3. Capital formation; and
4. Entrepreneurship.

SEWA focuses on poverty alleviation and food security, with a strong emphasis on the empowerment of rural women engaged in agriculture. It contributes to the empowerment of 200,000 small and marginal women farmers and informal sector workers through support for grass-roots campaigns and social mobilization. As a labour union, it works primarily to strengthen and advocate the position and rights of the informal labour force. By building the economic organization of its members, SEWA enables their transition from wage labourers to owners and managers of their own trade, thus creating alternative livelihood opportunities.

SEWA members are organized into 4813 Self Help Groups (SHGs), 160 cooperatives, economic federations and 3 producer companies (Nanavaty 2018: p. 4). The Association works as a national lead organization for family farming to promote the UN agenda to strengthen families for food security.

Women, Work and Food Security in South Asia: SEWA's Experience

At the national level, there has been a decline in the cultivation of food crops and an increase in cash crops. This has led to farmers remaining

hungry in spite of being cultivators. Over the past four decades of experience, SEWA has realized that nearly 200,000 women farmers face various challenges. These include a lack of access to support services such as capacity building, extension services, market information, technical education, tools and equipment, organizing, credit availability and market linkages. To further investigate the constraints and needs of farmers, members of SEWA launched their own agriculture campaign in 1995 and attempted to address a critical question—'Why does the farmer go hungry?'

SEWA believes that there is a pressing need to improve the collective strength and bargaining power of female cultivators, in an integrated manner under the leadership of women themselves. SEWA's approach has been to treat agriculture as entrepreneurship. By mainstreaming agricultural practices with market demands, it works towards upgrading farming from being subsistence level to becoming viable and profitable. Small, marginal farmers and women cultivators are organized into farmers' collectives (farmer groups), which are federated with district associations. These associations are well connected with SEWA (and communicate regularly with the farmers) as well as the SEWA Bank which provides them with timely access to credit. This enables them to avail agriculture inputs such as seeds and fertilizers on time and thus increases the farm yields by almost 30–40% (SEWAa, n.d.; SEWA Bharat 2014).

SEWA has undertaken several simple yet innovative initiatives to facilitate access to climate-resilient agriculture and ensure nutritious food for their members. Through years of experience, SEWA has demonstrated that women are the best agents to engineer change and address new aspects of development in a society. With the face of Indian agriculture getting feminized and the increasing acknowledgement of the female farmer's presence in Indian agriculture, women are best placed to work towards the economic and social security of their families, and implement frameworks for using climate-resilient agriculture. SEWA encourages community involvement spearheaded by women to implement climate-resilient practices in agriculture to facilitate women farmers' right to food, which can be replicated and adopted in other communities.

These initiatives are:

A. The Rural Retail Value Chain:

SEWA also strives to provide economic security to agricultural workers and to bring them into the fold of development. One of SEWA's

pioneering initiatives is RUDI—the Rural Distribution Network. RUDI (named after a SEWA member) is a multi-trading company, owned and managed by the small and marginal farmers of SEWA. It is a robust rural distribution network that strengthens the entire commodity supply chain and links the farmer directly to the end consumers or the markets. RUDI in Gujarati means pure and beautiful and eponymously brings nutrition and food security to over a million households today. SEWA envisions an integrated form of food security that also encompasses nutritional security through sustainable agriculture. The smallholder farmers sell their produce to RUDI, which is then graded and processed into small, affordable packaging for redistribution into the villages by SEWA's sales force—called Rudibens or Rudi sisters. Working with an integrated approach, SEWA thus organized access to technical trainings, agricultural inputs, tools and equipment, finance and credit.

It is a rural supply chain that procures agricultural produce from marginal farmers at fair prices. It processes and packages the products at various rural processing centres with the help of women trained at the grass-roots level. RUDI takes affordable and unadulterated branded products to remote households via a large team of trained saleswomen from vulnerable households.

B. Access to Technology via the RUDI Sandesha Vyavhar:

This application is an affordable, simple-to-use and easily accessible mobile tool. It enables the Rudi sisters to place orders, track their inventory and sales and even run reports by using just the application feature on basic handsets. Such technologically driven innovation is strengthening local agriculture and agri-supply chains under the leadership of women and provides broader employment opportunities for youth.

RUDI facilitates development and sustainability through the following:

- Building a rural distribution network for women workers in the informal sector which acts as a supply chain owned and managed by these women;
- Linking the women workers in the informal sector and their enterprises to get market access through online platforms—local to national and local to regional;
- Including technological innovations such as an e-platform for the enterprises of women workers in the informal sector. Women can access real-time inventories and sales records which are linked to the mobile payment system on these platforms;

- Facilitating private sector partnerships that enable the small and marginal farmers to gain access to the mainstream market and reap the benefits of scale and value addition;
- Enhancing the capacity of local farmer associations to play the role of an aggregator in organizing small and marginal farmers and preparing them to supply to the mainstream market; and
- Strengthening the capacity for distribution, through procurement, processing and grading in order to supply quality goods to the market.

RUDI has positively impacted marginalized households at several points. Approximately 15,000 small and marginal farmers sell their produce to RUDI every year at their doorsteps for rates that are 20–30% higher than those offered by traders (SEWAb, n.d.). Over 300 women are employed at RUDI processing centres. They earn from INR 5000 (US$ 73) to INR 8000 (US$ 116.8) per month. Additionally, over 3000 saleswomen take RUDI products to rural households and thus earn a monthly income from INR 2000 (US$ 29) to INR 10,000 (US$ 146)[2] (SEWAb, n.d.).

SEWA also sets up market linkages to enhance farming at a subsistence level to an agri-business. Some of the major inputs in the backward value chain are as follows:

1. *Seed Banks*: SEWA encourages its members to preserve seeds from their harvests in order to reduce input costs for subsequent cycles of planting. SEWA's farmers groups have also secured greater margins by obtaining licences from the Seed Corporation of India to sell seeds and fertilizers. Approximately 220 acres of land is cultivated by 7500+ farmers who currently source seeds from the SEWA seed bank (SEWAa, n.d.).
2. *Soil Health*: Farmers often have a limited theoretical knowledge about the quality, kind of soil, or the proportion of nutrient content their land possesses. SEWA, in partnership with the Indian Farmers Fertilizer Cooperative (IFFCO), conducted training sessions for 6455 farmers in Gujarat on how to test the quality of soil. 20,000 marginal farmers have now opted for soil health cards and are well

[2] 1 US$ = INR 68.45 in July 2019.

versed with the type of soil and kind of crops that can most suitably be grown on their farms. While 93% respondents reported an increase in their farm yield, 92% reported an increase in income. The average reported increase in yield and income was 20.7% and 25.3%, respectively (SEWAa, n.d.: p. 17).

3. *Plant Clinics*: SEWA set up 119 'plant clinics' in two districts—Ahmedabad and Sabarkatha—which cover between seven and ten villages. These clinics are run by 'plant doctors' who are master trainers and provide services for soil testing, crop advisory, proportion of organic fertilizers to be used and timely information regarding bio-pesticides.
4. *Organic Farming (Manure—Vermicompost):* SEWA has been actively promoting the use of vermicompost and organic fertilizers among its farmer members as an effective means of enriching soil. Women have taken on the role of vermicompost producers where the Vanlakshmi Tree Growers Cooperative, for instance, has been producing and selling vermicompost, and have made their entire farm organic. Local farmers are also given training—presently, 582 members from groups have started the production of vermicompost on a commercial basis. Current production is around 1–1.5 tonnes of fertilizer per month per member. Ninety per cent of the respondents who started using vermicompost in their farms reported a reduced need for fertilizers. The average reported reduction in fertilizer use was 19.3%. Ninety per cent of the surveyed members also reported that they required lesser water for irrigation. Ninety-eight per cent of the respondents reported increased yield (SEWAa, n.d.: p. 17). These women-run initiatives are promoted by the organization to create and support an additional stream of income.
5. *Tools and Equipment Libraries*: Small and marginal farmers cannot afford to buy expensive agricultural tools like tractors, threshers, etc. During the time of need, they have to rent this equipment at a steep rate. To combat this constraint, seven tool and equipment libraries are currently run by the village-level farmer development group and benefit 15,000 farmers from the three districts of Mehsana, Surendranagar and Bodeli (SEWAa, n.d.: p. 24).
6. *Farmer's Field Schools*: SEWA develops master trainers to carry out sustainable farm management. This cadre manages their own field schools and offers training to other farmers. So far, SEWA has set up 15 Farmer Field Schools and trained 64,555 farmers, covering

all 14 districts of Gujarat. These training schools are decentralized and operate in the areas where the women live. Training is provided by women with experience at the grass-roots level in agriculture and working in the fields. The communities also see the practical results of such learnings on the fields of their master trainers. SEWA supports such women through hand-holding measures in the provision of these trainings.

7. *Farm Top Energy Access:* To reduce input costs, SEWA introduced solar pumps with a drip irrigation system connected to the solar pump for the cultivation of their crops. This reduces the wastage of water drastically and thus saves both water and money, which is otherwise spent on diesel for pumping water (usually at a rate of INR 100–INR 120 per hour) or for buying water (SEWAa, n.d.: p. 26).
8. *Digitization*: To save its carbon footprints and keep real-time records, SEWA has introduced many digital initiatives spanning all districts in Gujarat for its women farmers. These include:

   i. PaySe—this is a peer-to-peer e-wallet payment solution, which digitizes collection activities,
   ii. MPaise—mobile-based digital money solution, and
   iii. MBachat—a multilingual android application built to collect savings details of the members of its SHGs.

C. Sister-to-Sister Approach for Food Security: Collaborations between SEWA and Africa

Since the 1990s, SEWA has worked with sisters from African countries through its ingenious sister-to-sister approach towards learning and knowledge sharing. Over the past decade, the Association has also expanded its network to countries such as Afghanistan and is now working in eight Asian countries through this very sister-to-sister approach.

Nearly 70% of Africa's poor live in rural areas and depend on agriculture for food and livelihood. In sub-Saharan Africa, 50–75% of the agricultural labour force comprises of women (FAO 2011; Nanavaty 2018). About 218 million people live in extreme poverty and 85% have less than 2 hectares of land (Trickle Up 2019).

Women's groups from the African countries of Kenya, Ethiopia, Ghana, Mali, Burkina Faso, Mozambique, Nigeria and Zimbabwe collaborated with SEWA for exposure visits and training sessions for about three

and four weeks. The groups met SEWA members and visited economic organizations owned by them to learn about their life stories, struggles and how to overcome challenges. Women learnt about developing sisterhood, solidarity and strength through collective action for their economic empowerment. SEWA's woman-to-woman learning and knowledge sharing as an approach is a scalable and replicable model which is now used in several African and Asian countries (Table 8.1).

Women from various countries in Africa have interacted with and benefitted from SEWA. Some of their testimonies are shared below;

Dabire Elina, a participant from the Burkina Faso team said,

> SEWA's message is for all our African sisters. The groups of Burkina and Mali are functionally different, whereas in SEWA a commonality runs through all the groups. The master trainers have very good command on what they deliver and they have good information on the topics. Moreover, the leaders articulated very well about their life stories, struggles and how they overcame their struggles and they are also aware of the current affairs. The RUDI value chain was a great learning for me. The way in which the Rudibens do marketing is amazing. All these will help us in Africa.

Another participant, Johanna Some of Mali, stated;

> When I arrived here, what impressed me most was SEWA's structure. At all levels, the grassroots women are owners and decision makers of their own organizations. When we visited the Vanlakshmi Tree Grower's Cooperative in Ganeshpura village, we saw the newly elected executive committee in

Table 8.1 SEWA's work in Africa

Sr. No.	*Country*	*No. of women participants*	*Outreach*
1	Burkina Faso	5	4000
2	Ethiopia	10	50
3	Ghana	5	20
4	Kenya	20	80
5	Mali	5	1500
6	Mozambique	5	20
7	Nigeria	10	100
8	Zimbabwe	5	20
Total		65	5790

Source Nanavaty (2018)

> action. The members of the cooperative elected these leaders. I saw that and I am very impressed…If one wants to create a group or a union, they need to have leaders that are skilled enough for their tasks. We got training on leadership by using role plays, images videos etc. Thanks to the '*SEWA Manager ni School*'[3] who developed such tools by which trainers could easily teach us leadership training at Anand District cooperative promoted by SEWA. I was very impressed to see that not only the literate but also the illiterate can get actual knowledge in order to comply with their duties.

Sana from Mali opined,

> When I am back home in Mali and especially at the level of our union *'Femmes en Action'* I feel we can set up the credit system we witnessed here at SEWA. That will help us in becoming 100 per cent self-reliant without needing an external financial partner. Our daily FCFA [West African CFA franc] 5 franc subscription will build us a required capital. This is the system which I am really planning to set up upon my return.

Maria Poda from Burkina Faso shared;

> Once I am back in Dissin, I will try to restructure the groups. Since I am already working with them and know the fact that most of the women are illiterate, we will try to start a literacy process with them. I believe we must start with this. (*SEWA Manager Ni School* 2012)

In Africa, SEWA works on sister-to-sister knowledge sharing through the support of various UN agencies, such as the International Fund for Agricultural Development (IFAD), Food and Agriculture Organization (FAO), and the Ministry of External Affairs (MEA), Government of India (GoI). SEWA initiatives in this domain have been recognized by UN agencies as well as the World Bank that acknowledges the potential role SEWA can play to help strengthen agriculture and farming in Africa under women's leadership. The very first of such initiatives for global learning was in 2012. The United Nations Secretary-General launched the five-year Global Education First Initiative in September 2012 to accelerate progress towards the 'Education for All' goals and the education-related Millennium Development Goals (MDGs). The three main priorities of

[3] *SEWA Manager ni School* (SMS) is a resource organization of SEWA for building managerial capacities among women at the grassroots.

GEFI were to expand access to education, improve the quality of learning and foster global citizenship. The initiative aimed to:

- Rally together a broad spectrum of actors for the final push to achieve the MDG targets by 2015.
- Put quality, relevant and transformative education at the heart of the social, political and development agendas and
- Generate additional and sufficient funding for education through sustained global advocacy efforts.

SEWA was approached by the Global Fairness Initiative (GFI[4]) in 2011 that works for the Shea Nut Economic Empowerment programme to help organize women farmers in Ghana. In September 2011 the GFI, with the support of the World Bank, designed the PangSung Shea Butter and Shea Nut Pickers Association (PASNSPA)—a Ghana Women Farmer's Partnership Programme—with an objective to improve the Ghanaian producer's skills to benefit from the Shea Nut production value chain. Women farmers from PASNSPA Ghana visited SEWA and met their counterparts from SEWA in the rural areas. They aimed to understand the concept of collective farmers groups and how SEWA helps, integrates and builds the capacity of women farmers to strengthen their supply chain and move up in the value chain.

The groups imparted community-based organizational training and conducted practical visits to the group members and the RUDI processing centre to understand how poverty among women farmers could be eliminated. The PASNSPA has become more effective as an organization by adopting the innovations introduced by SEWA in their new strategic plan. This initial exchange was meant as an inflexion point towards a dialogue on building a better future and committing workers to a vision of activities that they can accomplish by taking external advice. The PASNSPA indicates that the exchange was indeed a unique opportunity for women to learn strategies for overcoming economic, legal and cultural barriers and developing practical business solutions that adapt to women producers' needs. The programme economically empowered women producers by establishing greater ownership over their supply chains, building capacity

[4] Global Fairness Initiative (GFI) is a non-profit organization that promotes sustainable and equitable approaches for economic development for the world's working poor.

among producers, and improving production quality to facilitate access to regional and international markets.

This India-Ghana Women Farmers Partnership is premised on three fundamental principles:

1. Women—especially poor smallholder farmers—offer one of the greatest untapped potentials for promoting sustainable economic growth and food security;
2. Broad and sustained poverty alleviation requires livelihood opportunities, improved access to markets, enabling policy environments and resources to make proven models accessible to women smallholder enterprises in developing nations; and
3. Successful models from the South provide valuable learning and effective partners for other South countries.

Since 2013, these women have exported almost 20 tonnes of Shea Butter to Japan (A2N Field work, 2014). For every one container of Shea Butter, the women collectively receive EUR 30 per month—a rate that totals up to 600 EUR per contract (Annan 2013).

Several African delegations have learnt of SEWA's approach to economic rehabilitation through setting up women's own economic organizations and women-led value chains, especially in agro-food processing. The visible success of woman-to-woman learning and sharing of experiences and knowledge has helped in replicating SEWA's value-based work in countries like Ethiopia, Mali, Ghana, Burkina Faso, Kenya, Nigeria, Zimbabwe and Mozambique, among others. SEWA has been working consistently on organizing more such exposure and dialogue programmes for other women farmers from the aforementioned countries.

A group of West African women leaders representing women's professional organizations participated in an Exposure and Dialogue Program (EDP) hosted by SEWA in 2010 as part of institutional and organizational strengthening. The aim was to allow African women leaders involved in basic agricultural commodities, to acquire insights and develop a deeper understanding of some of the factors, processes, policies and institutions that constrain or enable access to the markets. Further a programme was developed to help foster producer organizations and cooperatives to create capacity in order to integrate markets and improve the economic services to its members. In November 2011, a workshop organized in

Mali was attended by a senior team who put forth recommendations to address the existing needs and issues for income-generating activities, structure and governance, degree of integration into the market, access to market integration, access to credit, training and capacity building of the members of the organizations run by the African women. Based on recommendations by SEWA and the approach developed by the FAO, the exposure and training visits were organized for the teams from Mali and Burkina Faso in 2012.

One such exposure and training visit to SEWA was organized for the Ten Tietaa Union from Burkina Faso in November 2011. They produce cereals. The women attended the training programme at '*SEWA Manager ni School*' on management and regulatory affairs for the unions established by them. The team visited various women's collective organizations to understand the working of the executive committee of cooperatives, the mobilization of communities, forming women's collectives and the women-led supply chain model.

In 2011, *Femmes en Action*, a team from Mali, underwent training with SEWA. This organization headquartered in Bamako has approximately 1500 total members and they are primarily involved in processing cereal and fish. Few of the members are also involved in horticulture, dyeing fabric, sewing and imparting training in pottery. It has 39 cooperatives; 34 of these are women's cooperatives and 5 are of mixed-gender. It is built on the idea of protecting women's interests and socio-economic empowerment within their member organizations.

At the end of May 2017, the African Development Bank invited SEWA to hold a round table on 'Sustainable agriculture - nexus of women, agriculture, energy, water and livelihoods' at the Annual General Meeting held in Gandhinagar, Gujarat, to share the experiences of SEWA with organizations from Africa. SEWA's approach to agricultural campaigns, building women-owned agricultural supply chains and the model of RUDI was highly appreciated and accepted by the AfDB to be replicated in its member countries.

To reap the benefits of the SEWA experience in Africa, a series of Exposure and Exchange Programmes (EEP) have been organized between women from cooperative and producer organizations in West Africa and SEWA within the framework of South-South cooperation. SEWA has taken cognizance of the many similarities between the women SEWA works within India and African women, especially in terms of trade, economic situations, challenges and opportunities. In future, SEWA

proposes a SEWA-Africa Women Economic Partnership which will focus on three areas: women's access to ownership of ecosystem-based agriculture, women's ownership of renewable energy products and women's access to capital that strengthens livelihoods. The objective was to organize the informal economy in African countries through an integrated approach. Under the programme, SEWA worked in 11 countries—Ethiopia, Ghana, Senegal, Tanzania, South Africa, Mali, Burkina Faso, Kenya, Mozambique, Nigeria and Zimbabwe.

SEWA explored trade linkages with five African nations—under the aegis of its six-year-long 'SETU (Skill and Empower the Un-Served) Africa programmes' that kick-started in 2014, to help strengthen their women cooperatives. The SETU Africa programme is supported by the Government of India, to promote solidarity between five African nations—Ethiopia, Ghana, South Africa, Tanzania and Senegal—and India. VimoSEWA, the SEWA-promoted national insurance cooperative, was requested by the GoI to implement the SETU Africa programme after the Namibian government invited VimoSEWA to share its experiences in providing micro-insurance to low-income communities, especially women workers of the informal economy (for details see VimoSEWA 2014; Chatterjee 2015).

A few of SEWA's best practices that African women leaders hope to replicate as measures to strengthen cooperatives include the board structure existing in sister organizations, *Bal Seva Kendras*, and an initiative under the National Rural Health Mission to prevent malnutrition among young children in the state of Gujarat (NHSRC 2012). A Tanzanian delegation along with a three-member team from Mozambique, for instance, visited SEWA to learn about how to organize women workers at the grass-roots level and help them build their own sustainable member-based organizations (MBOs) through an integrated approach.

Outcomes Under South-South Cooperation: Knowledge Sharing by SEWA

Developmental experiences and outcomes are shared between countries to reap the benefits of tested and proven on-field experiences. SEWA's four decades of experience on various geographical, cultural and trade areas have resulted in numerous achievements under the framework of South-South cooperation:

1. The RUDI programme ensured nutritious food security to 100,000 rural households and urban slums at affordable price (SEWAa, n.d.: p. 31).
2. SEWA's experiences on economic empowerment could be replicated in 9 African countries with an outreach of more than 10,000+ African women (Nanavaty 2018: p. 16).
3. Approximately 851,941 women from the rural areas in India, other countries in Asia, and from Africa, have benefited from the agricultural campaign. SEWA's programme directly worked with 16,000+ women from the disaster affected areas (including India) but the actual benefit has reached to 52,000+ people. When the responsibility of development is in the hands of women, the income generated goes to women. The benefits also trickle down to the entire family, as women often prioritize their children and family members' needs and ensure food security for everyone at home (Nanavaty 2018: p. 16).
4. SEWA has extended credit of more than 18.53 million (US$ 2.6 million) to over 17,222 farmers. Soon after, 98% of the respondents reported increased yield (SEWAa, n.d.: p. 27).
5. About 182 registered economic organizations owned and managed by women working in the informal sector in India and other countries have been set up by SEWA in varied scenarios. They have worked in remote parts of countries like Afghanistan, where women have little visibility and suffer oppression. All the economic organizations promoted in various countries are operational effectively and provide a platform to vulnerable women for whom food security is a priority. SEWA's programmes have helped organizations in these countries undertake development through learning entrepreneurial skills and forming women's economic collectives (Nanavaty 2018: p. 17).
6. The skill development programme of SEWA under the aegis of the *SEWA Manager ni School* provides a platform to the poor, illiterate women of the informal sector to the business schools reaching 800,000 women to form 4813 SHGs. SMS focuses on practical training, with techniques that can be easily grasped by the informal sector women of any geography and country (Nanavaty 2018: p. 17).

7. The SEWA integrated programme is designed collectively and inclusively with the local governments/organizations and communities prioritizing needs, demands and local market conditions of the women. The interconnected programme of skill development and value chain support ensures conversion of skills into livelihoods. Almost 65–70% of the women in these countries have been linked to a decent income (Nanavaty 2018: p. 17).
8. Women-led value chains have been set up in these areas for farm and non-farm trade in eight countries of Asia and five countries of Africa; these have helped women move up in the value chain (Nanavaty 2018: p. 17).
9. SEWA's involvement has led to the financial inclusion of women of the informal sector and women headed families to enable them to buy productive assets in their own names (Nanavaty 2018: p. 17).
10. SEWA has developed informal sector trade friendly technology for the technological inclusion of women in the informal sector (Nanavaty 2018: p. 17).

Learnings from SEWA's Experience

SEWA's organizational structure and modus operandi can serve as a guiding principle for interested non-governmental organizations, financial institutions, government agencies and policy makers. SEWA's offering of services and activities revolves around five main categories—organizing, capacity building, financial services, support services and building linkages, e.g. marketing services. Hence, the replicated strategies need to be designed to encompass all of these.

Further, SEWA nurtures relationships based on trust and credibility and addresses the most immediate needs of the local communities. It does so through an active and conversational involvement of the local communities, thus fostering a sense of ownership. Once such a relationship of trust is built, SEWA institutionalizes it by organizing or providing a formal shape to it in the form of a Farmers Collective or Farmers Associations.

SEWA firmly believes that exposure and training at SEWA, by the SEWA members' economic organizations is the key turning point. Talking and listening to the life struggles of other women and how they overcame them made the sisters of Africa realize that they were resilient and

that they could make a difference through self-organization. Women-to-women learning builds confidence not only through the transfer of knowledge and skills, but also through sharing values and an ideology of mutual support. In building these women-to-women people's partnerships, SEWA acts as the facilitator.

Once the women have economic security and food security, SEWA works on helping them to build their own local organization. This becomes the local women's social enterprise—which then sustains, scales and expands across provinces. SEWA's 'sister to sister' approach has taken the shape of a movement that extends from South Asia to Africa. In the current global arena where many countries in the world are facing challenges of war, conflict or disturbances, it is essential for governments to work on the Gandhian principles of non-violence and peace.

SEWA considers it a moral responsibility to work for the affected families under women's leadership in Africa and deeply values the SEWA-Africa South-South cooperation. SEWA has continued its collaborative efforts in building access to markets, developing a social protection net and organizing women constructively, to meet its vision of a future based on women's solidarity.

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PART III

Private/Public Partnerships

CHAPTER 9

Supporting Indian Trade and Investment for Africa: The International Trade Centre Project

Govind Venuprasad, Aman Goel, and Candice Ungerer

Abstract Established in 1964, the International Trade Centre (ITC) is the joint agency of the World Trade Organization and the United Nations. ITC is the only development agency that is fully dedicated to supporting the internationalization of small- and medium-sized enterprises (SMEs) in developing and transition economies, thus raising incomes and creating job opportunities, especially for women, young people and poor communities. Supporting Indian Trade and Investment for Africa (SITA) is a project funded by the UK's Department for International Development (DfId) and implemented by the International Trade Centre (ITC). It aims to increase and diversify exports from East Africa and attract investment to promote sustainable economic development

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in the region. Since 2015, ITC, through SITA, has been working to improve competitiveness by leveraging Indian expertise through knowledge sharing, technology transfer and partnerships. SITA's interventions in the agricultural sector have focused primarily on capacity building, facilitating market linkages and investment attraction in the East African pulses, spices and sunflower value chains. With the introduction of the Duty Free Tariff Preference (DFTP) scheme for Least Developed Countries (LDCs) in 2008, India has strengthened trade and investment linkages with southern partners including East Africa. India offers innovative solutions along with a growing marketplace for East African exports. In turn, East Africa offers opportunities for Indian businesses to expand their global reach. To guide SITA's focus, initial face-to-face surveys with more than 500 companies were conducted which assessed the competitiveness of select value chains and established the main challenges to development.

Introduction

India is expanding its involvement with the Global South through government-initiated activities and policies, supported by private sector trade and investment flows. India offers its southern partners a set of innovative business solutions, derived from its globally leading industries including agriculture, manufacturing and services. India's expertise can be leveraged through the sharing of knowledge, technology and lessons learnt. India also offers countries in Africa a large and growing marketplace for its exports.

Facilitating increased South-South trade and investment, specifically between India and East Africa, has the potential for significant development impact, influencing supply capacity and food security for both regions. Supporting Indian Trade and Investment for Africa (SITA), a five-year South-South trade and investment project of the International Trade Centre (ITC) and funded by the UK's Department for International Development (DfId),[1] has entered its fifth year of implementation in March 2019 and is showing results to that effect. Through its trade and investment promotion and capacity building interventions, SITA aims to

[1] Merged into the Foreign and Commonwealth Office to form the Foreign, Commonwealth and Development Office as of September 2020.

increase and diversify exports from East Africa and attract investment to promote sustainable economic development in the region.

Although SITA's interventions go beyond agriculture, this paper highlights four activities related to SITA's work in the pulses, sunflower and spice sectors. The first part of this paper will introduce SITA, outline the sector and country focus under the project, and present the initial quantitative results. The following section examines four of the immediate impacts and lessons from various SITA interventions through case studies on:

1. Pulses Crops Grown in Ethiopia, Kenya and United Republic of Tanzania (Karanja 2016);
2. Market information mobile applications and the online India-East Africa trade helpdesk;
3. Chilli buy-back arrangements in Rwanda; and
4. Institutional partnerships in the sunflower value chain.

About SITA

SITA is a South-South trade and investment project funded by the UK of Great Britain and Northern Ireland's Department for International Development (DfId). It is implemented by the International Trade Centre (ITC)—the agency of the United Nations (UN) and World Trade Organization (WTO). Through its interventions, SITA aims to increase and diversify exports from East Africa as well as attract investments as a vehicle for promoting value addition and setting the ground for sustainable economic development.

Africa has emerged as an important trade and investment partner for India with great potential for further growth. However, to date, India's trade with Africa has been concentrated in a limited number of sectors and countries, with 75% of exports from Africa to India limited to natural resources and primary commodities (Afreximbank and EXIM Bank of India 2018).

In 2008, India introduced its Duty Free Tariff Preference scheme (DFTP) for Least Developed Countries (LDCs) which gives preferential rates on 98.2% of tariff lines (Ministry of Commerce and Industry 2017), thus making it an attractive destination for an expansive portfolio of African imports. To better take advantage of this scheme, SITA aims

to improve the competitiveness of select value chains from the agriculture sectors, namely sunflower oil, pulses and spices (chilli, ginger and turmeric). These sectors were chosen based on both the demand from Indian buyers and investors as well as the potential for contributing to economic development of these sectors in the target African countries—Ethiopia, Kenya, Rwanda and the United Republic of Tanzania.

SITA works with Indian companies that create employment opportunities, while ensuring commercial viability. It operates within a framework that aims to achieve a win-win partnership where commercial transactions benefit Indian and East African businesses while creating a positive effect on the region's development. Consequently, SITA's trade and investment facilitation interventions seek to contribute to employment and income creation for the people of East Africa.

Trade and Investment Advantages in East Africa

East Africa is in many ways positioning itself as both the market place and supplier of the future. Indian companies have much to gain from increasing their market share and, at the same time, participating in the region's growth. East Africa can be a potential sourcing hub for value-added raw material.

Moreover, East Africa has much to offer in terms of duty-free and quota-free access to markets in the USA through the African Growth and Opportunity Act (AGOA) and to Europe through the Cotonou Agreement and the Everything But Arms (EBA) scheme (AGOA 2019; European Commission 2019a, b). The Tripartite Free Trade Agreement (TFTA), signed by 26 countries, opens access to a market of over 600 million consumers from Cairo to Cape Town (ATF 2015; BBC News 2015). Most recently, the ongoing negotiations on the African Continental Free Trade Agreement (AfCFTA), which aims to create a single market followed by free movement and a single currency union between 49 African Union member states (African Union 2019), have garnered attention from international firms. SITA helps Indian companies to internationalize and take advantage of such opportunities—a vital step for future growth in the country.

SITA's Interventions

During SITA's project design phase in 2014, face-to-face surveys were conducted with over 500 micro-, small- and medium-sized enterprises (MSME) in the five aforementioned East African countries. The aim was to provide an in-depth analysis of the challenges faced and current state of competitiveness to guide the focus of SITA's interventions. The MSME are being tracked throughout the project to monitor individual company results and inform the progress of sector development overall.

SITA's interventions include not only direct trade and investment facilitation through business matchmaking, site visits and business-to-business (B2B) meetings, but also capacity building interventions. These activities enable East African MSME to increase their efficiency, enhance quality and attract buyers and investors.

By the end of 2018, SITA had achieved an outreach of over 900 MSME in East Africa of which more than 145 have benefited from in-depth support covering B2B facilitation, capacity building and exposure missions. In India, over 40 SMEs benefitted directly from SITA advisory services, investment and trade promotion, and exposure visits.

Measuring the Success of the Project

The success of the project is being measured through greater Indian investment in the region, increased exports to India and third countries, policy, and regulatory and procedural changes to enable ease of exports and inward investment. To this end, capacity building and promoting technology transfer and partnerships are also prioritized under the project.

Greater Investment

Since implementation began in 2015, SITA has facilitated the negotiation of over US$ 100 million worth of investment deals, of which US$ 58 million have been concluded. There is a high degree of confidence that many of the deals still under negotiation will materialize.

Rwanda's chilli sector is an attractive destination for Indian investment. Four Indian companies have begun operations, including organic cultivation, in Rwanda. In addition, one of the world's largest spice extraction companies from India has committed to starting chilli, ginger and turmeric cultivation in Rwanda with the objective of setting up a

primary processing unit and the possibility of making Rwanda a hub for their African operations. All of these investments will create employment, impacting positively on livelihoods in local communities. By 2020, SITA's goal is to attract over US$ 80 million in 16 investment deals concluded across its five target countries (ITC 2018).

Increased Exports

Through targeted interventions, by 2018, SITA had catalysed more than US$ 37.5 million of additional exports from East Africa. A particular focus is given to strengthening the export competitiveness of SMEs and women-owned companies.

The *Mitreeki* East Africa-India Partnership is an initiative under SITA, which offers in-depth capacity building and bespoke support specifically to women entrepreneurs. *Mitreeki* aims to assist women to grow their businesses and become export ready and then facilitates their participation in various SITA trade promotion activities. Through *Mitreeki*, SITA promotes greater participation by women across its interventions.

For example, as a result of contacts made at a SITA supported trade promotion activity, a *Mitreeki* participant company has sold an additional US$ 1 million worth of oilseeds. This and other sales have contributed to the company reporting a 40% increase in company turnover in a year.

Among other trade promotion events, SITA has supported the attendance of seven public and private sector stakeholders from Ethiopia and Rwanda at the International Spices Conference (ISC) in Kerala, India. February 2017 was the first time an African delegation presented and promoted the region at the ISC. Following the conference, several business links were established between Indian buyers and spice producers. Three companies have since reported deals to the value of US$ 2.3 million. As a result of this success, SITA also brought a delegation to attend the ISC in February 2018 (ITC 2018). Again, a number of deals were initiated including for the purchase of 90 MT of turmeric from one Ethiopian producer. Before project completion, SITA aims to facilitate US$ 43.3 million in exports in target sectors.

Policy, Regulatory and Procedural Changes

SITA has also been working closely with policymakers in target countries to address supply-side constraints and to enhance trade and investments.

Together, SITA and individual East African governments have designed sector and value chain strategies or roadmaps[2] to guide development in the sunflower and pulses industries, among others. The respective governments have adopted these strategies with a commitment towards implementation.

In Rwanda, SITA in collaboration with the EXIM Bank supported the feasibility study of an Export Credit Guarantee Scheme, which was presented to the Government of Rwanda (The East African 2015). It has since been adopted as a blueprint for the Government's Export Growth Fund (Development Bank of Rwanda 2018). SITA has also produced several investment and trade-related reports on business process analyses and investment profiles across SITA sectors to raise awareness of trade and investment opportunities as well as challenges to be addressed.

In response to India's requirement for the treatment of all agricultural products with methyl bromide (a product banned in Ethiopia), SITA initiated ongoing discussions between East African pulses stakeholders and Indian government officials to outline steps to avoid re-fumigation penalties on exports. The Tanzanian Pulses Network, a trade and investment support institution established by SITA in collaboration with the Kenya-based East African Grains Council (EAGC), is an important player in these discussions as well as in advocating for other policy changes affecting the industry in East Africa.

Capacity Building and Technology Transfer

From 2015 to 2018, SITA conducted over 50 trainings for businesses and support institutions in East Africa to build capacity across sectors, directly training 642 farmers and reaching 16,000 farmers through training-of-trainer (ToT) programmes.

In March 2017, SITA and the Tepi Spices Research Centre, Ethiopia, organized a ToT for 16 field trainers to disseminate best agricultural practices for ginger and turmeric. The field trainers who attended the ToT programmes agreed to a training contract under which they organized and facilitated five training sessions for 240 smallholder farmers in the Tepi region, on a voluntary basis in autumn 2017. Less than a year later, there was clear evidence of Indian technologies and best

[2] Available at http://www.intracen.org/SITA/SITA-Publications1/.

practices being adopted across the Tepi region. For example, farmers have been observed splitting turmeric fingers and bulbs at farm level, properly cleaning and boiling as per the recommended process in the training. Turmeric boiling technologies which were outlined in SITA's 'Farmers Field School Manual' have been adopted (Voice of SITA 2018). In addition, two new cooking technologies were under development at the Mizane Rural Technology Institute, Ethiopia.

In other initiatives to enable the transfer of technology, SITA has supported over 10 exposure missions for East African companies to see technologies being used in India and in some cases facilitated the purchase of machinery from Indian suppliers. For example, with SITA's support, members of the Ugandan sunflower industry have initiated discussions with an Indian farm mechanization conglomerate and at last review were in the process of securing funding towards the purchase of 10 tractors.

Partnerships

SITA works on a partnership-based approach, whereby Indian businesses and institutions partner with East African suppliers and institutional counterparts to achieve mutual results. SITA has facilitated seven institutional partnerships resulting in institutions and businesses in East Africa and India hosting joint events, facilitating knowledge and technology exchange and strengthening business partnerships. These partnerships will ensure the sustainability of SITA interventions after the project concludes in 2020.

SITA Case Studies

The following section outlines important lessons and four corresponding initiatives that SITA has implemented in the agricultural sector. Each of the lessons is supported by evidence from one or more specific case studies of SITA interventions, which highlight the outcomes achieved as part of the overall project.

Lesson 1: Access to Information is the Key to Business Success

In an ever-changing global business environment, access to reliable market information is key to the success of any business. Limited access

to information and information asymmetry are major obstacles to international trade and investment in East Africa. Although East Africa is emerging as a global investment destination for agriculture and agribusinesses, the pace of development in these sectors is hampered by the lack of reliable and up-to-date information across the production spectrum. Through the Pulses Handbook, market information mobile applications and the online India–East Africa Trade Helpdesk, SITA is facilitating a better flow of information to East African and Indian stakeholders.

A. Pulses Crops Grown in Ethiopia, Kenya and United Republic of Tanzania for Local and Export Markets (Pulses Handbook[3])

During SITA-facilitated B2B meetings, it was noted that the different names in local languages for pulses created challenges in carrying out business deals. Many farmers, and buyers alike, are only conversant with the local names.

For example, in Kenya in 2016, an African pulses producer was promoting his high-quality green gram to an Indian buyer who was unsure of that particular pulse variety. He explained to the pulses farmer that an Indian favourite was actually green *mung*. Eventually, the farmer produced a sample of his product to which the buyer identified as green *mung*. When they realized that they had been talking about the same pulse type, the business deal could progress. The buyer and seller understood that they were negotiating the sale of a high-demand product for the Indian market.

Later, during a meeting in Ethiopia with public and private stakeholders on the development of a national strategy for pulses, it was suggested that there should be a dictionary for pulses. SITA took this idea to its clients around the region and the response was unanimously in favour. Working with the EAGC, SITA developed the booklet, Pulses Crops Grown in Ethiopia, Kenya and United Republic of Tanzania, for Local and Export Markets (Pulses Handbook). The Pulses Handbook includes the names of pulses grown and traded in East Africa and India in Hindi, English, Amharic and Swahili. The handbook also provides basic

[3]The handbook is available at http://eagc.org/wp-content/uploads/2016/07/Pulses_Crops_Grown_ITC_web-1.pdf, and is also accessible through the ITC-Level A commodities apps.

specifications regarding the growing seasons and harvest patterns for each pulse variety.

East African pulses producers are now better equipped to make informed decisions on what to grow and when, based on the agro-climatic conditions and market opportunities. They are also in a better position to negotiate with regional and Indian buyers. Distributing extracts from the handbook to B2B meeting participants is now a standard procedure for SITA and is proven to facilitate greater understanding and better trade outcomes. To date, through a range of pulses-focused initiatives, SITA has catalysed over US$ 10 million in additional exports from target countries.

B. Mobile Applications Delivering Market Information and the India–East Africa Trade Helpdesk

Information asymmetry refers to a lack of equal information between businesses, leading to situations in which one agent possesses more information while other agents involved in the same trade have less. Such a situation favours the more knowledgeable party, and prevalence of information asymmetry can get in the way of potential trade and investment deals. Empirical evidence shows that East African farmers and agribusinesses have little or no access to information on international markets.

To address this lack of information and information asymmetry in SITA target countries vis-à-vis the Indian market, SITA, in collaboration with Level A Commodities, an Indian-based global knowledge management firm, developed two mobile phone applications relevant to the East African and Indian agriculture markets. The mobile applications provide SITA stakeholders across the agribusiness value chain with real-time market intelligence on commodity prices, trade trends and statistics, weather conditions, and other relevant news and information.

The mobile applications were launched formally at the Indo-Africa Agri-Business Summit 2017 in June in Indore, India. Known as the ITC-Level A Africa, the app provides news and market information on East Africa, while SITA's ITC-Level A India app provides information on the Indian market. The apps make access to information quick and convenient and have been developed specifically for SITA partners.

The East African market app provides intelligence on prices, trade trends and other relevant news including weather updates on the SITA

countries. Through the app, East African as well as international businesses can readily keep track of developments in this market. The app also provides detailed reports on grains, pulses and oilseeds with key updates, prices, trends and market commentary as well as a crop calendar marking out sowing/planting months and harvesting period across all SITA countries.

The Indian market app provides similar detailed information on commodities in India. Detailed daily reports accessible through the app provide information on domestic scenarios influencing the international market including the latest in trades, stocks, prices and trends. A detailed weather report from the Indian Meteorological Department, also available on the app, shows information on prevailing weather conditions, temperatures, rainfall and forecasts and impact on agricultural operations domestically.

In 2018, only 9.2% of the African population had access to a computer. However, the number of mobile cellular subscriptions showed that around 70% of Africans had access to mobile phones (International Telecommunication Union 2018). These apps provide information that is readily accessible to a growing population of smart phone owners. By downloading and using the app, East African and international businesses can keep track of the developments in these markets, bringing to light market opportunities and helping to level the playing field in business negotiations. In 2018, there were over 1250 registered users of the apps from Indian and East African companies. The apps are also now available to the wider public.

SITA has also developed an online India–East Africa Trade Helpdesk to facilitate trade and investment between India and the East African region through the provision of information (ITC 2019). The helpdesk provides information on trade data, customs duties and taxes, market access regulations and business contacts. It can be used to analyse business opportunities and market access requirements or connect with SITA's network of trade and investment support institutions for help in finding more market information on India, Ethiopia, Kenya, Rwanda, Uganda and United Republic of Tanzania.

Lesson 2: Market Linkages and Partnerships Support Better Outcomes

Through the creation of new partnerships, SITA is nurturing and growing South-South cooperation at the stakeholder level. Linkages and partnerships between institutions, companies and individuals can build one another's capacity by working together. For example, institutions gain a better understanding of how to advocate for policy environments that encourage investment, and promoting linkages between the companies they represent. In addition to securing a buyer for their product or investment, businesses gain from knowledge and technology exchange with more established counterparts. Such partnerships among institutions and businesses are the ones that we hope will last beyond the lifetime of SITA, thus strengthening links between East Africa and India into the future. SITA's hybrid chilli pilot project in Rwanda and linkages between Tanzanian and Ugandan sunflower oil institutions and their Indian counterpart are examples of the vital role partnerships play in sector and business development.

A. Chilli Buy-Back Arrangements in Rwanda

The Rwandan economy relies heavily on agriculture, which accounts for a third of annual GDP. With 80% of the total population who derive their income from agriculture, increasing productive capacity is fundamental to ending poverty, which according to the UNDP stood at 39.1% in 2014 (UNDP 2019). In 2013, the poverty rate for those employed in agriculture in Rwanda was 76% (World Bank 2013). Farmers face a range of challenges including the lack of quality seeds, inadequate knowledge of good agricultural practices, lack of reliable market and lack of capital, among others.

Linking Rwandan suppliers with international buyers and facilitating buy-back arrangements can tackle many of these challenges. Furthermore, Rwanda's farmers gain the confidence to expand production and delve into new, higher-value commodities, diversifying their export baskets. SITA is supporting the production and processing of new, high-value hybrid chilli varieties in Rwanda for export markets and facilitating market linkages with Indian buyers. Increasing chilli cultivation will help generate more employment opportunities for youth and women improving socio-economic conditions within the country. At the same time, Indian spice companies have an additional source of supply to meet the growing demand in India.

A leading Indian spice processor and buyer is trialling the sourcing of six new chilli varieties from Rwanda. SITA is providing coordination, support and execution of appropriate agronomic practices together with Rwanda's National Agricultural Export Development Board (NAEB). The chillies chosen are in high demand in international markets and offer better yields and returns to farmers.

In July 2016, the Indian company provided premium quality chilli seeds to the NAEB for distribution to the Rwandan farmers, and in September 2016, the seedlings were effectively transplanted from nurseries to the main fields under the supervision of the project team comprised of NAEB and SITA. The trial was conducted in different locations around the country with select farmers on four hectares. The SITA team along with NAEB provided training, agronomic support, best practice exchange from India, and closely monitored the farms' progress.

Training sessions on good agricultural practices for chilli production have been developed to support farmers and implemented since 2016. The sessions cover a variety of topics, from establishing nurseries to raising seedlings, to preparing the main field, planting, applying fertilizer, mulching, controlling diseases and pests, flowering and harvesting. By the end of 2018, through ITC's training of trainer (ToT) programmes, 59 lead farmers and trainers had been trained in the above-mentioned areas in Rwanda.

Post-harvest ToT sessions are also being conducted for 21 stakeholders, covering on-farm drying of chilli and packaging practices for scientific chilli production, challenges in hybrid chilli cultivation, pricing of dried and graded chilli, strategies for procurement, logistics, export documentation and payment. Quality standards that apply when exporting chilli to international markets are also covered.

Assessment of the crops produced thus far concludes that the availability of fertile land, water for irrigation and the young farming community are the major strengths of the chilli cultivation initiative. However, the shortage of funds to buy fertilizers and other farm inputs, and the lack of facilities to dry and store chillies are major challenges still faced by the farmers. These challenges will be overcome gradually as production and resulting exports increase.

A buy-back arrangement has been made with the company, who committed to purchasing the dried chilli at prevailing market prices. However, the first yield harvested in early 2017 was insufficient to fill a container due to severe weather conditions and therefore dried chillies

could not be sent to India. It was therefore processed into chilli oil, locally packaged and exported successfully to Belgium and the USA.

The first ever container of dried hybrid chilli was exported from Rwanda to India in April 2018. The shipment was worth over US$ 23,000 and signifies the start of a new export industry for the country (New Business Ethiopia 2018). A Rwandan chilli farming and processing company who has been part of the trials and buy-back arrangement has since concluded deals worth US$ 1.8 million to supply chilli oil to a Chinese company and another deal to supply Birds Eye Chilli (small and piquant chilli).

Following these successes, the ultimate objective is to expand chilli cultivation in Rwanda. Further for export to global markets. By 2020, cultivation had begun in 198 Ha of land. To achieve this result, farmers are continuing to buy high-quality hybrid seeds from India with three similar buy-back arrangements made with other Indian spice companies. Investments in primary processing facilities are also being considered should production increase sufficiently. The signs are pointing in this direction with bumper harvests expected.

B. Sunflower Industry Associations in India and East Africa

The sunflower industry is a key sector for SITA in the United Republic of Tanzania and Uganda. The two East African countries are major producers of sunflower oil. In 2017, United Republic of Tanzania and Uganda exported US$ 89.5 million and US$ 29.1 million worth of oil, respectively (ITC Trade Map 2019). However, low farm yields, a shortage of quality seeds and inefficient technology reduce the competitiveness of these producers internationally, as well as in the local markets.

Increasing production of oilseeds and pulses in Africa will have multi-dimensional effects on development and contribute to addressing various challenges by ensuring a sustainable food supply of dietary fat and protein rich staples. This will generate additional income for small-holder farmers, providing opportunities for value addition, and increasing employment for youth and women.

There is a significant demand for oilseeds in the region and imports of oilseeds to Africa have been growing consistently. In 2017, the value of oilseeds imported to Africa was US$ 234 million more than it exported (ITC-Trade Map 2019). This trend is likely to continue with Africa's population expected to double between 2010 and 2050 (UN DESA

2017). At the same time, there is ample idle processing capacity which has not being utilized and could fill this gap.

In line with the strategy for sectoral development, SITA has been working to strengthen supply-side capabilities of the Ugandan and Tanzanian sunflower oil producers as well as the institutional capacity of sunflower sector associations; the Tanzania Sunflower Oil Processor Association (TASUPA) and the Uganda Oil Seed Producers and Processors Association (UOSPA). Trade and investment support institutions (TISI) like TASUPA and UOSPA play an important role in business success. They act as multipliers for a sector enabling business to focus on operational and commercial matters while institutions focus on improving their operating environment and additional services such as providing market linkages.

To support TASUPA and UOSPA provide better services to their members, SITA has facilitated institutional linkages, through Memoranda of Understanding (MoU) between ITC and the relevant institutions for the transfer of knowledge and technology, as well as to establish market linkages. In September 2016, ITC, TASUPA and UOSPA formalized their relationships with the Solvent Extractors' Association (SEA) of India,[4] by signing an MoU (Solvent Extractors' Association of India 2018) and have since been working together on various initiatives.

Together, SITA and SEA of India have organized exposure visits, workshops and B2B meetings, both in India and East Africa for UOSPA and TASUPA and their members. The ongoing B2B meetings are aimed at fostering business linkages between the East African and Indian companies in the sunflower sector, and to promote public–private dialogue and partnerships. The events offer a unique opportunity for the East African businesses to interact with overseas buyers—a first for many of them.

The interaction and eventual partnerships with Indian buyers inform East African businesses on the quality improvements required to be export-ready, as well the value addition possibilities. Companies now recognize the need to come together, to improve their scale of production and to leverage available technologies.

[4]The Solvent Extractors' Association of India was formed in 1963 to help and foster the development and growth of Solvent Extraction Industry in India. At present, the Association has 875 members, including about 350 working solvent extraction plants with the combined oilcake/oilseed processing annual capacity of about 30 million tonnes (Solvent Extractors' Association of India 2018).

The institutional partnerships and related exposure visits have enabled the East African institutions and businesses to learn and replicate best practices from India. Agong Ray Bruno, Executive Director of the Uganda Oil Seed Producers and Processors Association (UOSPA), remarked at the SEA Annual General Meeting in Goa in 2016,

> This has been a great opportunity for us to learn and improve our operations. With more expertise and better connections, we can improve our credibility with our members and stakeholders and deliver more value to the sector and the Ugandan economy. Further, we have seen in person that India can offer equipment at the scale, quality and price that Uganda needs. Our organization will support the transfer of this technology for the benefit of our members.

As these partnerships grow, so will the extent of knowledge and technology transfer, enabling East African sunflower producers to expand their capacity to meet demand locally, regionally and subsequently increase their exports globally.

Conclusion

The impact of SITA's interventions in the East African agricultural value chains is evident. Solutions based on information provision via the mobile-based agricultural commodities apps and the Pulses Handbook have shown immediate and sustainable results. East African farmers can now easily access the going rate for their product, or the amount their target market is producing, among other integral information, thus levelling the playing field in business discussions with buyers. Communication gaps between buyers and sellers have also been bridged through the multilingual Pulses Handbook. Meaningful partnerships have been forged in the spice sector between local Rwandan farmers and leading Indian companies as well as in the sunflower sector between industry support institutions in Tanzania, Uganda and India. East African suppliers have connected with buyers, and technology and knowledge transfer has occurred, enabling the further development of supply capacity and quality. Although SITA has helped to facilitate these partnerships, more can grow from the initial links established. Furthermore, they stand to last beyond the life of the SITA project, continuing to contribute to the growth of these sectors well into the future. The evidence presented here shows that Indian South-South trade and investments is making a tangible difference

in the development of East African farming and commercial practices. Support for these endeavours through projects such as SITA can promote business deals that are transformational in the lives of East African farmers and other value chain stakeholders, resulting in trade and investment impacts for good.

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CHAPTER 10

Maximizing Output: The Role of Corredor Pvt. Ltd in Mozambique

Sami Saran

Abstract The Republic of Mozambique is endowed with fertile land and abundant minerals and has a primarily agricultural economy. A majority of the population struggle economically and only 16% of the arable land in the country is cultivated. This paper discusses a capacity building project undertaken in the town of Ribaue, located in the Nampula province of Mozambique to improve the agricultural productivity. The farmers face challenges in the form of a lack of crop diversification and risk mitigation instruments. They also lack adequate skills, tools and knowledge regarding optimal farming practices. The project aimed to overcome these barriers, by using the innovative hub and spoke model. The project successfully resulted in enhanced productivity for all the actors in the value chain, enhanced the skills of the farmer, adopted the use of technology and improved market access to the farmers. They also incorporated international actors such as the USAID and IFAD in the project.

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Introduction

The Republic of Mozambique is a coastal country situated in South–East Africa. It is endowed with fertile land and minerals such as coal, graphite and natural gas. The country's economy relies primarily on the agricultural sector, which employs 72% of its total employable population (World Bank 2018a, b). Agriculture, along with forestry and fishing, plays an important role in the Mozambican economy and accounts for 21.3% of the GDP (World Bank 2017a, b). A majority of the people struggle economically as 62.4% of the total population of 29.6 million peoples live below the poverty line (World Bank 2014, 2017c). Only 16% of the arable land in the country is cultivated. The vast expanse of uncultivated arable land in Mozambique presents a tremendous opportunity to boost economic growth through the agricultural and allied sectors and support the country to become a major food producer in southern Africa (USAID 2019). The country's strategic geographic location, with landlocked neighbouring countries on one side and well-developed ocean ports and maritime connectivity on the other, gives it significant leverage in the international markets.

Mozambique is divided into ten provinces.[1] Of these, the main agricultural provinces are Zambezia, Nampula, Niassa, Manica, Tete and select areas of Maputo and Gaza. The major staple crops grown in Mozambique are maize, cassava and rice, while the cash crops are bananas, cashew nuts, sugar cane and cotton. This study focuses on the Nampula province. The province is a major producer of cotton, mainly in the 'cotton belt' of Nampula. It is also one of the major pulses producing regions and cultivates maize, cassava, pigeonpeas, cowpeas and sesame (FAO 2016). Nacala is a deep seaport in the northeast of Mozambique, and the entire stretch from the north across four Northern provinces of Niassa, Zambézia, Nampula and Cabo Delgado is referred to as the 'Nacala Corridor'. It is connected by the narrow gauge Nacala railway system.

A large proportion of the farmers in Mozambique are smallholders. Smallholder households are typically led by low-income-earning men who lack formal education and often operate under dire financial constraints. There are 3.2 million smallholder farmers in the region, which account

[1] Cabo Delgado, Gaza, Inhambane, Manica, Maputo (capital), Nampula, Niassa, Sofala, Tete and Zambezia.

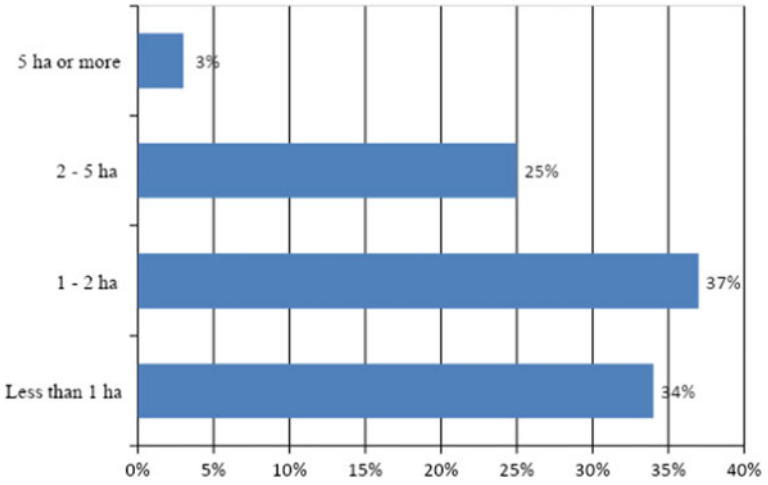

Fig. 10.1 Size of agricultural holdings in Mozambique (*Source* CGAP 2016)

for 95% of the country's production. Roughly 400 commercial farmers produce the remaining 5% (FAO 2019). They use rain-fed agricultural practices, traditional varieties of crops, low-intensity fertilizer and a minimal amount of pesticides. The average size of a landholding in Mozambique is 1.2 ha (CGAP 2016). Figure 10.1 depicts a distribution of the size of land holdings in Mozambique.

Mozambique faces several challenges due to which the agricultural productivity is chronically low. Farming practices are affected by poor extension services, lack of storage infrastructure, high post-harvest losses, poor transport facilities, high transaction costs and limited access to financial services. Some of the other pressing challenges are as follows:

Lack of Land Ownership

Mozambican smallholder farmers own their plots of land individually through a lease, certificate or under customary law. The farms governed by customary laws have no official documentation of ownership, which impacts their access to financial services. State and communally owned farms are fewer and are concentrated mainly in the southern and central regions.

Lack of Crop Diversification

Each household grows an average of four crops. Two-thirds of smallholders rank maize as their most important food crop, followed by cassava and rice. An estimated 9 out of 10 households consume a bulk of the crops (such as maize) they grow, utilize a part of their cash crops and sell the remainder. This poses a challenge as most of the crop is produced to consume rather than to sell, which lowers commercial productivity (CGAP 2016).

Lack of Risk Mitigation Instruments

Mozambique is among the most vulnerable and least prepared countries with regard to natural disasters. It ranks 153 out of 178 nations on the Notre Dame Global Adaptation Index (ND-GAIN), with a score of 38.6. Climatic factors pose a great risk to smallholders' household agricultural activities. Drought and flood-induced crop losses can result in chronic food shortages and pose a high risk to food security, agricultural production and livelihoods. The country loses 1.1% of its GDP annually due to the adverse impacts of droughts and floods on economic activity (Irish Aid 2017). Accidents on the farm, thefts, pests and diseases are other risks that pose a challenge to agriculture. Farmers often seek insurance to insulate them from such uncertainties, but there is a lack of microfinance services for smallholders.

Farmers also lack adequate skills, tools and knowledge regarding optimal farming practices. They are unaware of the importance of incorporating external actors into their value chains. At the same time, while agribusinesses do participate in the purchase of farmer produce, they do not engage with them in a holistic manner.

Corredor Agro Limited: A Case Study

Against the above economic and agricultural climate, this paper discusses a project undertaken by Corredor Agro Limited. The site of the project implementation was the Ribaue district in the Nampula Province. About 2000 smallholder farmers were engaged with Corredor as a part of the project. The International Fund for Agricultural Development (IFAD) and the United States Agency for International Development (USAID) also extended their support to the initiative.

The project used the Hub and Spoke model to augment productivity of the farmers. This model is a centralized, integrated logistics system designed to keep costs down. Hub and spoke distribution centres receive products from many different origins, consolidate the products, and send them directly to different destinations. It aimed to improve the smallholders' access to the marketplace by setting up a series of collection centres and warehouses. The project also helped organize the farmers to establish a chain of command, provided them with legal recourse and enhanced their financial and technological skills.

Ribaue District

The principal town, Ribaue, is a small town with poor infrastructure. During the course of the project, Ribaue did not have facilities such as a bank, fuel station or a post office. The road from Nampula city to Ribaue was 140 kilometres long and muddy. The commute took between four and five hours in the rainy season.

Economy in the District

The Ribaue district is the 'bread basket' of northern Mozambique. It has the optimal agro-ecological environment in which many crops can be grown productively. Consequently, agriculture is the predominant activity in this Corridor. The maximum temperature in summer is 35 degrees Celsius and minimum is 19 degrees Celsius. The soil type ranges from sandy soil to loamy clay soil. Rough estimates revealed that Ribaue has about 37,000 farmers who engage in farming practices spread over 48,000 hectares. Most landholdings in the district are approximately 1.2 hectares. The Mozambican government is keen to develop infrastructure and build capacity in an area that is conducive to promote the agricultural sector. Due to a high annual rainfall (average annual rainfall of 1200 mm from November to April), most rivers are perennial and winter irrigation is very common. These geographic conditions are optimum for growing crops and allow plants to achieve their maximum yield potential.

The landmark industry in Ribaue is a cotton ginnery set up by a multinational organization. The company operated on a concession given by the government to provide inputs to farmers in the district. In return, the company was authorized to be the sole buyer of all the cotton in the district. The prices were pre-fixed by the government and quite often

unprofitable for the farmers. Since the farmers did not have a choice, they were forced to grow cotton to meet their survival needs.

Another industry in Ribaue that was a successful venture was a mineral water factory. This factory purified and packed water from the mountains for consumers in 1 litre and 500 g bottles. Incidentally, the brand name was also called 'Ribaue'. The brand was received and accepted well in the markets of north Mozambique.

Prior to the project by Corredor, the farmers were primarily engaged in cotton farming. Without the practice of active crop rotation, the soil health of the region degraded considerably over the year. The farmers grew other crops such as maize, cassava and beans for their own consumption, and only meagre quantities were grown for active commercial trading. The commodity-oriented agricultural companies that came to the district during the harvest season were primarily local traders. They sourced whatever was available and had little interest in enhancing the farmer's crop yields or augmenting the farmer incomes. They often exploited the farmers as the agriculturalists lacked any understanding of market price or access to other markets as alternatives to these companies.

Objectives of the Project

The Corredor project was undertaken to solve the challenges in the growth pathway of Mozambique's agricultural sector. It aimed to improve the efficiency of the existing farming practices through innovative solutions, augment capacities by incorporating technology in the agricultural production processes. The objectives of the project were to:

1. Undertake contract farming with 2000 smallholder farmers for soya, sesame and maize crops,
2. Provide farmers with crop diversification,
3. Provide quality inputs on credit,
4. Ease market access for the produce through a buy-back arrangement,
5. Eliminate logistical challenges for the farmers,
6. Ensure minimal post-harvest losses and handling, and
7. Provide fair weights and fair pricing at the market price.

Under this project, the chain of activities that were carried out are elaborated below.

Identification of Potential Farmers

The aim of the project was to work with farmers having reasonable farms of 2 hectares and above, with several of these farms contiguous to each other. However, the farms were very often scattered or spread out. Signing a contract with farmers in close clusters gave the project workers greater efficiency in land preparation, training, and monitoring farm activities. Given the demography of the area, meeting the twin objectives of having land size of over 2 ha and working in clusters with several farm holdings was a serious challenge.

Two thousand farmers were identified across approximately 50 associations and were grouped into Farmer Associations[2] and organized through the exertion of influence and pressure through the office bearers of the association.[3] Influential local chiefs typically held office as the Association's president and secretary. The Association office was usually close to the president's residence. It served as a rendezvous point for meetings, pronouncements or training sessions with farmers.

Each association was provided with two extension workers as a part of the project. These extension workers were sometimes chosen from the same locality, as they were expected to have a good knowledge of the area and a working relationship with the farmers in the Association. The extension workers were trained by the project manager, who was typically an agronomist. They were trained in several areas, but most significantly in aspects of agronomy and the use of a digital platform. These trainings were carefully designed to ensure that the extension worker had an independent mindset and was not influenced by the farmers during the course of his work.

Farmer Contracts

There was little legal recourse available for the stakeholders in case of credit default by the farmers. However, it was considered prudent to get into a formal contract with the farmers. Elaborate contracts were drawn

[2] The concept of Farmer Producer Organizations (FPO) consists of collectivization of producers, especially small and marginal farmers so as to form an effective alliance to collectively address many challenges of agriculture such as improved access to investment, technology, inputs and markets.

[3] These associations are equivalent to the Farmer Produce Organizations (FPO) in India.

up to capture all the details of the farmer and map his land, crop history and the contract details. These details included the particulars of the land being offered, the crops planned, the yield, the expected price and the returns that the farmer could expect. The contract was signed by the Association of the President who served as a witness, and an endorsement of the farmer's credibility. In case of a default, the Association through its office bearers was expected to bear upon the defaulting farmer to pay back the loan; otherwise, they were informed that the entire association would be blacklisted in the following cropping season. No associations, however, got blacklisted over the course of the project.

Skill Development

An important element of the project was to develop the agricultural skills of the farmers for augmenting productivity. Most farmers carried out their farms activities with the knowledge obtained through experience and through peer-to-peer learning in their immediate vicinity. This meant that modern farming practices were not practised consistently, which led to higher costs, lower yields and below optimum income.

Farmers were segregated into groups and given training on various aspects of farming. Ecosystems of active promotion of skill development were created. The training included financial literacy, good agricultural practices, pest management, and optimum usage of fertilizers and chemicals. Under the financial literacy programme, farmers went through an awareness programme where the 'profit and loss' statement of their contract was explained to them. The farmers were further trained in the best sowing practices based on soil and weather conditions and equipped with the right knowledge on quantum methodology and the timing of fertilizer application. They discussed the advantage of the contract with regard to better yields and better harvest prices.

In course of the various skill development programmes, the importance and benefits of adhering to the contract were explained to the farmers. This also included a note of caution on risks such as droughts, torrential rains and pest attacks that could lead to lower yields, and stagnant prices due to sluggish or low demand. In such events, the contract proved beneficial to the farmers as it protected them with a minimum price realization for their products.

Further, farmers did not maintain quality standards and take enough care during harvest and storage, which led to crop damage and losses.

Quality maintenance is of particular importance to export-centric crops such as sesame and pulses. Admixture and pest infected Pest Control Technology (PCT) were two important parameters that quality inspections agencies wanted strict compliance with. The side selling of produce was also rampant, and previous contract farming companies had suffered considerably. To curb this malpractice, the contracts stated that the consequence of side selling would result in the farmer being blacklisted and the farmer would have no recourse to any lending the following season.

Digital Tracking of Farming Progress Using Farm Force

The project contracted with Syngenta, a Swiss-based multinational company to digitally track every aspect of the engagement with farmers under the project. Their digital product, called Farm Force (FF), was in the trial stage. The FF structure used a pre-designed digital platform loaded onto smartphones and tablets. These smartphones and tablets were given out to extension workers who were responsible for the engagement with farmers. The project associates worked with Syngenta to develop the software to suit the requirements of the project. They made it available in Portuguese, the language spoken in Mozambique. All images and document proofs were captured through the FF. Farmers data (past cropping history, land size, family size, location, identity details, farmer photo) were captured at an earlier stage and data was recorded till the point of harvest transactions.

The Know Your Farmer (KYF) data was required to meet the eligibility criteria without which there could be no engagement with the farmer. If the farmer was eligible for the engagement, a formal contract was signed and the copy of the duly signed contract was uploaded on to the FF as a record.

Thereafter at every stage of farming, the progress was digitally captured through data entry, image capture and a suitable document capture was stored as a record. A lot of this data capture was done by extension farmers who, after returning from the fields, would download the data to the central server for further analysis. The farmer analysis reports gave an insight on the efficiency of the farmers, the magnitude of challenges, and the scope for improvement.

Input Distribution

Input distribution includes the distribution of seeds and fertilizers to the farmers. This activity began with the preparation of land. The farmers had a choice of whether or not to avail the tractor-led service rendered by the company. They could also manually prepare their land. Typically, the larger acreage farmers sought the company's service. The rest chose to prepare it on their own, using family labour. Most smallholder farmers planted and fertilized their land manually. Once there was ample proof of land preparation activity executed with digital imaging and GPS coordinates of the farmer, the next step was to lend him the inputs. It was important that in each step, the farmer was assisted with the best practices. These results were closely monitored and reported to the central agronomist. When these findings were analysed, advice was generated and then communicated back to the farmer. This system had its challenges, due to the fact that farmers did not have smartphones for communicating advice to them digitally. The advice had to be disseminated in person in a region where the terrain was very rough and the farmers were in remote areas.

Farm Implements

Farmers in the region by and large did not own farm equipment, and the existing farm implements were not well maintained. During the season, government organizations, namely the District Services for Economic Activities (SDAE), arranged for two tractors and harrows to prepare the land. These were not enough to cater to all the needs of the farming community. With support from USAID and IFAD, the project invested in farm implements, primarily four tractors and harrows. They used these implements to provide land preparation as a service to the larger farms. They also encouraged the farmers to pay for the fuel and charged them a small service fee which was recorded in their loan book. This reduced the loan exposure and allowed the farmer to carry out subsequent activities. It promptly reduced the time and money spent in land preparation, which was earlier wasted due to the manual removal of weeds. Land prepared through mechanization also resulted in better crops.

Harvest Collection Centres—The Hub and Spoke Model

A unique concept introduced in the project was the 'Hub and Spoke Model'. Farmers cultivated deep in the jungles—a minimum of 50 km away from Ribaue. The project created Collection Centres (CCs) within 5 km of each farmer. This brought the buying centre to the doorstep of the farmer. The CC received the produce of the farmers and bought it from them at the market price. These CCs were inexpensive thatched structures, usually located next to the Association President's House as this was a central place for the farmers in the Association, who also visited this location for their meetings. There were additional facilities at this location, such as a small shop and a mini maize mill (Fig. 10.2).

A CC close to the farm proved to be highly beneficial for the farmers. It allowed the farmers to avoid a 50 km trek to the nearest town centre for selling their goods. These treks were disadvantageous as the farmers would often accept the sub-par town prices as they had already trekked

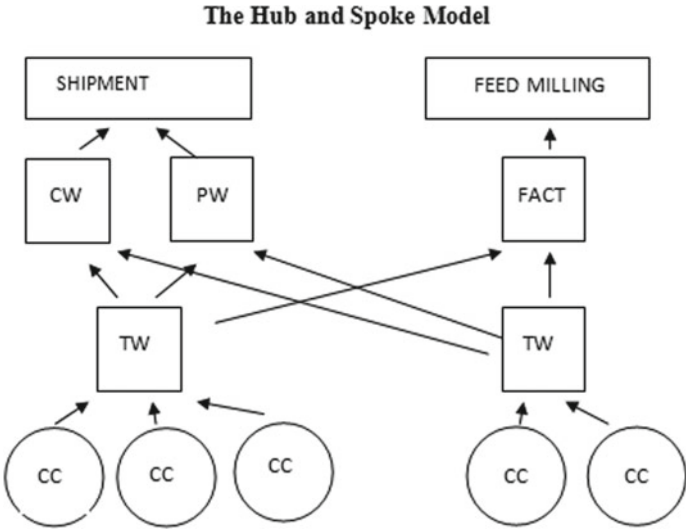

Fig. 10.2 Graphical representation of the Hub and Spoke model (Author) (**CC**: Collection Centre; **TW**: Transit Warehouse; **CW**: Central Warehouse; **FACT**: Factory; **PW**: Port Warehouse) (*Source* Author's compilation)

that far to reach the town. If the goods remained unsold, they would have to be carried back to the village. Having a centre close to the farm that offered the same prices as the town, also meant that there was less post-harvest handling of the produce. Having a centre from the beginning of the season assured the farmers that they had a buyer for their harvest. Initially, farmers were sceptical about the price, but over time they realized that at the centre they were offered fair weights and competitive prices. In the past, the government often handed out seeds, but did not offer a solution for better market access. This meant that all the effort put in by the farmer to grow the produce would be in vain.

The responsibility of constructing the CC was given to the Association itself. They could use tractors to source the bamboo from the jungle through the project. They were also provided with US$ 100 for labour and other requirements. Hence, the structure was extremely cheap and was appreciated by the farmers as they had ownership over the structure. It was built by them and they could sell their harvest close by at these CCs.

Each CC was manned by 3–4 people depending on the size of the catchment area and the transactions that were expected to flow from the centre. There were 30–35 CCs in the Ribaue district. One person was in charge of the CC and responsible for its overall functioning. His responsibility included maintaining farmer accounts to:

1. Receive farmer produce,
2. Check weight and quality,
3. Raise an appropriate document to register the receipt (GRN—goods receipt note),
4. Pay the farmer in cash as per the daily market price set by his manager,
5. Arrange suitable stocking of the goods to avoid pests; and
6. Dispatch the goods to the transit warehouse and create an appropriate transfer/dispatch document (Fig. 10.3).

They were responsible to account for all cash, stocks, quality and overall upkeep of the centre. They were supported in these tasks by the Quality Controller (QC), labour to handle stocks, and a security guard. Sometimes the QC also worked as a labourer to handle the stocks.

Fig. 10.3 Inside the Collection Centre (*Source* Author's photo)

Transit Warehouses

Produce that was collected in the CCs across the area that the project operated in was aggregated in a chain of transit warehouses (TW).[4] These TWs were larger warehouses with a capacity to stock a minimum of 120 tonnes (around 4 trailer loads each of 30 tonnes). The produce coming in from the collection centres to the TWs went through the following stages:

[4]The TWs were at times brick or mortar structures. Some Associations had these structures available, which were built by grants from governments or any other agencies. In other instances, the TW's were also thatched structures built around the same lines as collection centres. These TW's were built closer to the harvest season. By this time, the rainy season would have long finished. There were occasions when due to heavy storms, the thatched structures broke down and they had to be redone. The Nampula province was quite infamous for these heavy storms recurring every once in a while.

a. It was checked for weight and quality. Any discrepancy was reported back to the collection centres through the appropriate chain of command,
b. The produce was segregated and stocked crop wise, and
c. The produce in each crop stack was tagged to identify the collection centre it originated from and an appropriate receipt document reference was made.

This process ensured traceability of each lot. First in First out (FIFO) policy of the lots was strictly maintained. According to this policy, the grain brought first was loaded out to ensure minimum storage at upcountry warehouses. Even at the time of dispatch to the city warehouses, port warehouses, farm warehouses and the feed mill warehouses, the dispatch document recorded the details of each lot that went into make up the full trailer load.

The TWs generated employment as each TW was manned by a warehouse head supported by a QC, a few labourers and security guards. The project managed to get an insurance company to cover the stocks against theft and fire. The project management ensured that the stocks did not lie in these warehouses for too long, so that pilferage was controlled and stocks did not deteriorate due to humidity and pest attacks. The personnel followed a strict regimen and fumigated stocks at the transit warehouse before dispatch. Such practices, alongside regular meetings, fortified the training in post-harvest practices at which the project was aimed.

Logistical Support

The road from Ribaue to Nampula was non-tarred during the course of the project. The terrain leading up to the TWs was rough and resulted in considerable damage to the transporter's fleet. Most transporters were based out of Nampula or Nacala. All the stocks had to be evacuated ahead of the rainy season as the roads would become unpliable. This meant added pressure on mobilizing the transporters to cater to the transport needs of remote locations. Due to logistical challenges, some of the trucks carrying the cargo lost their balance and had accidents. Fortunately, they were able to get transit insurance on the stocks.

The reliability of the transporters and their commitment was always doubtful. To avoid mishaps, the project hired a full-time logistics officer

Fig. 10.4 The Nampula–Ribaue highway (*Source* Author's photo)

in the city office at Nampula. They created a Logistics Management Information System (MIS) which was circulated to all the levels in the chain. This was a detailed excel sheet which captured the movement of lots from one point to another including costs, weights and losses at each point. The system provided updates on movements to all concerned stakeholders in a systematic, process-driven manner (Fig. 10.4).

The Nampula–Ribaue highway which was non-tarred between 2011 and 2014. This road was tarred in 2016.

Market Access

Maize and soya were sent to the feed mills. A pre-season contract with two of the leading feed mills in Nampula city had been signed. The arrangement was beneficial for the feed mills as it meant a year-long supply of the key crop ingredients. They hired a large warehouse in Nampula, from where stocks were moved daily to the feed mills based on an agreed weekly delivery plan.

Maize and soya were procured in addition from farmers who were not on the list of contract farmers. These non-contracted farmers were of two types;

A. Those who did not need input assistance; and
B. Those who did not qualify for the assistance programme.

These farmers were not provided with any inputs on credit. They could buy inputs from the project management against immediate payment. The project however did not exclude any farmers from selling to them. This was an opportunity to get more crops. It also provided an avenue for more farmers in the region to come under the fold of the project's assistance after a due diligence on their credibility was conducted.

Social Impact Study

During the course of the project, a contract with a USA-based university was established to source their students for a ten-week summer internship who were entrusted with the task of conducting a Social Impact Assessment (SIA) study. The intern, a first year MBA student, spent ten weeks in Ribaue. As a part of his impact study project, he covered a reasonable number of farmers and visited the operations from end to end in all the Associations. The study presented some interesting results.

Model Farms

Among the 2000 farmers on contract, it was predicted that some would be much better off than the rest. This was due to,

1. Better soil conditions,
2. Better farming practices adopted,
3. Timely sowing and fertilization, and
4. Pest management.

On the basis of these factors, the concept of 'Model Farms and Star Farmers' was introduced. The project tied up with TechnoServe, wherein these Star Farmers received a small grant to create a special model farm next to theirs. TechnoServe is a US-based NGO which supports the development of soya in Mozambique and other countries in Africa. These showcased the impact of various farming practices, such as the advantages of using fertilizers. In subsequent seasons, the TechnoServe intervention often expanded to other farmers. This included the creation of trial farms to check the viability of other crops and for seed trials. Five model farms were created.

The project arranged for groups of 50 farmers each to visit these model farms and learn from them. This was one of the ways to disseminate good agricultural practices by exposing the farmers to demonstration farms. It was noticed that peer-to-peer learning was much more effective, especially when it was in field training. Farmers could relate and accept advice more easily when it came from their fellow farmers. This also fostered spirited competition among farmers to do better than the other. Such interactions also brought insights to the team members—which were hitherto missing as part of their knowledge bank or database.

Agripreneur Development Programmes

Employment generation was a great by-product of the project. The unemployment rate in rural Mozambique is 25.04% (World Bank 2017d). Therefore, the opportunities brought in through the project to create employment were of great benefit. The project generated livelihood and incomes for more than 500 people in various activities. These ranged from building and managing their CCs and assisting with transportation. Such interventions increased incomes and brought more people under the fold of the project. Participants who were not fully committed to the project were dissuaded from participation.

The project also handpicked some students from the Ribaue Institute of Agriculture as extension assistants, who had a formal education in agriculture. These extension assistants were further trained by the agronomists and project managers in the practical aspects of farming. They were assigned the role to disseminate this knowledge through farmer training, in groups and individually, at the farmer's fields. The training was meant to be a two-way interaction, where the extension assistant learned as much as he imparted knowledge. At an early stage of their career, it was important for them to understand the challenges and opportunities in the field.

Conclusion

The project was well received by the farmers, government bodies, and aid agencies because of the impact it brought to the livelihoods of farmers in Ribaue district. The achievements of the project are as follows:

1. Enhanced Productivity for every actor in the value chain,
2. Organized the farmers into associations, and established a chain of command,

3. Supervised all activities undertaken by the farmer,
4. Provided legal recourse to the farmers and thus insulate them from risk,
5. Enhanced their skills, financial awareness and better agriculture practices,
6. Adopted the use of technology through data collection and analysis,
7. Provided stakeholders the ability to analyse their problems and reach solutions,
8. Offered market access through the innovative 'Hub and Spoke model', and
9. Incorporated international actors such as USAID and IFAD for logistical support in the project.

As a result of this intervention, farmers worked on the project very passionately. They grew alternate crops, which benefited them in the second season. The yields for soya went up as much as 2–4 tonnes/ha. The sesame yields increased to 500 kgs/ha. Besides, the farmers did not have to walk 40–50 km to sell their produce. They also did not have to deal with unscrupulous traders, who buy the produce without helping the district (Saran 2018).

An important learning from this project was that a joint collaborative effort by multiple parties is crucial in effectively executing a plan of this magnitude. Since the project was executed via a public-private partnership, it included engagements between bilateral, multilateral and governmental agencies. It successfully addressed every aspect of the agricultural value chains that it worked with. The project, in other words, accomplished its vision of strengthening Mozambique's food security by empowering its farmers.

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PART IV

Trading in Pulses

CHAPTER 11

Africa's Pulse Exports to India

Bharat Kulkarni

Abstract Pulses play a key role in driving the development of modern agriculture and are an important source of food security. Changing food preferences, combined with rising incomes and populations in major consuming countries, are creating a global pulse shortage. The pulse trade between India and Africa holds considerable potential. The pulse industry in African countries has developed without a lot of focused intervention. Pulse cultivation on the continent is mainly an intercropping solution. On the other hand, pulses in India are an essential food ingredient along with being one of the cheapest sources of protein. Nevertheless, the Indian pulse sector grapples with price volatility. The entry of East African pulses in India has been facilitated by the Government of India's State Trading Corporations and some private traders for almost the entire span of the pulse trade between the two regions. However, export from Africa to India is accompanied by challenges such as a lack of information, poor transport facilities, and language barriers. The pulses industry in India is heavily integrated with the processing sector. The demand from the

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diasporic community and India's 2006 pulse export ban has pushed pulse processors and exporters to look for alternative set-ups. East Africa proves an attractive destination for such set-ups, on account of the availability of pulses through the network of smallholder producers, tax free schemes that promote exports and industrialisation, and the low cost of labour. Certain Least Developed Countries (LDCs) in the region have duty free access to American and European markets. Given such a trade climate, India has to intensify its engagement with Africa, present more transparency in its trade, and take into consideration global factors while deciding on its trade restrictions to strengthen its relations with Africa in the pulse sector.

Introduction

Pulses have a long history of cultivation and play a key role in driving the development of modern agriculture. They are an important source of food security after crops such as maize, wheat and rice. While pulses offer a cheap and environmentally friendly alternative for nutrition, they also help soil regain its nutritive balance and reduce the use of fertilizer. Changing food preferences, combined with rising incomes and populations in major consuming countries, are creating a global pulse shortage. The situation of pulse imports in India is in the readjustment phase. The rise in the prices of pulses and favourable weather has led to an overproduction of pulses. This has prompted the government to impose import restrictions, but India imported 5.6 million tonnes in 2017–2018 and has imported more than a million tonnes as of September 2018 (Department of Commerce 2018). Since the Indian carry over stock is not very high (Department of Commerce 2018), India is expected to go back to the importing market very soon. China has also shifted from being a net-exporter to a net-importer of pulses in the span of a few years.

Box 11.1 The International Year of Pulses 2016
The 68th UN General Assembly declared 2016 the International Year of Pulses (IYP) and the Food and Agriculture Organization of the United Nations (FAO) was nominated to facilitate the implementation of the Year. It was a highly vibrant year in terms of raising awareness about pulses and its importance.

The FAO, in collaboration with Governments, Non Governmental Organizations (NGOs), private sector players and all other relevant stakeholders implemented the year to raise public awareness of the nutritional benefits of pulses as part of sustainable food production aimed towards food security and nutrition. The efforts of the various agencies were focused to promote the better utilization of pulse-based proteins, further global production of pulses, better utilize crop rotations and address the challenges in the trade of pulses.

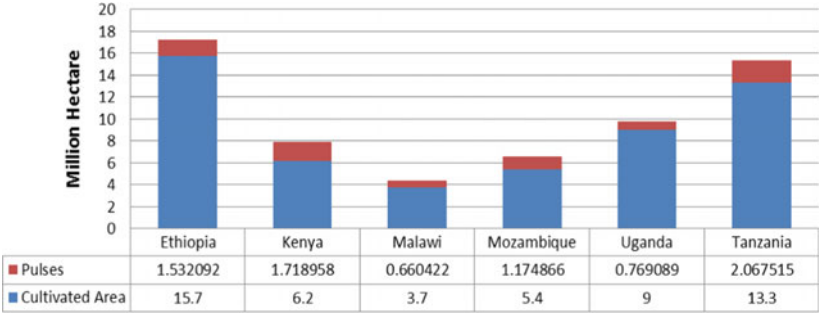
Source Calles et al. (2019)

Pulses from Africa

The pulse industry in Africa has developed without a lot of focused intervention; pulse cultivation on the continent is mainly an intercropping solution as the production of pulses balances soil health and reduces the use of fertilizers. In recent times, however, there is an increased awareness of the potential that the pulse sector holds if it is aided by proactive and targeted support. Out of the overall area under cultivation, the area of pulses is not very high (Fig. 11.1).

An increase in the production of pulses will not only augment the agricultural sector of the continent but also contribute significantly to expanding its exports.

Smallholder farmers grow a large share of the pulses in Africa, and the development of the sector can increase their incomes through greater



	Ethiopia	Kenya	Malawi	Mozambique	Uganda	Tanzania
Pulses	1.532092	1.718958	0.660422	1.174866	0.769089	2.067515
Cultivated Area	15.7	6.2	3.7	5.4	9	13.3

Fig. 11.1 Cultivated area versus pulses area (*Source* FAOSTAT [2017])

productivity per hectare of pulses planted. The global demand for pulses presents an opportunity to stabilize the sector and increase supply by meeting the full potential for production. This would allow African countries to fulfil domestic demands, ensure food security and benefit economically from an expanded export market. The following sections present an overview of the pulse production and market in a few African countries.

Ethiopia

Ethiopia is a major oilseed- and pulse-producing country in Africa. Pulses occupy approximately 13% of cultivated land and account for approximately 10% of the agricultural value addition in the country (Rashid et al. 2010). The sector has received governmental attention and has been significant in terms of exports. Ethiopia produces a variety of pulses such as Chickpeas, Haricot beans and lentils. The Haricot beans and are mainly exported, whereas the Red Lentils are locally consumed. Pigeonpeas have a big local market, but also form a major export type.

Pulse production in Ethiopia has shown signs of improvement since the inception of the Growth and Transformation Plan of 2010 (Rashid et al. 2010). However, the production levels are still not at par with the global standards. The road map developed by the International Trade Centre (ITC) in partnership with the Ethiopian Pulses, Oilseeds and Spices Processors-Exporters Association (EPOSPEA) indicates that the limited use of quality inputs such as pesticides, fertilizers, and use and low-yielding seeds have been responsible. An efficient implementation of better agronomic practices like the use of pulses in crop rotation, better post-harvest handling, and the promotion of mechanized production can also improve the yields (ITC 2016) (see Venuprasad et al., Chapter 9, this volume).

In Ethiopia, pulses are produced in two seasons—*belg* (short rains from February to June) and *meher* (long rains from June to October). The *meher* crop season is the main season for cultivation. It accounts for 90–95% of the county's agricultural output, whereas the *belg* harvest provides the remaining 5–10% of output (author's estimates). Since the sowing and harvesting seasons overlap sometimes, the Ethiopian *belg* crop season is officially defined as any crop harvested between March and August, while the *meher* crop season is defined as any crop harvested between September and February for the sake of clarity.

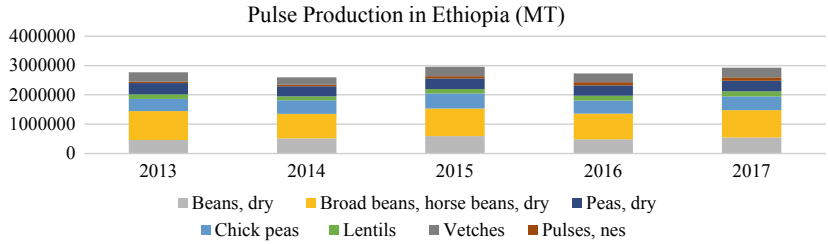


Fig. 11.2 Pulses production in Ethiopia 2013–2017 (*Source* FAOSTAT [2017])

The season-wise bifurcation of production process indicates the relationship between agro-climatic conditions and pulse production. The production of chickpea and lentils is on dark soils and residual moisture. This soil type is found in west and north Shewa zones of Oromiya, north and south Gonder, south Wollo, north Shewa, east and west Gojam Zones of Amhara, and Goro zones of Southern Nations, Nationalities, and People's Regional State (SNNPRS). Fava beans (also known as *broad beans)* and field pea, on the other hand, are grown during the main season on both red and black soils primarily in Amhara, Oromiya and the SNNPRS. Haricot beans are concentrated in the relatively dry and warmer parts of the country mainly along the Rift Valley (Alemu and Seifu 2003). Production of Haricot beans has also spread to the SNNPRS, Gambella and Benshangul-Gumuz region (Fig. 11.2).

Tanzania

Pulses in the United Republic of Tanzania are an important crop. They account for about 12% of the cultivated land (author's estimate). Though the production of pulses suffers from low yields (less than a tonne per hectare), Tanzania is still a major player in East Africa and one of the top ten producers globally.

Major types of pulses that are cultivated in Tanzania include pigeonpea (*Tur/Arhar dal*), chickpea, cowpea, green gram, dry beans, green *mung* beans, and yellow grams (*Chana dal*). The production of pulses is spread over four major areas—Lake, Central, Southern and Northern (Fig. 11.3).

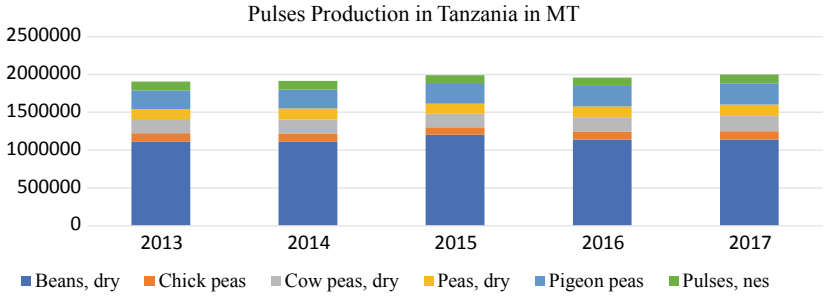


Fig. 11.3 Pulse production in Tanzania 2013–2017 (*Source* FAOSTAT [2017])

Tanzania is not yet a major player in the global pulses' scenario. Compared to major exporters like Canada, Australia, Myanmar, China, and Argentina, the share of Tanzania's export is not very high. Though Tanzania is a major producer, a large share of the beans produced are consumed locally and not offered for export. Pigeonpeas are a major type pulse for export, followed by green *mung* beans and chickpeas. Like many other pulse exporters, a major market for Tanzania is India; India imports close to 25% (Department of Commerce 2016) of its pigeonpeas from Tanzania (see Andrew, Chapter 12, this volume). The production calendar of Tanzania makes it a strategic supplier for India. The majority of pigeonpea harvest is done between May and September, when the Indian crop is still to be harvested. The shortfall in the Indian crop is covered by the Tanzanian output in May-June of the next year. Apart from India, Asian markets like Pakistan and the Middle East also import from Tanzania.

A similar advantage is enjoyed by Kenya, Malawi (for pigeonpeas) and Ethiopia (for pigeonpeas). With proper investment in production and processing technology, the export of pulses from Tanzania can be improved and diversified. The diasporic population of South Asians in the UK, USA and the Middle East makes a sizable number and presents a more premium market to be exploited.

Kenya

The major type of pulses produced in Kenya is dry beans (including green *mung* beans), followed by pigeonpeas and cowpeas. Kenya has shown

progress in production, though the area under cultivation keeps fluctuating. In the past few years, despite significant challenges, Kenya has steadily moved on to become one of the major pulse producers in Africa.

A lot of cultivation of these pulses happens in the Arid and Semi-Arid Lands (ASALS) of the Eastern Province of Kenya. This province is also the main producing area for pigeonpea in the country. Three Kenyan districts account for about 80% of the total production of pulses (author's own estimates). Such concentrated production poses a considerable risk on account of regional weather problems. Overall, the sector has not been able to achieve its full developmental potential. Kenya can benefit from the opportunities offered by the market and channel the potential of this sector to support its farmers and agribusinesses (Fig. 11.4).

Kenya exports green *mung* beans and pigeonpeas to India. However, the share of Kenya's exports in India's total imports is very small. Roughly 3.5% and 1.5% of India's imports of *mung* beans and Pigeonpeas respectively are from Kenya (Department of Commerce 2016). Kenya has also been exporting dry beans and green peas to the Middle East. This too is a growing market, and the share of Kenya's export in the total imports of Middle East is not high. Hence, there is a scope for increasing the export and being a more prominent trade partner with the Middle East. Europe also imports a sizable quantity of pulses like the peas and beans from different countries in the World. However, due to stringent quality norms, Kenya does not have a share in these exports. By focusing on quality then, Kenyan exports to these regions can be increased and diversified. In the sector of processed exports, Kenya can export processed *dal* to East

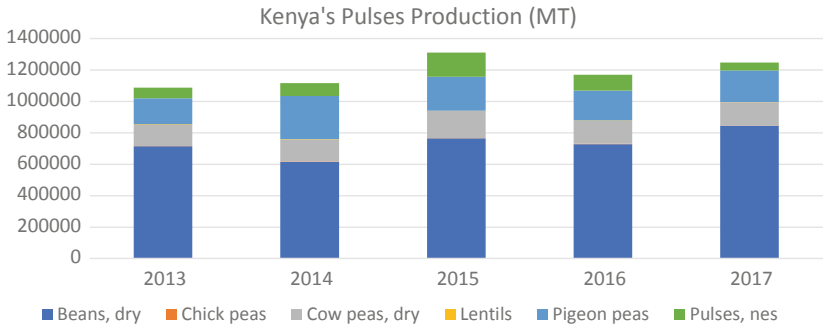


Fig. 11.4 Pulses production in Kenya 2013–2017 (*Source* FAOSTAT [2017])

Africa region and beyond. The region has a large South Asian diasporic population that has processed *dal* as a staple. With the export ban from India, there is an increased scope to access this market. However, it will require collateral investment in processing facilities. Once that is made, the regional market as well as the international market can be explored.

Malawi

Malawi is another major pulse producer in Africa. Pigeonpeas form a large share of the pulses produced in Malawi. Malawian smallholder farmers grow pigeonpeas largely as an intercrop with maize and cotton. The quality and cultivation are therefore irregular and requires standardization. So far, there are very few large-scale farmers in pigeonpea production. These smallholder producers sell the produce to local traders, who in turn sell to other local traders, middlemen, and processing companies (Fig. 11.5).

Although there is both domestic and regional trade in pigeonpeas in eastern and southern Africa, what makes it particularly different from other food crops is the export trade to India. Being the world's largest producer, as well as a major consumer of pigeonpeas, India is thus far the focal point for international pigeonpea trade. Malawi is already one of the largest exporters of pigeonpeas in Africa. Its pigeonpea industry has efficient decorticators and cleaning and drying machines, capable of meeting the quality standards required by the international markets.

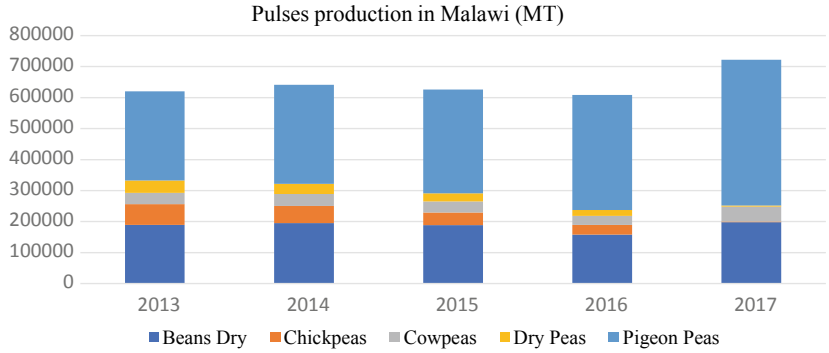


Fig. 11.5 Pulses production in Malawi 2013–2017 (*Source* FAOSTAT [2017])

Pulses in India

Pulses form an integral part of the Indian diet. They are an essential food ingredient along with being one of the cheapest sources of protein. Nevertheless, the sector grapples with numerous challenges, including price volatility, and came under serious vigil after the record jump in prices in the years 2015 and 2016. The fluctuations resulted in government intervention; these interventions, however, did not entirely mitigate the problem.

After the volatile years of 2015 and 2016, political and business-related hopes were pinned on the 2017 crop. The pulse production in 2017, and again in 2018, was massive and fundamentally altered the pulse markets from 2017. In both years, India saw a production of well above 20 million tonnes, which is India's average domestic consumption as well. The peak pulses production prior to this was in 2013–2014, when the production was 19.25 million tonnes, a figure that eventually dropped due to the factors like erratic weather conditions among others (Ministry of Agriculture and Farmers Welfare 2015).

In spite of a surge in India's production, the import of pulses in 2017 was a record 6 million tonnes. In 2018, however, due to the import restrictions and duty barriers, the import was around only 4 million tonnes (author's estimation based on discussion and Department of Commerce 2018). In 2016, the government had agreed to import pigeonpeas from Mozambique for five financial years and aims at doubling the trade from 100,000 tonnes in 2016–2017 to 200,000 tonnes is 2020–2021 (PIB 2016). The import from Mozambique was allowed in spite of an overall quantity restriction. This is a government-to-government trade, with a portion through agreement with private trade bodies.

The moderate monsoons in 2015 and 2016, along with a significant rise in the area under pulse cultivation, have led to an increased estimate of production in India. The estimate suggests that the total area under pulse production is about 25–30% more than the average, leading to a higher volume of production (Ministry of Agriculture and Farmers Welfare 2015). The increased production and the record import in 2017 led to a higher carry over stock. In spite of fall in production as compared to 2017 in 2018, the overall position of stock has been that of oversupply. The impact of increased planting as well can be seen on the prices. The wholesale domestic prices of all the major pulses collapsed in 2017–2018 and led to a high level of farmer dissatisfaction and distress.

Table 11.1 Pulses imported by India

Pulses	*Imports from*
Peas (*Pisum Sativum*)	Canada (70.59%), Russia (11.06%), USA (8.37%), Australia (6.19%), France (1.74%)
Pigeonpeas (Garbanzos)	Australia (61.43%), Russia (22.77%), Tanzania (7.84%), Myanmar (6.40%), USA (0.47%)
Mung/Urad (Green lentil and Black Gram)	Myanmar (82.83%), Tanzania (4.23%), Kenya (3.55%), Australia (3.05%), Mozambique (1.61%)
Red Lentils (*Masoor*)	Canada (79.33%), USA (10.70%), Australia (9.85%), Uzbekistan (0.01%), Turkey (0.01%)
Pigeonpeas (*Tur dal*)	Myanmar (51.37%), Tanzania (27.44%), Mozambique (14.69%), Malawi (4.53%), Kenya (1.79%)

Source Department of Commerce (2016)

India's Import of Pulses from Africa

The entry of East African pulses in India has been facilitated by the Government of India's (GoI) State Trading Corporations (STCs) and some private traders for almost the entire span of the pulse trade between the two regions. The major pulses that India imports from East Africa are pigeonpeas, green *mung* beans and pigeonpeas. For years, the sources of import for *tur dal* have been limited to Tanzania, Mozambique and Malawi. The import of pigeonpeas has mainly been from Tanzania, and some from Ethiopia. *Mung* has been imported from Kenya, Tanzania and Mozambique.

The African crop of pigeonpeas in Tanzania, Malawi and Mozambique starts arriving from the end of August and early September. This coincides with the time of arrival in India as well and proves to be a volatile time for prices (Table 11.1).

Africa's Pulse Export to India—Challenges in Trade

Export from Africa to India presents a huge potential. However, it is accompanied by its fair share of challenges too. They are:

- *Comfort with counterparty*: Since the trade is long distance, buyers and sellers find it difficult to establish a comfortable trade relationship, leading to trust issues.
- *Diversity of languages*: Language often becomes a major obstruction for trade relations. Though English is a commonly used language in East Africa, Indian and East African traders at times find it difficult to communicate and discuss trade terms. The commodities are also not always referred to by same name.
- *Transport*: The transport of products from the East African ports is an issue. In Malawi which is landlocked, for example, the transport to port itself is very expensive and time-consuming. Since the market is very price sensitive, the delay and cost in transport is a great hindrance in Indo-Africa trade.
- *Lack of information about production*: The pulse trade is heavily dependent on Indian and other global production levels. The relevant information is normally not available to African producers who are then exposed to risks and uncertainty about the demand.
- *Lack of information on foreign traders*: Buyers and sellers usually do not have a direct and close relationship between them. Both have to take special steps to verify the credit worthiness of their counterparties. It is difficult to obtain information regarding creditworthiness, business standing, and financial positions of traders living in different countries.
- *Import and export restrictions*: Indian imports have several procedural demands, especially in terms of phytosanitary requirements. One of them is the treatment of the incoming cargo with Methyl Bromide. This is a requirement that often poses a challenge for East African exporters. Since the use of Methyl Bromide is prohibited in most East African countries, this restriction is a major challenge. India's recent export restrictions have also created serious challenges and uncertainty.

Opportunities for Indian Investment in Pulse Processing Within Africa

The pulses industry in India is heavily integrated with the processing sector, where more than 75% of the pulse consumption (Industry estimates) is in the processed (*dal* or flour) form. Processed pulses, often called *dal*, are an essential ingredient in most South Asian diets. These people have carried their food habits, and as a result, the demand for the

dal across the world as they migrated. The demand of the South Asian diaspora was traditionally met through the imports of processed *dal* from India and neighbouring countries.

This business model, however, was disrupted in 2006 as the GoI banned the exports of pulses, which also applied in *dal* as a food security measure. The Indian authorities have expressed an intention to lift the ban ever since. The expanding gap between the demand and supply and the volatility of the *dal* prices in India also suggests that the ban will remain in place.

The demand from the diasporic community and the ban in India has pushed the processors and exporters of *dal* look for alternative set-ups. Many have chosen to relocate their processing plants to places such as Dubai and Singapore. With no signs of change in the policy surrounding the ban, the investment in setting up *dal* processing plants is becoming more attractive.

In spite of these challenges, the *dal* industry has been growing steadily. In the span of 25–30 years, the number of *dal* processing units has increased significantly. The growth of these *dal* processing plants has been seen in areas like Indore, Jalgaon, Akola, etc., where the production of pulses is also quite high. The proximity of the production and trading location has been an important factor in the geographical spread of the plants.

However, the sector is losing the initial appeal it enjoyed in India. Processors face significant challenges as the industry becomes increasingly unorganized. In the absence of branding and the brand preference, the certainty about the market is absent. Further, the *dal* processing plants in non-production areas like Chennai and Nagpur face even greater challenges as the uncertainty of the raw pulse makes it difficult to plan the production schedule. The processing plants in these areas desperately need new opportunities to grow.

These processors, nevertheless, can look at the current situation as a blessing in disguise. The current economic climate may push them to look beyond the borders and explore new pastures in newer locations. The ban on exports and the non-availability of processing facilities in foreign production locations makes the opportunity more lucrative. *Dal* processing is a very technical area and requires experience to produce superior quality products. This is also important to keep the costs under check, as in the absence of proper technical operations and as the wastage is high. The experience of the processors is a big advantage for them.

As in India, processors can look at establishing the processing units in pulse-growing countries as well. East Africa proves a very attractive destination. The availability of pulses through the network of smallholder producers makes it easier for small processors to set up. Also, these countries are promoting exports and industrialization, making production and exports almost tax free. Further, the cost of labour and power in countries like Kenya and Tanzania is considerably cheaper, making the cost of operations lower. Finally, countries like Tanzania and Malawi being Least Developed Countries (LDCs) have duty-free access to American and European markets. The major importing markets of South Asian Diaspora are in USA and Europe and a duty-free access to these markets is a big advantage for pulse processors. They would be more competitive as compared to the exporters from Dubai or Singapore. Finally, under several support programs, the availability of finance for investments is also often available at a concessional rate.

Conclusion

The production of pulses in Africa has been on the rise. Various pulses like kidney beans, green *mung* beans, and peas have seen an increase in area under production. Globally, the consumption of pulses is growing as well, and African exporters have a number of new markets. However, India is the largest and most convenient market for East African pulses. The trade presents lucrative opportunities for India as well.

Overall, East African countries, particularly Tanzania, Kenya and Ethiopia, have a good export potential of pulses to India. Pulses like pigeonpeas, *mung* beans and kidney beans are produced in good quantities in these regions. Logistically, the routes are well established and a lot of pulses are already coming to India. The ban on export of pulses, however, has adversely affected the exporters of processed pulses from India. The demand for processed pulses (*dal*) is high as it is a staple for the South Asian population and its diaspora. Thus, the ban catalyses the setting-up of processing facilities in countries that have access to diasporic populations. The input is easily available; the cost of operations, particularly labour and electricity, is cheaper. Further, the export from LDC countries, like Ethiopia and Tanzania, also have advantages under the preferential trade agreements with Europe and USA.

However, for India to have stronger relations with Africa in the pulse sector, India has to step up its engagement and present more transparency in its dealings. The recent handling of the pulse issue by Indian policy makers has created considerable doubt about Indian markets in the minds of the African governments and producers. A striking example of a region affected is Tanzania. The Tanzanian producers increased the area under cultivation and produced an increased output of pulses, specifically pigeonpeas. Based on the request of the Government of India, the Tanzanian government encouraged its farmers to grow more pulses. This took some time and the year of 2016 and 2017 had a bumper production. But the Government of India imposed a quantitative restriction on the imports, specifically of pigeonpeas. This led to a price collapse and Tanzanian farmers could not even recover their production cost. It is believed that close to 25% of the production was burnt on the fields.

This incident has seriously dented the image of India as an importer. The Indian government's commitment to international trade has come under scrutiny for its knee-jerk reaction in the trade policy. It would be advisable for India to take such engagement seriously and look at the bigger canvas before deciding on its trade restrictions.

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CHAPTER 12

Ban on Pigeonpeas from Tanzania and Its Impacts

Zirack Andrew

Abstract This paper intends to ascertain the future of trade between Tanzania and India after an unprecedented ban on pigeonpeas in August 2017. It reflects on the background of bilateral trade, the inception of the ban, the response of the stakeholders, the interventions made in order to capture the effects, and the predicted outcomes of the ban. Tanzania and India have had bilateral trade relations since the early 1960s. As of December 2018, trade between the two countries stood at US$ 1895.087 million, out of which US$ 1167.465 million were India's exports to Tanzania, while US$ 727.622 million were Tanzania's exports to India. The lucrative pulses business encouraged many Tanzanian farmers to shift from cash crops towards the cultivation of pigeonpeas. This resulted in a surge in the production of the crop from 10,000 MT in 1961 to a projected 292,000 in 2001 (FAOSTAT 2017). The Indian ban on Tanzanian pigeonpeas, however, led to a decline in exports from 160,000 MT to 51,000 MT (Tanzania Revenue Authority 2017). This led to 73,000

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Table 12.1 List of Tanzania's export items to India. (US$ in 1000s)

Commodities	*2015*	*2016*	*2017*	*2018*
Pulses, live animals and their products, fish, meat, vegetables and their preparations, nuts, spices, coffee, tea, cereals, milling industry products, lac, oilseeds, oils and their products, cocoa and their preparations, residues and wastes from food industries	1,149,437	702,992	782,927	727,622

Source ITC (2018)

MT of pigeonpeas (worth US$100 million) remaining unharvested in Tanzanian farms (EAGC 2018). Following this unfavourable turn of events, the future of Tanzania–India trade appears bleak.

Introduction

Trade between India and Tanzania has been on the increase, spurred by several international cooperations such as the Non-Aligned Movement (NAM), South-South solidarity and the South Commission.[1] India and Tanzania are founding members of the World Trade Organization (WTO) and have abandoned socialist principles to become market economies (Bhushan and Katyal 2004) (Table 12.1).

India and East Africa share a rich history of trade integration through the Indian Ocean sea routes. Trade is likely to rise with these countries through systemic efforts by the partner countries. In particular, the six East African Community (EAC) countries (Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda) have the potential to emerge as future gateways of the continent's trade with India (Chakraborty and Sahu 2016). Among these EAC countries, India is Tanzania's largest trading partner since 2013.

[1] The South Commission is a group of 77 economically backward countries that decided to unite to negotiate with rich, industrialized and developed nations in the Northern Hemisphere. It was founded in 1987 and established its headquarters in Geneva, Switzerland. The Commission elected Julius K. Nyerere, Tanzanian founding president as the first Chairman. Manmohan Singh—a renowned economist and India's prime minister (2004–2014)—was its secretary general in 1988.

Tanzania's product exports to India in 2018 were valued at US$ 727.622 million. This is slightly behind Kenya's at US$ 130.965 million (ITC 2018). India is among the top five leading investors in Tanzania over the 1990–2017 period, with a total investment of US$ 2.2 billion (MEA 2017). These exchanges clearly show that a strong bond exists between the two countries (Fig. 12.1).

While the exports from Tanzania have predominantly been raw agricultural products, Indian exports to Tanzania mainly consist of finished manufactured goods because of India's highly developed industrial base. Agricultural products exported to India range from cotton, raw cashew nuts, live animals, fish, coffee, tea, spices, edible vegetables, cocoa and pulses. While, imports to Tanzania include pharmaceutical products, vehicles, machinery, textile material and organic chemicals like fungicides, insecticides, rodenticides and herbicides.

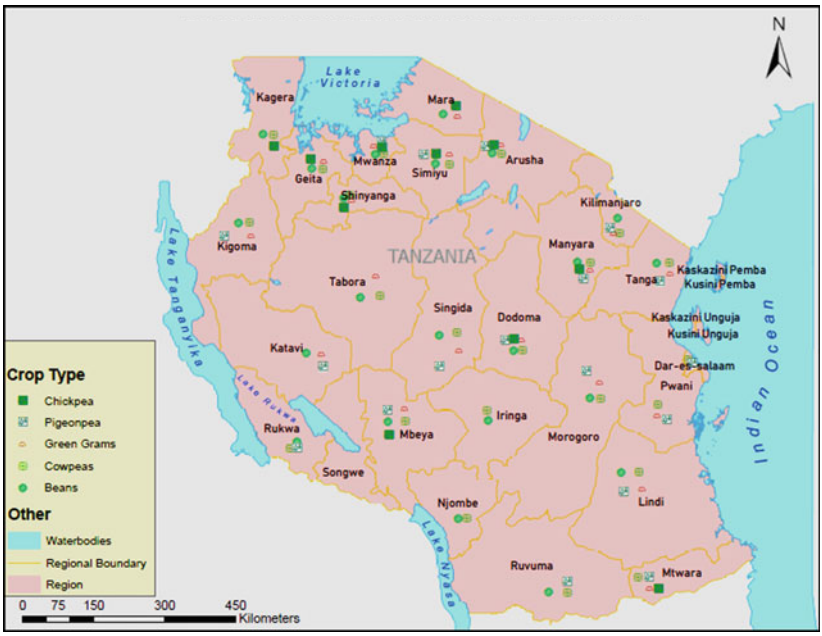

Fig. 12.1 Regions growing pulses in Tanzania (*Source* Tanzania Investment Centre 2016)

Over the past decade (2008–2018), trade between India and Tanzania has grown steadily. Exports from India to Tanzania have grown by 76%; while that from Tanzania has exhibited a higher growth of 320% (author's calculations based on ITC's Trademap statistics).

To obtain high volumes of raw materials for industries, India introduced the Duty Free Tariff Preference (DFTP) scheme in April 2008 for all the Least Development Countries (LDCs) (INTRACEN 2015).

The DFTP scheme was announced by the Indian prime minister on 8th April 2008, during the India-Africa Forum Summit in New Delhi. The WTO was notified on the 5th of September 2011, after coming into effect on the 13th of August 2008.

The scheme is a unilateral, non-reciprocal tariff preference scheme which benefits all 48 LDCs.[2]

- Elimination of customs duties over a period of 5 years through equal annual reductions on 4430 items, which constitute 85% of total tariff lines;
- Reduction of duties on the basis of a prescribed margin of preference over a period of five years through equal annual reductions on 468 items, which constitute 9% of total tariff lines; and
- No reductions on 326 items, which constitute 6% of total tariff lines (Ancharaz et al. 2014).

With respect to exports from LDCs under this scheme, by 2012, 85% of India's total tariff lines were duty free; 9% of tariff lines had a margin of preference ranging from 10% to 90%; and 6% of total tariff lines were retained in an exclusion list with no duty preferences (UNCTAD 2017: p. 4). However, in April 2014, the Government of India (GoI) made an amendment to the DFTP, that covered more than 98.2% of India's tariff lines. Only 1.8% of the tariff lines have been retained in the exclusion list, with no duty concessions. It further reduced the exclusion list to 97 items (from 326) and 114 lines under the margin of preference (MOP) list—offering greater opportunities to 48 LDCs. Moreover, as of October

[2] It entails the following benefits (for items at the Harmonized System 6-digit level of classification—a code number that defines products designed by the World Customs Organization. Countries are at liberty to add more digits but 6-digit codes are the most detailed and internationally recognized).

2017, only 34 LDCs remained in the list, and those that graduated out of the UN list of LDCs were deleted (Ministry of Commerce 2017).

On 6th February 2019, the Indian Ministry of Commerce's statement at Rajya Sabha (the upper house of India's Parliament) expressed commitment to uphold the DFTP scheme by extending it to six additional African countries (Angola, Democratic Republic of Congo, Djibouti, Mauritania, South Sudan and Sierra Leone), which were not included in the previous list (Ministry of Commerce 2017).

Pigeonpea is a product that has benefited under the DFTP scheme. Since the launch of the scheme in 2008, imports of products including agro-commodities have been exempted from tariffs—the success of which has prompted a subsequent upgradation of the initiative. The scheme has been essential in promoting India's industrialization agenda and has provided an assured market to less industrialized countries like Tanzania.

For instance, in the post-DFTP period, more than 90% of Tanzania's raw cashew exports were shipped to India for further processing and value addition. It is estimated that more than 30,000 jobs could be created if 100,000 MT of raw cashews were processed domestically using the existing facilities. The reasons why Tanzania exports a bulk of raw cashews to India are due, at least in part, to the agricultural support policies of the Indian government (Ancharaz et al. 2014). Indian cashew processors receive a 5% subsidy from the Indian government to stimulate local Indian employment. This is also to ensure the availability of raw materials. Thus, the import duty of raw cashew nuts from countries that don't qualify for DFTP was reduced from 5% to 2.5%, with effect from 1st February 2018. This, nonetheless, is a result of India's stance in promoting domestic industrial base and increased consumption power.

Pulses are a major item of Tanzanian export to India and have seen steady growth over the years. In 2016, the export of this commodity peaked and pulses worth US$ 208,134,000 were exported, as compared to US$ 12,075,000 in 2001—a remarkable increase of 1624%. Pigeonpeas constitute up to 60% of pulses exported from Tanzania, of which 95% are destined for India. About 27% of the pigeonpeas imported into India are from Tanzania (United Republic of Tanzania 2020).

On 5th August 2017, the GoI imposed an unprecedented ban on the import of pigeonpeas, including from Tanzania. With the imposition of the ban in 2017, exports slumped from US$ 208,134,000 to US$ 78,056,000 in the previous year—a sharp decline of 62% (ITC 2018).

This paper tries to examine the contentious ban on pigeonpeas from Tanzania. The analysis is premised on the data obtained from the perception of several Tanzanian exporting companies, the UN COMTRADE database, as well as government, trade and investment support institutions and other sources.

The Tanzania–India Trade

In the early 1990s, India, like several other emerging economies, transitioned from a centralized to a liberalized economy. The change lifted 133 million Indian people out of abject poverty by 2012. It also increased incomes and consumption in the country. India's national poverty reduction, much as it is credited to the performance of the tertiary sector (service) and secondary sector (manufacturing), is a result of the interplay between these sectors and the primary sector—i.e. agriculture (Datt et al. 2016). In response to declining production and rising consumption of pulses—which is a major source of protein for many Indians—larger quantities of pulses were subsequently imported from all over the world (Fig. 12.2).

Tanzania is one of the leading trading partners of India. Since pulses are not consumed in their raw form, processing industries in India also

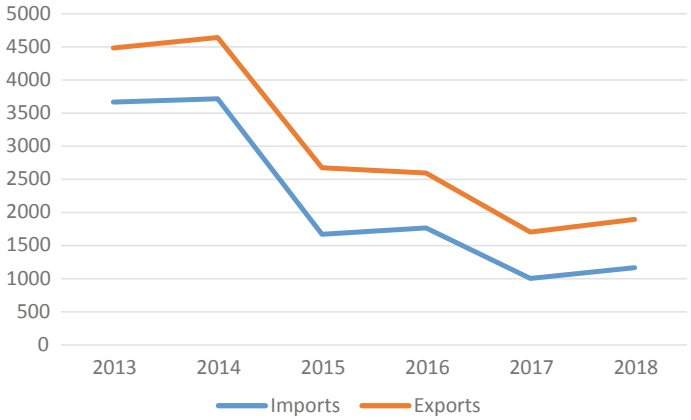

Fig. 12.2 Tanzania's imports and exports to India (*Source* Author's calculations based on TRA, n.d.)

surged in number to add to the required value. In 2018, Tanzania's export value to India was 19.2%, of the country's total exports to the world. On the other hand, Tanzania's import value from India was 13.7%, of its total imports from the global supply.

India–Tanzania Trade Treaties

India's Duty-Free Tariff Preference Scheme for Least Developed Countries

The trade between Tanzania and India has been based on the pursuit of mutual benefits. Being an emerging market, India is categorized among the Newly Industrialized Countries (NIC). This has developed an osmotic relation that drives raw materials from a resource-rich country like Tanzania to India. Tanzania sees India as a perfect trading partner, a substitute to American and European trading partners that have complicated standards which are unattainable for LDCs. The GDP per capita for India and Tanzania is US$ 1700 and US$ 851, respectively. This difference creates confidence on the consumption capacity on the Indian side and creates an assured market for producers in Tanzania.

The mutual interests shared by the two countries have led to a series of bilateral agreements such as:

- Agreement on Friendship and Technical, Economic and Scientific Cooperation (28th January 1966)
- Memorandum of Understanding (MoU) on Technical Cooperation in the field of Posts and Telecommunications (12th December 1996)
- Agreement on the Establishment of Joint Business Council (25th June 1997)
- MoU on Cooperation in the field of Agriculture and Allied Sectors (16th December 2002)
- Agreement in the field of Health and Medicine (16th December 2002)
- MoU on Exchange Programme on Cooperation in the field of Education (27th April 2003)
- MoU on Defence Cooperation (1st October 2003)
- Agreement on Waiving Tanzania's Outstanding Loans (14th September 2004)

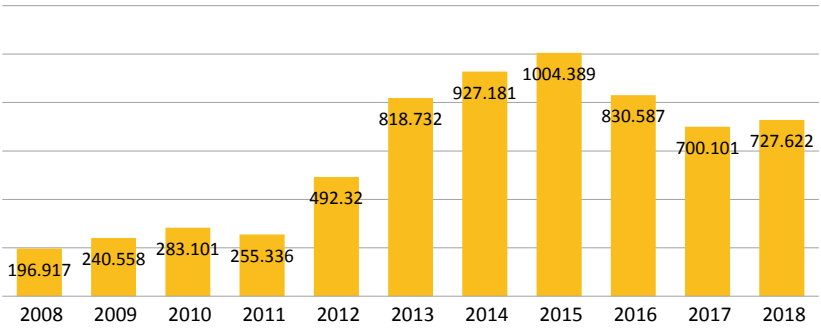

Fig. 12.3 Value of Tanzania's exports to India (in US$ million) (*Source* Author's calculations based on TRA, n.d.)

- Agreement on Cooperation in Information and Technology Services (14th September 2004)
- MoU on Preliminary Joint Venture Agreement (28th May 2011)
- Joint Action Plan between National Small Industries Corporation (NSIC) and Small Industries Development Organization (SIDO) (28th May 2011)
- Letter of Intent (LOI) of Cooperation in Mining and Steel Sectors (6th April 2013)
- MoU on cooperation between Foreign Service Institute of India and the Centre for Foreign Relations, Dar es Salaam (16th October 2018)
- MoU for cooperation between National Research Development Cooperation and Tanzania Industrial R&D Organizations (16th October 2018) (for details, see Ministry of Commerce 2017; MEA 2017).

Among the products qualified in the DFTP programme, pulses from Tanzania were included and enjoyed duty-free preference. However, for the exported products to benefit from the scheme, they were all required to adhere to the rules of origin. This meant that all products such as minerals, agricultural produce and live animals had to be extracted, harvested and raised in the respective country of origin. The inception of the preference seemed to have stimulated the Tanzanian export trade with India, as the exports grew from US$ 172.967 million in 2008 to US$ 727.622 million in 2018 (ITC 2018) (Fig. 12.3).

The export slump from 2015 onwards is partly attributed to the emergence of alternative export destinations. Countries like Japan, Vietnam and Switzerland have emerged to be leading importers of coffee, raw cashew nuts and minerals, respectively. During the preference period, the exports of the top 30 Tanzanian products (of which 70% have duty free access) have increased by 400%. The pulses export value has also increased. This suggests that India's DFTP had a significant contribution in streamlining trade with Tanzania.

Another variable that adds weight to the role played by the DFTP is the increase in the Indian share of Tanzanian exports. In 2007, India accounted for only 5.3% of Tanzania's global exports. By 2018, it became one of the biggest destinations, accounting for 19% of the East African countries' exports (author's calculations based on ITC statistics 2018).

For decades, Tanzania has been a leading source of several raw materials for Indian industries, mainly—pulses, cashews, cocoa, oilseeds and tea. In India, they are processed by local industries that enjoy government subsidies—for instance, cashew processors are subsidized by 5%. Imported pulses like pigeonpea are processed and re-exported to countries like the USA (50%), Canada (18.6%), United Arab Emirates (7.8%), Australia (4.0%) and UK (3.9%). Out of all of India's imported pigeonpeas, 27% comes from Tanzania, the second largest exporter after Myanmar, but it is not re-exported to Tanzania (United Republic of Tanzania 2020) (for details see Figs. 12.4 and 12.5).

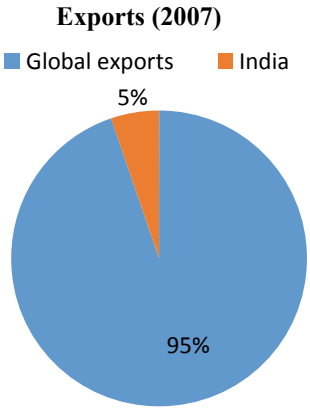

Fig. 12.4 Tanzania's exports to India versus Tanzania's exports to the world, 2007 (*Source* Author's calculations)

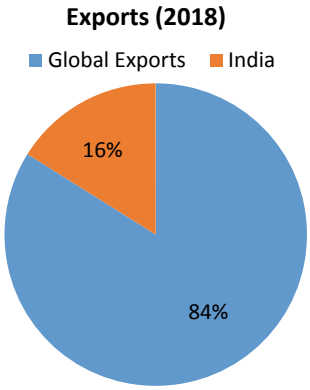

Fig. 12.5 Tanzania's exports to India versus Tanzania's exports to the world (*Source* Author's calculations)

'Most Favoured Nation' Status for Tanzania

'Most Favoured Nation' (MFN) is the treatment accorded to a trading partner to do away with discriminatory measures such as tariffs and quotas. Under the General Agreement on Tariff and Trade (GATT), a country is obliged to provide the same treatment to all other members of WTO on the same goods or services, unless agreements between the trading partners state otherwise. Contrary to preferential treatment, a country classified as MFN is expected to reduce trade tariffs and increase quotas. Albeit, the clause does not restrict a partner from using certain non–tariff barriers when the same products move within its territory. The WTO rules, nonetheless, put an exception on the Free Trade Regional Agreements entered by its members, the likes of (EAC), (COMESA), (SAARC) etc. (WTO, n.d). This means that custom duty rates are lowered by a country for trading partners within their Regional Economic Community (REC), but may not apply to those outside the block.

In 1996, just a year after the WTO was founded, India accorded the MFN status to Pakistan for 300 items. This was in effect as per GATT's Article 1(1); the privileges granted to Pakistan were automatically applicable to all WTO members including Tanzania. This case may suggest a probable reason for the increased trade between the two countries and may explain the reason for Tanzanian traders not applying for certificates of origin in order to utilize India's DFTP window.

The Tanzania–India Trade in Pulses

India is the leading producer of pulses in the world with an output of 25.2 million MT in the 2018 season, followed by Canada (9 million MT), China (4.5 million MT), Myanmar (4.43 million MT) and Brazil (3.1 million MT) (FAOSTAT 2017). In Africa, Tanzania is the fourth largest producer of pulses after Nigeria, Niger and Ethiopia. Despite being the major producer, India is the leading importer of pulses, accounting for about 30% of the global exports.

India's import of pulses from Tanzania includes pigeonpeas, common beans, chickpeas and green grams. With the exception of common beans, all other pulses are for export mainly to India, and a very small amount is consumed in the country. Therefore, the three pulse crops are considered cash crops rather than food crops.

India is a home to 1.3 billion people and many of them are vegetarians who depend on pulses for their protein intake. Given the large number of vegetarians and the increase in the purchasing power, the Government of India has been engaging with African countries to produce pulses that cater to the Indian populace. In 2016, Indian prime minister Narendra Modi visited four African nations—South Africa, Tanzania, Mozambique and Kenya. His visit to Tanzania encouraged Tanzanians to produce and export cheap and large volumes of pulses to India. During his visit, the prime minister emphasized increased trade engagements between India and Africa, particularly in the agriculture and food sector. He also committed to the extension of Line of Credit worth US$ 92 million and assured an additional concessional credit worth US$ 500 million (MEA 2017). The two partner countries signed the following agreements during the 2016 visit:

- MoU on cooperation in the field of water resource management and development between the two countries,
- MoU on visa waiver agreement for diplomatic/official passport holders between the two countries,
- Agreement on Joint Action Plan (JAP) between India's National Small Industries Corporation (NSIC) and Tanzania's Small Industries Development Organization (SIDO),
- MoU between the Government of Tanzania and the Government of India for the establishment of Vocational Training Centre (VCT) in Zanzibar, and

- LOC of US$ 92 million for rehabilitation and improvement of the water supply system in Zanzibar (MEA 2017).

The new collaborations were meant to boost an already established bilateral relationship, wherein trade was at the centre stage. Between 2008 and 2018, Tanzania's trade with India registered a whopping 100% increase, outdoing other European countries (author's calculations based on ITC statistics 2018) (Table 12.2 and Fig. 12.6).

In 2016–17, the increased agricultural production in India culminated in decreased incomes of farmers by 16%. The price of the agricultural products offered by several Indian states were below the Minimum Support Price (MSP). According to the GoI data, the area for cultivating pulses decreased from 14.30 million ha to 13.76 million ha in 2018. Farmers shifted towards less risky products like cotton and sugarcane to deal with the fall in support prices for pulses. With these factors at play, the GoI imposed an export ban and thus saved US$ 2–5 billion spent earlier on importing pulses from Australia, Myanmar, Argentina, Canada and Tanzania.

India's partnership with Tanzania has evolved at present—the pace of exporting raw pulses from Tanzania has decreased significantly. Several firms that process pulses in India shifted/extended their operations to Tanzania and began processing in the producing country. Notable examples are Quality Pulses Export (QPE) and Export Trading Group in

Table 12.2
Tanzania–India bilateral trade between 2008 and 2017 (in millions)

Year	*Amount ($)*
2008	1038.674
2009	960.7
2010	1121.513
2011	1775.125
2012	1608.251
2013	3060.88
2014	3660.14
2015	2408
2016	2127.6
2017	2161.08
2018	1957.10

Source Author's calculations

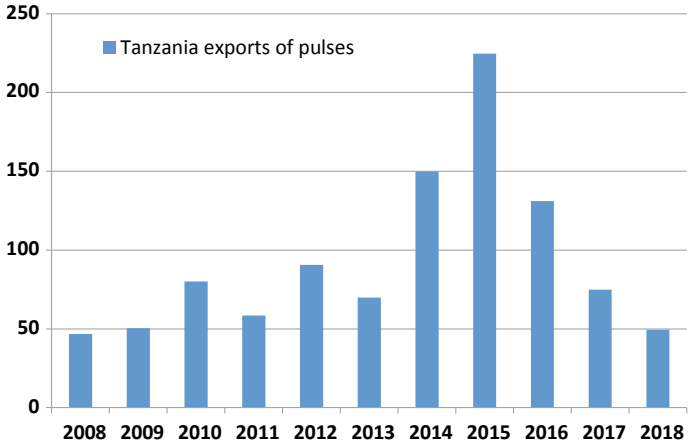

Fig. 12.6 Tanzania's pulse exports to India (2008–2018) (*Source* ITC 2018)

Tanzania (ETG), whose total processing capacity is about 80,000 tonnes per annum (author's calculations).

There was a ban by India on the export of all pulses for reasons of food security. Companies came to realize that Tanzania is a better place to set up pulse processing plants as it permits them to export with no restrictions. In January 2016, the Indian Agricultural and Processed Food Products Export Development Authority (APEDA), in collaboration with the Indian High Commission in Tanzania, organized a two-day 'India Brand Promotion' campaign (APEDA 2015). It was attended by the Ministry of Industry, Trade and Investment in a bid to woo Indian manufacturers. The government reiterated that it was ready to welcome all processors to supply the world with *dal* from one of the continent's leading pulse producing countries. Several companies thus began processing pulses before exporting them to India and other markets.

However, the recent development in the business environment of the two countries seems to deter investments into Tanzania. As per the World Bank Ease of Doing Business Report, India ranked 142nd while Tanzania ranked 131st in 2013. This encouraged many firms to invest in Tanzania. However, in 2017, Tanzania dropped 6 points to the 137th position, while India appreciated 42 points to the ranking of 100. More so, in

Table 12.3 Rankings of ease of doing business

Activity	*Tanzania*	*India*
Ease of doing business	144	*77*
Starting a business	163	137
Dealing with construction permits	150	52
Getting electricity	83	24
Registering property	146	166
Getting credit	60	22
Paying taxes	167	121
Trading across border	183	80
Enforcing contracts	64	163
Resolving insolvency	117	108
Protecting minority investors	131	*7*

Source World Bank (2019)

2019, India continued to rise to 77th position, while Tanzania backslid to the 144th place (World Bank 2019).

Difficulties in doing business with Tanzania, coupled with GoI's imposition of export restrictions on pigeonpeas in September 2017 (though a few tonnes of pigeonpea are still shipped to India), may serve to dissuade major Indian firms from relocating their investments to Tanzania and other African countries—as they can still access potential markets in Europe and America from their home country (see Table 12.3).

Indian Market Access Conditions for Tanzanian Exports

There have been special conditions for Tanzanian exports to India that vary from one product to the other. Like any sovereign nation, India can impose any form of regulation to govern her imports. The following are some of the regulations that Tanzanian pulse exporters grapple with before exporting their products to the Indian market:

1. *Tariff Regimes and Applied Tariffs*

There are only two tariff regimes that govern Tanzania's pulse exports to India, namely—MFN duties and preferential tariff for Least Developed Countries (LDCs). With an exception to chickpeas which are charged 40 or 60% of MFN duties depending on the variety; all pulses, including beans, cowpeas, pigeonpeas, bambara beans and green grams, are charged

at applied tariffs of 30% of MFN duties and 0% of preferential tariff for LDCs.

2. *Non-Tariff Measures*

The following are the requirements applied by India on Tanzanian pulses and other food products:

- Food Safety and Standards (Packaging and Labelling) Second Amendment Regulation, 2013
- General Grading and Marking Rules, 1988
- Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulation, 2015, relating standards of Steviol Glycoside in various food products
- The Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms Genetically Engineered Organisms or Cells Rules, 1989
- Food Safety and Standards (Contaminous, Toxins and Residues) Regulations, 2011
- Food Safety and Standards (Food Import) Regulation, 2016
- Food Safety and Standards (Packaging and Labelling) Regulations, 2011
- Legal Metrology (Packaging Commodities) Rules, 2011
- Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulations, 2016 related to Proprietary Food
- Food Safety and Standards (Laboratory and Sample Analysis) Regulations, 2011
- Food Safety and Standards (Food Products and Food Additives) Regulations, 2011
- Plant Quarantine Order (Regulation of import into India), 2003 as amended up to March 2016
- Plant Quarantine Order (Regulation of import into India), 2003 as amended up to January 2015
- Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011
- Pulses Grading and Marking Rules, 2003
- Legal Metrology (Packaged Commodities) Rules, 2011.

3. *Trade Remedies*

Usually remedies include anti-dumping, countervailing and safeguard measures. But pulses from Tanzania do not face Indian trade remedies.

4. *Trade Agreements and Rules of Origin*

To date, there are only two trade agreements governing trade between India and Tanzania, namely:

- Preferential Tariff for Least Developed Countries (LDCs) which requires certificate of origin, and
- Preferential Tariff for Global System of Trade Preferences (GSTP) countries (43 countries including Tanzania), which requires GSTP's certificate of origin.

(All of the above India market conditions are available in Trademap and Market Access Map market tools of ITC.)

Indo-Africa Agri-Business Summit

There was an exhaustive one-week interaction between African agri-business entrepreneurs and their Indian counterparts, academicians and policy makers, from 19th–24th June 2017 in Indore, India. It was co-organized by Eastern Africa Grain Council (EAGC) from Africa and Indo Global SME Chamber from India. It was funded by ITC under its flagship project Supporting India Trade and Investment for Africa (SITA). Four East African countries were represented at the summit, namely Tanzania, Kenya, Uganda and Rwanda.

The summit consisted of a four-day certificate training course and two days of conference and business-to-business meetings. Various agri-business professionals had an opportunity to exhibit their products and services, and share their experiences.

Six Indian companies signed non-binding contracts with their Tanzanian counterparts, namely Manaksia International, Pitambari Product Pvt. Ltd., Sas Quality Global Exim Pvt. Ltd., Ferro Oiltek Pvt. Ltd., P.M Projects & Services Pvt. Ltd. and Rajdar Commodities Pvt. Ltd.

Pigeonpeas were most in demand. Other pulses exported were chickpeas and green gram. Sesame, raw cashew nuts and rice were also in demand. As expected, India had a lot to offer to their African peers in terms of agricultural technology. Agriculture machineries dominated the list, including: oil seed processing machines, grain storage and grading, cleaning, drying and conveying machines.

In July 2017, barely a month later, Pitambari Product Pvt. Ltd. made a maiden trip to reconnect with their counterparts in Tanzania. The main purpose of this was to explore the Tanzanian markets and set up a processing plant. It planned to begin shipping pulses to India and export products such as basmati rice, detergents and intense sticks, among others to Tanzania. But no business was realized because in August 2017, the GoI declared a ban on the import of pulses.

India's Import Ban on Tanzanian Pigeon Peas

On 5th August 2018, the Indian government, through the Ministry of Commerce and Industry, issued the Trade Notice No. 13 (2015–2020), which restricted the import of pulses from countries with no bilateral agreements and fixed a quota for its inbound shipments. The restriction was subjected to an annual quota of 200,000 tonnes only. This was a result of increased pulse production in India—from 17 million to 23 million tonnes. There was also an import of 703,540 tonnes of pigeonpea in the 2016–2017 fiscal year, which resulted in a drastic 60% fall in the price of the pigeonpeas (Chandrashekhar 2018). This restriction however lasted for roughly one week, as the government again imposed a total ban on pigeonpea and green gram.

The ban came at a time when farmers in Tanzania were in the harvesting season. Some traders were quick enough to buy pulses and store them, speculating better prices in the future. This included Indian companies who had earlier signed contracts with several Tanzanian companies. Since India consumed more than 94% of all pigeonpea exports, the shock of the sudden ban was grave.

Impact assessment was conducted in Tanzania to review the effects of the ban. It was found that more than 73,000 tonnes of pigeonpeas worth

Tanzanian Shilling (TShs) 100 billion (US$ 43,495,000) were left unharvested in the fields (EAGC, pers. communication)[3]. Although only a few Tanzanian farmers keep records, a cost-benefit analysis revealed that the harvest and storage costs were higher than the market price of the crop. A survey was conducted on production by farmers in the Mkwapa village in Masasi, Mtwara region—well known for the production of pigeonpeas. The results showed that the cost of production was TShs 580,000 (US$ 252) per acre, its harvests projected at a 2017 market price, were valued at only TShs 160,000 (US$ 70), which meant a staggering loss of TShs 420,000 (US$ 182).

Quality Pulses Exporters (QPE) invested more than US$ 1 million to install new plants and incurred great losses and had to lay off 50% of their workers. All these investments went down the drain as return on investments was reduced to zero (author's calculations).

The effect of market collapse on pulses, particularly pigeonpea, has been felt across all sectors of the economy as it employs more than 300,000 farmers. This market also provides jobs, indirectly, to more than 1.5 million people who work on off-farm activities like transport, processing and trade. It is estimated that more than 4.5 million people were directly affected. In the relatively favourable season like 2015/2016, Tanzania exported 140,000 tonnes of pulses to India. However, in the 2016–2017 season, only 50,000 tonnes was permitted to be shipped to India. By December 2017, exports of pulses were worth only US$ 55,845,000. This is a 73.2% drop as compared to the previous year (Agricoop 2018) (Fig. 12.7).

Tanzanian government's Minister of Industry, Trade and Investment Mr. Charles Mwijage travelled to India in August 2017 to discuss the matter of ban on pulses exports, with his counterparts. The meeting concluded with the promise that a modality to review the ban on pulse originating from Tanzania would be undertaken. Till date, nothing has been done to avert the situation although the two countries have had a bilateral agreement on trade since 14th January 2000.[4]

[3] The Eastern Africa Grain Council (*EAGC*), personal communication on 12 November 2018.

[4] This was inked in Dar es Salaam by Hon. Iddi M. Simba, Tanzanian minister for Industry and Commerce and Hon. Abdullah Shri Omar, India's minister for Commerce and Industry.

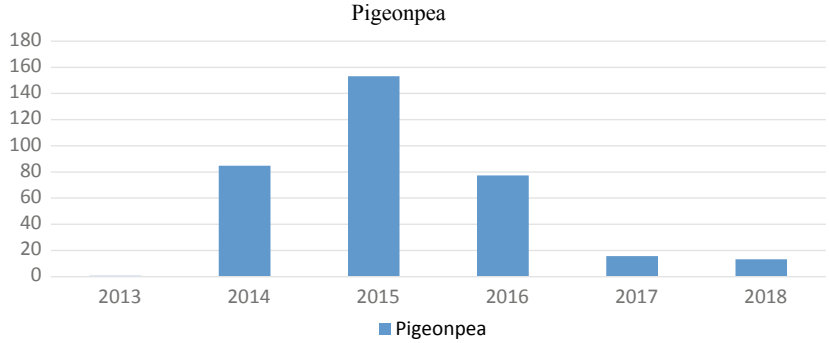

Fig. 12.7 Pigeonpea exports by Tanzania to India (2013–2017) (*Source* ITC 2018)

WTO rules prohibit all forms of total ban, imposed unilaterally, as they discourage cross border trade. In this regard, India may find herself in deadlock of disputes with other trading partners for discriminatory practices; such as that of granting Mozambique access to her markets through a quota of 150,000 MT of pigeonpea this year while access to markets was denied to others (Ministry of Commerce 2017).

Subsequent to the arbitrary ban on pulses imposed by India on Tanzania, there have been discussions concerning the rules that govern international trade around the following issues. First, both the countries belong to the South Centre. Second, all countries are required to abide by WTO regulations if they are to honour their membership and finally, WTO's principle requires countries to have special and differential treatment to LDCs and that member states to the WTO have to adhere to non-discrimination practices.

The Fate of Tanzania–India Trade

This paper aims at predicting the future of trade between the two countries after the arbitrary ban on pulses imposed by India in August 2017. To arrive at a well-grounded projection, a survey on several active players was conducted. The entities interviewed included pulses exporting companies, trade and investment supporting institutions, and diplomatic institutions. The exporting companies were divided into two categories; those owned by Tanzanians of Indian origin and those owned by people

of other origins. Their opinions were highly diverse, which led to development of origin-based theories. The experiences and perceptions are cited here below.

Exporting Companies Owned by Tanzanians of Indian Origin

Tanzanians of Indian origin own a majority of pulse exporting companies in Tanzania. It is suggested that their excellence in the pulse business is linked to the Indians consuming pulses for proteins. Due to favourable industrial policies in India, many Indians established pulse-processing plants in India, which were extended to Tanzania. Therefore, Tanzanian companies have served as important extensions that supplied raw materials to processing companies in India.

These companies believe that the future of Tanzania–India trade shall continue to be strong despite the murky water that the countries entered last year. The respondents expressed that leaders in the Bharatiya Janata Party (BJP) ahead of the May 2019 elections politically motivated the ban on the import of pigeonpeas. Since India witnessed high farmer suicides as they failed to pay their bank loans—thanks to an unprecedented plunge in the price of pulses in 2016/2017, that eventually lead to farmers' demonstrations in states such as Madhya Pradesh and Maharashtra.The BJP has been trying to pacify and capitalize on rural farming voters that constitutes the bulk of the Indian population—as over 70% of Indians are engaged in farming. Therefore, the protectionist measures were aimed at winning votes of the farmers constituencies.

Exporting Companies Owned by Tanzanians of Other Origins

This second viewpoint paints a rather bleak picture on the future of trade relations between the two countries. They assert that trade between Tanzania and India is less sustainable, because Indians are unreliable and untrustworthy. Proponents of this group demand that a case must be filed against India at the WTO for violating rules guiding international trade. They point to a case won by Boeing against Airbus over the EU's US$ 22 billion illegal subsidy to the airline company. This case began in 2006 and was finally settled on 15 May 2018. The ruling was in favour of the US government, who was the plaintiff. Moreover, China's recent complaint filed to the WTO over the US tariff measures on selected Chinese goods serves as a guiding example for Tanzania.

They believe that other types of trade beyond pulses will feel the ripple effect. They expressed that the Government of Tanzania should retaliate by banning Indian investments in Tanzania, which currently amounts to US$ 2.2 billion. Indian investments in Tanzania include the Kamal Group of Industries, the National Mineral Development Corporation (NMDC), Bank of Baroda, Bank of India, Canara Bank, LIC, NIC, United India and others (India High Commission, 2018, pers. communication). Once put into effect, the counter-ban is likely to increase Tanzania's power at the negotiation table with India.

Trade Support Institutions and Diplomatic Institutions

Trade support institutions and diplomatic institutions are important players in increasing trade between the two countries. They play a salient role in linking sellers and buyers who exist in these two countries and facilitate the exports of various products.

Despite the recent economic hurdles, Tanzania and India continue to be trade partners because of the existing economic specialization that has created an interdependency. Reasons behind this theory include India's advanced and cheap technology, which is in high demand in Tanzania and other African countries. Contrary to her main rival—Chinese companies, some of whom have earned the ill reputation for manufacturing counterfeits—Indian products manufactured by companies and brands such as Bajaj, Tata, Ashok Leyland, Eicher and TVS have earned the reputation for being durable, advanced and user-friendly. Equally important, Tanzania is endowed with abundant natural resources. Apart from pulses, the country has Tanzanite minerals. Tanzanite is a blue gem produced only in Tanzania. However, prior to Tanzania's export ban on minerals in 2013, the city of Jaipur, in the state of Rajasthan, India, received 95% of the total export benefits of these finished gemstones. Due to the infancy of the Tanzanian gem cutting and polishing industry, India was able to accrue 80% of all the profits of Tanzanite, while Tanzania earned a measly 5%. It also generated employment of 230,000 people in Jaipur, out of the 1 million employed across India (The Times of India 2013).

Due to such inter-linkages, it is anticipated that the bond between the two countries will continue. Recent developments show that the year 2018 has observed a surge of India's exports to Tanzania. Tanzania's

share of imports from India versus the world by the end of 2018 stood at 14.3%, up from 12% in 2017 (Agricoop 2018).

Conclusion

There is a hope of ending extreme poverty globally by 2030. However, it may not be realized by India and Tanzania if the majority of the farmers (who constitute about 70% of the population) are left out of the inclusion agenda.

It is interesting and threatening in equal measure to note that the policies and statements by the polical leaders of the two countries provide little clarity regarding the post-pulses ban scenario. On the Tanzanian side, after the government realized that efforts to seek policy review from their counterparts in Delhi became futile, it decided to look for alternative markets. The Minister for Agriculture Mr. Charles Tizeba was heard for the first time in January 2018, at a public rally, saying that the government was committed to developing the domestic market as an alternative to the Indian market. This will be implemented by including pigeonpeas in the diets for boarding schools, prisons and hospitals in the country.

The pronouncement was well received by the private sector that promised to support the move by running a countrywide campaign to sensitize people to include pigeonpea in the meals because of its nutritious content. If this plan succeeds as anticipated, Indian traders and consumers will not be able to get access to the Tanzanian variety of pigeonpeas or will have to pay a higher price to compete with local consumers. The actual current consumption pattern, which is below 10% of traded pigeonpea, has been helping India in getting enough quantity at a lower price (TPN internal data).

Despite the fact that India is a leading pulses consumer, there are a few countries in the Middle East that import these commodities as well, albeit in small quantities. Markets that are expected to provide an alternative are Pakistan, Egypt, Oman and China. These trends which still emanate from the political sphere may shape the trading climate in the future.

Recommendations

The two countries need to urgently resume talks on the MoU for pulses. In the aftermath of the Indian prime minister's official visit to Tanzania, talks regarding trade agreement on pulses have begun. The draft MoU

seen by the author shows that Tanzania is likely to export a minimum of 100,000 tonnes of pulses to India every year. Tanzanian authorities blame the Indian government for failing to reply to the last MoU draft they sent in February 2017. If India had replied, Tanzanian government officials believe that inking the final agreement would have been possible. Little is known of the reasons behind India's silence on the matter, but it is speculated that the last draft MoU was sent at a time when the production of pulses was at its peak in India. This could be verified by Pulse Pod—an e-magazine published by Global Pulse Confederation (GPC). The July 2017 edition carried this warning, 'News of imploding values and possible nearby oversupply in the world's largest consumer and producer of pulses, India, has reverberated through much of the industry'.

Whatever be the reason for this deadlock, the two friendly nations need to reach an amicable solution on the matter to benefit people from both the countries. Furthermore, Tanzania needs to develop safety nets for its farmers to help them weather the vagaries of a globally liberalized economy which is hinged on fulfilling the interests of the powerful players. Tanzania can take a lesson from India's Minimum Support Price (MSP) system. Just like any welfare system, MSP is an effective programme designed to protect farmers from price volatility as the government buys an affected crop at a favourable price to help farming in the next season and thus keeps the yields ongoing. This will ensure sustainable production to combat food insecurity. As the world's population is set to expand to 10 billion by 2030, securing food production and assessing the policies associated with it, are an urgent imperative.

Finally, Tanzania and India are long-time friendly nations and their cooperation history dates as far back as 1961. To continue trading without a bilateral agreement on important crops like pulses leaves room for mistrust and unpredictability. The damage could be permanent at a time when Tanzania is in the know about other competing exporters like Mozambique that has already obtained an agreement for the export of pulses (in July 2016). India has a vast capacity for processing pulses into *dal* and has a an export market that Tanzania does not possess. The conclusion of a bilateral agreement with Tanzania on the import of pulses will serve a dual purpose; first, sustain bilateral relationship between the two countries; and second, provide processing companies in India access to better varieties from Tanzania and help them generate more profits from their exports.

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CHAPTER 13

Production of Pulses in Tanzania: Opportunities and Challenges

Sebastian Sambuo Mushi and Alefiya Doctor

Abstract The developmental potential of Tanzania's agricultural sector presents a viable and sustainable solution for its economic growth and food security. Agricultural development in Tanzania can be accelerated through intensive South-South cooperation through the exchange of technology, expertise, troubleshooting methods, and the overall experiences of implementing best practices in the agricultural sector. This paper attempts to specifically examine the pulse sector in Tanzania and identify the challenges and opportunities that it presents. Pulses are an important subsistence and cash crop in Tanzania. Pulse production is a potentially profitable value chain for all actors, but underdeveloped harvesting and post-harvesting practices, the lack of standard branding strategies, unstructured trade, poor market linkages, and minimal access

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to credit arrest the growth of the sector. The paper uses field research conducted in the Kilombero district of south-western Tanzania as a case study. This study attempts to understand the socio-economic factors and agricultural practices that determine the pulse production process of the Kamwene farmers' community. It identifies the issues that hamper production in Kamwene, such as poor agronomic practices, the presence of middlemen in farm loans, the lack of access to inputs, inadequate quality of harvesting, processing and challenges to value addition, and financial inclusion. The research then uses feedback from the farmers' community to present an appropriate solution for these agricultural setbacks, as well as select areas in need of intensive value addition. It further recommends a Farmers' Organization Model to augment farming practices and subsequently provide incentive for South-South trade links and investments with countries such as India.

Keywords Pulses · Agriculture · Tanzania · Kilombero · Farmers' Organization Model · South-South cooperation · India · Trade · Investment · Value chain

Introduction

Tanzania has some of the richest and most diverse of Africa's landscapes and natural resources. The sub-Saharan country has sustained a relatively high rate of economic growth, averaging 6–7% over the last decade (World Bank 2019). Given this positive growth, the poverty rate of the country has declined, however the number of poor people has stayed constant. This is because the decline in poverty has been offset by a high growth rate of population. As of 2017, Tanzania's overall population was 57.3 million (World Bank 2019). The development potential of the agriculture sector, in the backdrop of such pressures, presents a viable and sustainable solution for the economic growth and food security of the country.

Pulses serve as an important subsistence and cash crop in Tanzania. Therefore, a focused development of the pulse sector will help the Tanzanian economy keep up with its growth. Pulse production is a potentially profitable value chain for all actors, but factors such as price volatility, insecure supply, poorly organized small-scale producers and poor service

delivery arrest the growth of the sector. Pulses are grown on about 12% of the land cultivated for annual crops. The types of pulses grown in the country are dry beans, cowpeas, chickpeas, *mung* beans (green, black, yellow grams) and pigeonpeas. Four main zones,—namely, the Lake, Central, Southern and Northern—are Tanzania's leading pulse-producing regions. Approximately 95% of pulse farmers are smallholders with less than five hectares dedicated to pulse production. Most of these farmers depend on rain-fed agriculture. These farmers also face difficulties in obtaining input and other production support. In this case, the yield level among smallholder farmers is very low. In 2015, the pulses yield per acre was 8 bags of 100 kg per acre (AGRA 2015). The timing of pulse harvest in Tanzania makes it a strategic supplier to India during particular periods of the year, such as the harvest period that starts at the end of July and continues till the end of October (Molenaar 2017).

Agricultural development in Tanzania can be accelerated through intensive collaborations with other countries of the Global South, such as India, because the Indian economy too relies heavily on agriculture.[1] The two countries have been exchanging technology, expertise, troubleshooting methods and overall, the experience of implementing good practices in this sector.

This paper studies the pulse sector in Tanzania to identify the challenges and opportunities that it presents. It uses data from research conducted in the Kamwene village (Kilombero district) of south-western Tanzania as a case study. It also draws conclusions based on data in other agricultural regions in Kilombero, such as the Matema and Mlimba villages, and parts of the Manyara and Kilimanjaro regions. It seeks to understand the socio-economic factors and agricultural practices that determine the pulse production process of the Kamwene farmers' community. The study concludes that financial inclusion and a Farmers' Organization Model are two specific mechanisms among others

[1] Under the Tanzania National Development Vision 2025, different strategies have been in place to ensure public welfare. These include the Agricultural Sector Development Program (ASDP I & II), *Kilimo Kwanza* (Agriculture First), The Southern Agriculture Growth Corridor of Tanzania (SAGCOT) Initiative and the Agricultural Sector Development Strategy (ASDS). The SAGCOT is a collaborative effort by the Tanzanian government, the private sector and developmental partners to open up the Southern Corridor of Tanzania, which is endowed with fertile soil, several water catchment areas, rivers and swamps.

to augment farming practices and subsequently provide incentives for South-South trade links and investments with countries such as India.

Historically, India and Tanzania have engaged in various forms of exchange through their trade relations. Agriculture has been a focal point in the development of both countries and has thus featured centrally in their collaborations over the years. Some recent initiatives in the sector are as follows.

Indian Governmental Support and Foreign Direct Investment

India has been one of the top buyers of crops produced in Tanzania. It imported dried leguminous vegetables worth US$ 50.07 million in 2018 (High Commission of India 2019). India has also extended several lines of credit (LOCs) to the country. For instance, during the State Visit of the President of Tanzania to India in June 2015, a loan agreement was made between EXIM Bank and Tanzania for an LOC of US$ 268.35 million for the extension of the Lake Victoria pipeline project to Tabora, Igunga and Nzega. An IT Resource Centre at Arusha, an NSIC project for establishing Incubation Centres at SIDO and a Vocational Training Centre (VTC) at Zanzibar are also being funded by Indian grants. An LOC worth US$ 178.125 million for the development of water supply projects in Dar es Salaam and the coastal Chalinze region is currently under implementation. Another LOC of US$ 36.56 million for the supply of Ashok Leyland trucks and other vehicles to the Tanzanian People's Defence Force (TPDF) was completed in 2013–2014 (MEA 2016).

Access to financing has always been one of the main constraints for agricultural development. Only a few commercial banks and micro-lending organs lend to rural farmers. Generally, there is a lack of financial support for rural investments and marketing of crops. The reason for the trend is the risk associated with the sector (in terms of output and price instability, especially in food crops). Agriculture does not attract adequate financing from commercial banks to support agricultural transformation. This is partly due to inadequate private sector incentives required to mitigate the risks that are inherent in agricultural production, agro-processing and marketing of agricultural produce. There are currently three banks operating in Tanzania with strong Indian connections. These are: Bank of India, Bank of Baroda and the EXIM Bank of India.

Apart from these banks, there are other companies which have supported the agricultural sector in different ways.

Table 13.1 Indian lines of credit to Tanzania

Year	*Purpose*	*Amount in US$*
2007–2008	Export of tractors, pumps and equipment from India to Tanzania.	40.00
2011–2012	Water supply schemes to Dar es Salaam	178.13
2014–2015	Extension of Lake Victoria pipeline to Tabora, Igunga and Nzega	268.35
2015–2016	Rehabilitation and improvement of water supply system in Zanzibar	92.18
2016–2017	Water supply scheme in 17 towns in Tanzania	500.00

Source EXIM Bank (2019)

- Several Indian multinational companies in Tanzania work on commodity marketing. For example, the Export Trade Group (ETG) has been a major buyer for Tanzanian crops, namely, sesame, beans, cowpea and edible oil seeds. This is a global company with its presence in several countries, including India. Its African headquarters is located in Tanzania.
- There have been trilateral collaborative initiatives such as the International Trade Centre's (ITC) 'Supporting Indian Trade and Investment for Africa' (SITA) project, which is funded by the UK's Department for International Development (DfId).[2] Some smallholder farmers in Tanzania have benefited from the SITA initiative (Table 13.1).

However, the Tanzanian agricultural sector is impeded by numerous challenges that not only thwart production but also adversely impact international collaborative efforts. An in-depth understanding of the challenges that hamper the growth of farming practices is thus imperative to effectively harness the full potential of the country's agricultural segment. Such an understanding also provides clarity on the collaborative steps that India can undertake for bolstering food productivity in the country, inter alia, through strategic investments. The following section presents a case study that elaborates on and exemplifies these variables.

[2] Merged with the Foreign and Commonwealth Office to form the Foreign, Commonwealth and Development Office as of 2020.

Kamwene Ward (Kilombero District): A Case Study

The case study surveys the Kamwene ward in the Kilombero district, situated in the floodplains of the Morogoro region in south-western Tanzania. The floodplains lie between the Kilombero river in the south-east and the Udzungwa Mountains in the north-west. The Morogoro region is situated at an altitude of 213 meters above sea level. It is one of the leading regions for food production in Tanzania. According to the National Census of 2012, this district has 19 wards and a population of 407,880 people (National Bureau of Statistics 2013). In addition to Kamwene, the study also takes into consideration neighbouring villages that grow pulses such as Matema and Mlimba from Kilombero district, Singe village and other areas of Babati district in Manyara region, as well as Bomangómbe village in Hai district from Kilimanjaro region. The volume of pulses cultivated across districts are different, with minor differences in quality. The pulses grown in the Manyara and Kilimanjaro in Kamwene, Kilombero are mixed with maize. On the other hand, pulses which are grown in Kilombero district in Morogoro region are grown separately. Both the pulse-growing districts have the same farming calendar and the same seasonality (see Fig. 13.1).

Yieldwise Baseline Survey for 2015 shows that the number of farming households in Kilombero is 38,121. These are households that depend entirely on crop farming and animal keeping to earn their livelihoods. The climatic conditions, soil type and agro-ecology of the region support the growth of several crops such as rice, maize, pulses, sugar cane, sesame, cocoa, banana palm, groundnuts and horticultural crops. The production of pulses is concentrated mainly in the highland areas where it is grown interspersed with the maize crop.

Pulses farming in the Kilombero district faces several problems. These include a lack of quality inputs, volatile market conditions, the production of high-quality pulses and low yield per acre. According to the research findings, financial inclusion of smallholder farmers through the 'Farmers' Organization Model' could be a way forward. It proposes that smallholder pulse producers should be organized into farmers groups or cooperatives for production and marketing. These associations will enable the farmers to control the quality and quantity of pulses and thereby address the problems of production that have burdened smallholder farmers in Tanzania for several years.

Fig. 13.1 Map of Tanzania showing pulse-growing regions where information was collected for the study (*Source* Nations Online, n.d.)

The Scope and Methodology of the Study

Kamwene village is located in the Mlimba division of the Kamwene ward. It has 1137 households engaged in small-scale farming. The village borders the Udzungwa mountain ranges in the north and the west; the

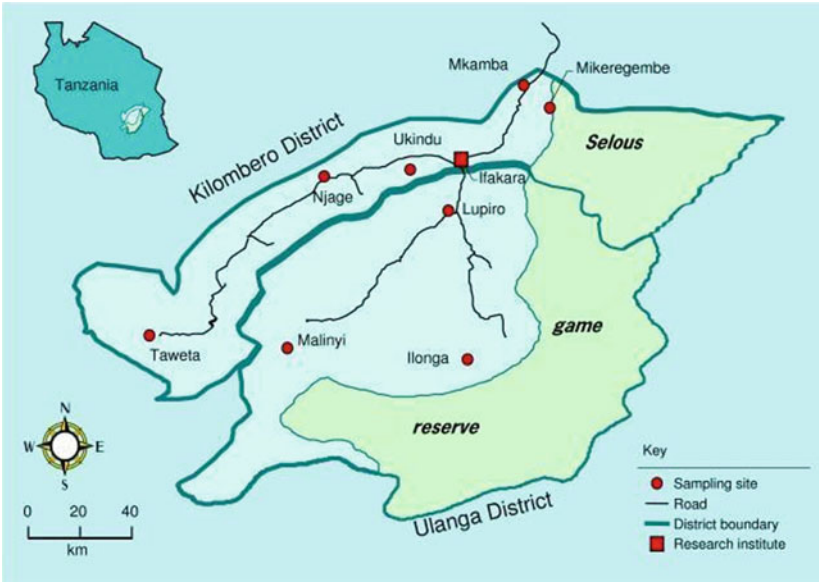

Fig. 13.2 Map of Kilombero district rain-fed agriculture (*Source* Nations Online, n.d.)

Matema[3] village in the south; and the Mlimba village in the north. Farmers in Kamwene produce pigeonpeas as their staple crop, whereas cash crops like rice, maize, cassava, palm and horticultural crops and beans are grown in smaller quantities (see Fig. 13.2).

The research findings of this study are based on primary as well as secondary data. Primary data was collected from households, group leaders, warehouse/processing plant operators and village extension leaders in Kamwene. Secondary data was extracted from the published and unpublished documents of farmers' association offices, apex offices and warehouse information databases from different warehouses in the Kilombero district. Miscellaneous sources of data collections include organizations working with the farmers and crop processors. A significant

[3]Matema is a town in south-western Tanzania. The town is primarily a fishing village with some agriculture. It is located on the northern tip of Lake Nyasa and is 90 kilometres (straight-line distance) south-east of Mbeya.

share of information was obtained from the host organization—Rural Urban Development Initiatives (RUDI),[4] including project write-up documents, project annual reports, monitoring and evaluation report papers (RUDI 2019).

Forty of the farmers in Kamwene—including paddy farmers' representatives, who are members of the Kamwene farmers' community—were interviewed by the lead author for information on their socio-economic status. Further, the focus group discussion method was used, where questions administered by the researcher were discussed in small groups of five, who were selected from different farmers' associations. The focus group also included the Kamwene farmers' community support officers, who are government employees at the village level.

Observation took into consideration the employment and informal trade that sprang up around pulse farms and pulse farm services centres—like input suppliers, warehouse operators, transporters and off-takers. In addition, the amount of crops harvested in the season was surveyed by visiting three warehouses in the district.

The sampling frame was formed based on the total number of households in Kamwene, with a focus on the households engaged in crop production. The population of Kamwene is 2522 people, and the number of people engaged in rice and pulse production is estimated at about 1900 (author's data). The pulses and rice are grown in the same season. Pulses are grown alone or interspersed with the maize crops. Farm preparations start in October. After harvesting maize from mid-April to June, pigeonpea remains in the farm and is harvested from August to November. Pulses are also grown for crop rotation and nitrogen fixing. For example, if the rice crop is not growing well, farmers have been advised to cultivate pulses for one or two years.

Forty agriculturalists were selected for the study. The sampling unit in this study is the individual head of each household, who collectively form the category of key informants. Within the context of survey research, 'key informant' refers to the person with whom an interview about a particular organization, social programme, problem or interest group is

[4] Rural Urban Development Initiatives (RUDI) is a private sector development organization based in Dar es Salaam. It is a local NGO that deals with empowering micro-small enterprises (MSE) and farming communities through improved market linkage and distribution channel for their products (RUDI 2019).

Table 13.2 Sample size for study—Kamwene village

Category	*Sample size*
Household representatives from one village	40
DAICO	1
Cooperative officers	2
District Community Development Officer	1
VEO—Kamwene	1
Total	45

Source Author's data based on field survey in Kamwene village, Kilombero district, 2017

conducted. In other words, the key informant is a proxy for her or his associates at the organization or group.

The category of key informants who were interviewed consisted of the District Agricultural and Livestock Officer (DAICO), the District Cooperative Officer, the District Community Development Officer and the Village Extension Officer (VEO). The sample size (inclusive of key informants) that was selected and interviewed was 45 people, which is more than 90% of the frame. The breakdown of the respondents is shown in Table 13.2.

Findings of the Study

1. Gender and Marital Status of Smallholder Farmers

Female smallholders accounted for 53.7% of the total agriculturalists, while male smallholders accounted for 46.3%. This imbalance may be due to the social characteristics of the community. During the off-season, it is observed that the women stay at home while more men go out in search of other income-generating activities. However, during the farming season, women are seen working in the family farms. Additionally, most farmers are married and the number of single people involved in agriculture is relatively low, below 5%.

2. Income of Smallholder Farmers

Income from non-crop farming activities in the district was found to be considerably low at less than 5%. These activities labelled as 'others', include earnings through the selling of local liquor, small shops/kiosks, fishing, animal keeping and other sources. The earnings from crop farming/agriculture seem to be equal to/greater than TShs

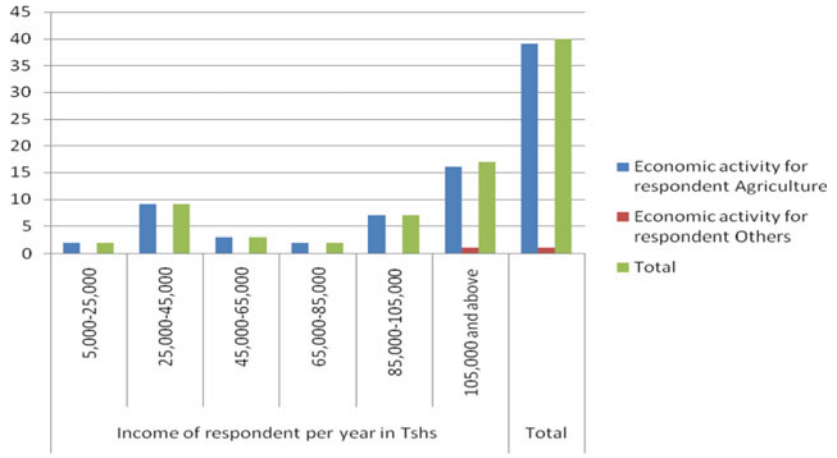

Fig. 13.3 Income of smallholder farmers (average of TShs per year). Income earned by farmers from crop farming and non-crop farming (non-crop farming is included under 'others') (*Source* Author's data based on field survey in Kamwene village, Kilombero district, 2017)

105,000[5] (approx. US$ 45) per year. This shows that crop farming still has enormous potential for developing and improving the income of the community and also offers several opportunities for investors (see Fig. 13.3).

Challenges in Farming Pulses: A Case Study of Kamwene

Tanzania's agricultural sector plays a significant socio-economic role in the fabric of the country. Numerous developmental strategies in Tanzania are based on agriculture. However, the country continues to struggle with sustainable agricultural production mainly due to poor infrastructure and agronomic practices.

Farmers struggle with low household incomes and low prices in return for their agricultural produce. The study highlights some of the main factors that need to be tackled to maximize the agricultural productivity

[5] TShs 100 = US$ 0.044 as of third quarter (Q3), 2018.

in the region. It further attempts to present local, sustainable solutions and project initiatives for bolstering the agricultural sector. The factors that need to be tackled are as follows:

Poor Agronomic and Harvesting Practices

Poor agronomic practices in agriculture include the use of multiple varieties of mixed seeds, low use of inputs, poor processing techniques, inadequate quality grading, the absence of known brands and pulse handling through unstructured trade practices. If the poorly handled pulses are mixed with the good ones, it lowers the grade of the whole pulse consignment. Improper handling occurs due to lack of post-harvest handling knowledge, absence of post-harvest handling technologies, poor warehouses and pest control techniques. This damages the pulses and lowers the quality. To improve these practices, the quality of crops must be controlled from the outset wherein a farmer elects the most suitable seeds and agronomical procedures for farming.

Further, Tanzanian farmers fail to harvest at optimum maturity and often use inadequate or inappropriate tools, resulting in losses at each level of the process, viz. harvesting, drying, hand-threshing and storage. The limited availability of mechanized harvest-service providers, combined with fragmented cultivation practices, also prevents farmers from employing mechanized harvesting. According to the Ministry of Agriculture Food Security and Cooperatives (MAFC), farm mechanization in Tanzania is still below 20% (CIMMYT 2015). Smallholder farmers lack this critical input because of small plots of farms due to land fragmentation and the continued dependence on traditional farming systems. Harvesting by local methods leads to a deterioration of the crop value as the crop remains at the farm for extended periods of time (see Figs. 13.4 and 13.5).

Farm Loans and Middlemen

During the farming season in Tanzania, middlemen who pose as farmers offer loans that farmers have to repay at the rate of 1 bag of crop for each TShs 20,000 (US$ 8.68).

In Kamwene, for instance, the farm gate price of one bag of pulse is TShs 100,000 to TShs 200,000 (approx. US$ 44–88) during the harvesting season. During the off-season, the price increases from

Fig. 13.4 Pulses with varied eye colours due to late harvesting (*Source* Author's photo from field survey in Matema village, Kilombero district, 2017)

Fig. 13.5 Pulses stored well in a warehouse in the Babati Manyara region, Tanzania (*Source* Author's photo from field survey in the Babati Manyara region, Tanzania, 2017)

TShs 200,000 (approx. US$ 88) to TShs 400,000 (approx. US$ 174) per 100 kg bag. The price, which can help farmers to breakeven, is estimated to be between TShs 200,000 and TShs 250,000 (approx. US$ 88–126) per 100 kg bag of. These informal credit service providers normally take one bag of pulse per each TShs 50,000 (approx. US$ 22) against the loan

taken by the farmer. By doing so, the farmers (borrowers) incur a huge loss as they cannot cover even 30% of their farm costs.

Unstructured Trade and Poor Market Linkages

In Tanzania, crops such as grains and pulses are not traded in a streamlined manner unlike coffee, tea, cashew nuts and tobacco. These non-streamlined crops are normally traded in small volumes through informal, cross-border trade along with formal trade. It is estimated that the total pulse export value for Tanzania between 2005 and 2014 was worth US$ 900 million (ITC 2016). However, structures to regulate, control and augment the growth of the grain and pulse sub-sector in Tanzania are a pressing need. For example, the Tanzanian market for pigeonpea in 2017 was extremely volatile as there was a sudden increase in the volume of pigeonpea production. Over 300,000 farmers had harvested a total of 291,935 tonnes of pigeonpea, which eventually had no buyers. Currently, the price for one kilogram of pigeonpea is TShs 100/-, equivalent to US$ 0.04, and yet there are no buyers (author's data based on field survey, 2017).

Minimal Access to Credit

Smallholder farmers, millers, traders, agro-input dealers and providers of mechanized services alike have identified access to capital as a constraint. Their needs range from access to working capital to accommodate and manage larger volumes of pulses for value addition and trading; capital investments for rehabilitation/upgrading/expansion of storage; and to processing machines and purchase of machineries for mechanized harvesting. Increased financial inclusion can also assist farmers' associations to collectively purchase inputs and services in bulk at more competitive prices, and eventually negotiate better prices for their outputs (Kambewa et al. 2013)

The farmers in Kamwene and the Kilombero region at large struggle with procuring the right kind of input at the right time, mainly due to a lack of money to buy better inputs. The problem is exacerbated by the government's arrangement of centralized input distribution, where only an approved supplier is sanctioned to distribute inputs all over the country. Most remote areas of Tanzania, including the Kilombero district,

were not provided with inputs for the 2016–2017 season. Input availability in the country is a necessary requirement for farmers. However, it has been scarce for several decades, such that even the little amount which is available does not reach the farmers on time. To combat this problem, the government found it improper to leave input business control in the hands of the market (free market). As a remedy to this problem, the government came up with the centralized input distribution system for the whole country.

Lack of Access to Quality Inputs

The data obtained through household interviews in Kamwene shows that access to inputs is one of the leading problems in Tanzania's agricultural sector. Quality inputs including seed and fertilizers are not readily accessible to smallholder farmers, which has led to poor production and crop yields. Yara International, a Norwegian multinational input production and distribution company, is the only well-known fertilizer company in the country. This demand for quality inputs and foreign direct investment (FDI) in agriculture in sectors such as fertilizers and seeds can be a good business opportunity for investments from different input manufacturers of the Global South in Tanzania, such as India.

According to a collective input purchase case study, the farmers explained to the interviewers that they had an informal agreement with an Indian input supply company called Wembley International Ltd. Wembley International Ltd. is an input and fertilizer importer and distributor in Tanzania and was approached in 2017 by Tanzanian farmers' organizations' leaders (author's data based on field survey, 2017). The owners of the company are Indians and most inputs are imported from India. Its market coverage is smaller in size compared to Yara International. Wembley entered into an agreement with the farmers' associations to supply input to 12 farmers' organizations in the Kilombero district. The inputs supplied by Wembley included:

1. Pre-emergence weed killer,
2. Post-emergence weed killer,
3. Basal fertilizer,
4. Top-dressing fertilizer,
5. Seed treatment chemical and
6. Knapsack sprayers.

The company managed to deliver a consignment of weed killers and fertilizer worth TShs 268 million (US$ 120,179) across 13 villages and farmers' organizations in the Kilombero region in 2017. In the course of the input distribution, even those farmers who were not members of the farmers' organizations requested for these inputs and services.

The arrangement was organized mainly to test bulk input purchase. Thirteen farmers' organizations, named after their respective villages, received the consignments. These included: Ngalimila Farmers' Association, Utengule Farmers' Association, Mpanga Farmers' Association, Viwanja Sitini Farmers' Association, Matema Farmers' Association, Kamwene Farmers' Cooperative Society, Chimka Farmers' Cooperative Society, Mlimba 'A' Farmers' Association, Mlimba 'B' Farmers' Association, Mwembeni Farmers' Association, Kalengakelu Farmers' Association, Udagaji Farmers' Association and Mbingu Farmers' Association. The farmers collectively put forth their input demands and the payments were deposited in their organization's bank accounts. The respective organization's leaders facilitated all transactions.

The arrangement with Wembley International has shown immense promise, especially in the light of the government of Tanzania's new programme for collective/centralized fertilizer purchase. The programme aims to ensure that even remote corners of the country can have timely access to fertilizers and other inputs. The formation of Pulse Farmers' Organizations is thus a sustainable and viable solution, as the farmers can make a bulk purchase of inputs through their organizational arrangement. A company can then deliver their requirements all at once, as in the case of Wembley International. Such a system will reduce transaction costs for the input supply company, which would benefit from the economies of scale.

Poor Post-harvest Management Practices

Inadequate management of the post-harvest process has led to large crop losses in Tanzania. The limited availability of storage facilities, poor construction and management of warehouses and insufficient access to capital for building and maintenance are the key issues. Even crops that are stored in warehouses are susceptible to post-harvest losses as facilities are of a low quality, lack hygiene and flout standard food safety measures. The mixing of seed varieties also adversely affects the quality and standardization process of pulses.

Crop waste and spoilage prevention technologies are an urgent need for Tanzania and present a prime opportunity for Indian investors. The country has been importing cocoons (individual packaging systems to improve food quality by protecting agricultural commodities against spoilage from insect infestation, pests and mould growth) from Latin America. There is only one Uganda-based agent—an American company named Grain Pro International with the capacity to provide protection for food crops. In fact, Tanzania can host multiple agents for the ease of doing business in this segment. PeePee Tanzania Company (PPTL) is an Indian company based in Tanga, Tanzania. PPTL manufactures different types of packaging materials by using petrochemical raw materials. The company has also manufactured different post-harvest technologies for food preservation for several years. With the support of Purdue University from the United States, PPTL has been manufacturing and marketing Purdue Improved Crop Storage Bags (PICS)[6] bags to farmers at a subsidized price (Fig. 13.6).

Farmer's organizations and groups in Tanzania and other East African countries have benefited from Purdue's support to PPTL in reducing post-harvest loss. Unlike normal bags, which have two layers, these bags have three protective layers, and one of the layers is airtight or hermetic. After filling the bag with pulses or any grain, each layer is tightened separately to make them airtight. These bags were originally made for pulses as the crop is susceptible to weevils, but now they are used for the storage of other types of grains as well. The Indian government can also adopt this support model to help Indian farmers prevent post-harvest losses.

Challenges During Processing and Value Addition

Crop processors largely act as service providers and a majority of them operate as single-pass machines that do not have cleaning, de-stoning, sorting, or grading facilities. For pulses, the availability of millers is scarce, and colour-sorting technologies are not available, even on hire. The pulses are thus often milled in the maize/other grain milling machines. Smallholders often approach markets without grading their produce. Further, the returns from the produce are not high enough to cover the losses that occur due to the reduced yield of pulses in the process of sorting

[6] Short form for Purdue Improved Crop Storage Bags, which was also linked to prevent hunger or 'Zuia Njaa' campaign by Purdue University USA in 2013 to 2016.

Fig. 13.6 Traditional '*Vihenge*' storage technology, which is vulnerable to rodents and other vermin (*Source* Author's photo from field survey in Matema village, Kilombero, 2017)

and grading. There is also little awareness about international standards and grades among smallholder farmers, buyers, and traders in the East African Community (EAC). Thus, they are unable to compete with other pulse-producing African countries, as well as players from Asia and America.

Lack of Weight and Measurement Consistency at Pulse Value Chain Nodes

Farmers in Tanzania still use tins for trade measurements. Most buyers in Tanzania carry their own tins to the village to buy crops. These tins may at times be magnified to take in more crops.

The Alliance for a Green Revolution in Africa's (AGRA) grain market survey of 2015, as well as its research on the 'lack of consistent weight measures' found that more than 60% of the farmers interviewed used volume measures rather than weight measures. By using volume measures, grain farmers were cheated and lost up to 30% of their income. According to AGRA, 'There is a lack of consistent weights and measures in the market. As a result, traders benefit while the farmers are at a loss. In addition, coordination among agriculture value chain members is inadequate' (AGRA 2015).

In Kilombero district, 68% of the farmers who were interviewed responded by saying that they were using volume measures for selling their produce. Only a small percentage (12.7%) of them stated that they use weight measures, while the rest of the farmers used other traditional measurements. Yieldwise Baseline Survey of 2015 shows that 30% of improvement in farmers' income can be achieved using accurate measurements which avoid cheating by buyers (AGRA 2015).

In addition to weight and measure consistency, better coordination among stakeholders would promote collective marketing and strengthen market linkages nationally as well as regionally for farmers. It would facilitate pulse branding, brand ownership and brand protection. Large buyers and technology owners like the Export Trade Group (ETG) are more open to working with larger groups of aggregated farmers who have better quality produce and higher volumes to offer. Traders will subsequently be able to reduce their costs both in terms of money and time, if they can buy from each village aggregation centre/village warehouse rather than from each smallholder farmer.

The Way Forward

Access to working capital, capital investments and machinery for efficient harvest and post-harvest practices are critical inputs for agriculturalists.

Increased financial inclusion can enable farmers' associations to collectively purchase inputs and services in bulk at more competitive prices and subsequently negotiate better prices for their outputs.

According to the Financial Sector Deepening Trust's (FSDT) FinScope[7] report, about 78% of rural Tanzanians live within a 5 km radius of formal financial service centres. The same report shows that about 80% of Tanzanians live in rural areas of which 41% earn their living by crop farming; 20% by offering casual labour service to other farmers; and 14% own businesses in the trade and service of agricultural products. Those who have financial access said that their proximity to these services was facilitated by bank agents who are also mobile money service providers (FSDT 2017). Nevertheless, banks as formal financial institutions are still scarce in Tanzania. India and other countries thus have a prime investment opportunity in the formal financial service provision sector.

Proposed Projects by the Community

Respondents were asked to name a sector/subsector that they think would benefit from Indian support in terms of capacity building and South-South cooperation. As per the Statistical Package for the Social Sciences (SPSS) table, about 57.5% of all respondents said that they would prefer capacity building support mainly for value addition to their crops in order to fetch a good price for their produce (see Table 13.3).

After coming to power in 2015, the current Tanzanian government has been actively promoting industrialization as a means for sustainable employment, utilization of locally available resources, and increasing exports of processed products rather than the export of raw materials to improve the balance of payment situation in the country (President's speech during farmers '*Nanenane*'[8] Agricultural shows, Mwananchi newspaper, 9 August 2017).

[7] Surveys/studies which are conducted to assess financial service provision and uptake; the studies are designed to build a comprehensive understanding of the financial services landscape and provide a baseline for service access and use.

[8] In Tanzania, *NaneNane* day is celebrated on August 8th with a week-long fair to recognize the important contribution of farmers to the national Tanzanian economy. *NaneNane* means 'eight eight' in Swahili (Hakimu 2017).

Table 13.3 Question: Which of the proposed projects does the Kamwene community need urgently?

Sector	*Frequency*	*Percentage*	*Valid percentage*	*Cumulative percentage*
Crop value addition project	23	56.1	57.5	57.5
Animal keeping project	9	22.0	22.5	80.0
Crop farming	2	4.9	5.0	85.0
Poultry keeping project	1	2.4	2.5	87.5
Fish keeping	1	2.4	2.5	90.0
Water project	2	4.9	5.0	95.0
Input selling project	1	2.4	2.5	97.5
Health project	1	2.4	2.5	100.0
Total	40	97.6	100.0	
Missing system	1	2.4		
Total	41	100.0		

Source FSDT (2017)

Value addition in the pulse sector will reduce the selling of bulk, unclean, ungraded and unpacked pulses that contribute to low pulse prices in the market.

Ongoing Provisions for Financial Inclusion in Tanzania

The government of Tanzania has undertaken different initiatives to improve financial inclusion in the country. The terms of interest rate applicable by commercial banks until 2015 were between 5% and 45% per annum. The government, through the Central Bank, has lowered the rates in the range of 19%–22% per annum for commercial banks, which are willing to lend to the agriculture sector, while the Tanzania Agricultural Development Bank (TADB) lending rates are between 9% and 12% per annum (FSDT 2017). These are some of the initiatives, which are being taken by the government to ensure financial inclusion, especially for smallholder farmers who have been excluded from financial services access for several years.

Facilitating the Outreach of Commercial Banks to Rural Tanzania

The National Microfinance Bank (NMB) has for long been the only well-known bank in rural Tanzania because of its presence at the national, regional, and district level. From 2010 onwards, it opened branches at the ward level as well. The government of Tanzania—one of the main shareholders in the bank—facilitated its expansion. There has been an increase in the number of commercial bank's branches, such as the Cooperative and Rural Development Bank Ltd. (CRDB), that have opened at the district level in the past few years. The government's efforts towards providing land to the banks for their buildings and providing the supply of electricity have contributed to the proliferation in outreach (NMB 2019).

Farmers Organization Model

This study has attempted to tackle the problem of low quality and sub-optimal quantity of pulse production in Tanzania. In the case of Kamwene, poor agricultural practices and inadequate post-production processes, as mentioned earlier, have contributed to the decreasing market value of the pulses.

One of the great challenges that are facing smallholder farmers is the lack of a strong institutional capacity to advocate for their needs. Most of the smallholder farmers are not united together in the form of cooperatives, associations or societies. This makes it difficult for them to acquire necessary agronomical support services, financial services and market access for their produce.

In the light of the research and findings of the study, a 'Farmers' Association Model' was recommended to augment the production of pulses. Different groups enable the farmers to choose their own leaders, open bank accounts and apply for loans from financial service providers using the group's guarantee.

This is a model that advocates a collective way of working with smallholder farmers, wherein they form themselves into an organization. They create the collective in a manner that is beneficial for them. For example, among the cashew farmers in Tanzania, the cooperative model has dominated and been successful for several years. The same model has been applied to coffee and cotton farmers. For pulses and other grains, the Farmers' Association Model has been more practical and beneficial to smallholder farmers. With this model, farmers, through their association

leaders, can coordinate different services collectively and reach out to each farmer easily.

The model also presents additional advantages to its members. They are as follows:

1. *Outsiders can engage with smallholder farmers in a cost–efficient manner*: It is very costly for a trader, credit officer or developmental organization to serve individual farmers separately. Coordination and communication are more efficient with a group. In the Yieldwise project, these groups take on organizational tasks of managing the contributions, motivating smallholder farmers and facilitating information exchanges.
2. *Smallholder farmers can benefit from economies of scale*: Farmers benefit greatly from being part of a collective. With adequate funding, farmers can build a warehouse, an irrigation canal and numerous other forms of infrastructure. In this project, individuals in the group pooled their skills for the benefit of the community. Group members skilled in these specific tasks undertook work that needed professional companies, such as warehouse management, accounts and bookkeeping.

   All the groups were requested to generate a volume of demands needed to buy inputs in bulk. Collectively, the smallholder farmers had enough output to fill a lorry and could sustain a regular supply of produce to the market. The solution lay in the use of the Yieldwise project model for collective sales that allowed them, for instance, to bulk their crops and fill a truck with 50 MT. The model also gave them a stronger bargaining position for better prices. These groups served as platforms for the farmers to express their concerns in unison to policy makers.

   This model was also found to be user-friendly in the B2B case of Wembley International and the farmers of the Mlimba ward. For example, it has always been difficult for an individual farmer to fill a single consignment of 50 MT. As a solution, in this model, the farmers can bulk their crops through collective sales and can thus fill 50 MT trucks easily. Farmers' organizations leaders coordinate the process of collective purchase of inputs in Kilombero district
3. *Information sharing among the farmers is enhanced*: The group enables farmers to share information and encourages peer-to-peer learning. Under the research project explored in the case study,

farmers groups served as a platform for learning from each other. Training-of-Trainers (ToT) programmes were conducted for select members or group leaders. These leaders, with all the required training gear and material, were equipped to train their fellow members. Demonstration plots were set up at the group/village level for practical learning.

Thus, through the Farmers' Organization Model, Tanzanian farming practices can be strengthened and opened up to investments from other agriculture-based countries such as India. In the spirit of South-South cooperation, India and Tanzania can further collaborate on capacity building initiatives and agricultural best practices to secure future cooperation and exchanges.

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PART V

Financing Mechanisms

CHAPTER 14

EXIM Bank of India's Support for Food Security and Capacity Building in Africa

Prahalathan S. Iyer and Rahul Mazumdar

Abstract Despite the availability of large tracts of cultivable land, Africa is unable to meet its basic food needs due to inter alia; scarce water resources, inadequate agri-infrastructure, inefficiencies in the production practices, among others. There is a need to transform the agriculture sector in Africa. This paper suggests a four-pronged strategy to transform the African agricultural sector. These are: productivity enhancement, agri-logistics, technical collaboration and investment in agriculture R&D. The paper also shares India's experience with agricultural transformation and discusses the green revolution, contract farming, irrigation techniques, agricultural markets and the like. Agricultural sustainability is intrinsically linked to food security, and therefore critical to the progress and socio-economic development of Africa and India. The paper also

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illustrates win-win strategies for India-Africa agricultural cooperation, through financing Africa's agriculture development through the EXIM Bank of India.

Keywords Lines of Credit · Exim Bank of India · Agriculture · Productivity enhancement · Capacity building · Financing agriculture

Status of the Agriculture Sector in Africa

Africa's agriculture is dominated by a variety of staple food crops and traditional cash crops. The former includes maize, sorghum, millet, cassava, yam and sweet potatoes; while coffee, cotton, cocoa, oil palm, sugar, tea and tobacco are the major cash crops. The agriculture sector is the key source of livelihood across the African continent. It accounts for 15.3% of sub-Saharan Africa's GDP and 3.9% of Middle East and North Africa's GDP, and employs more than 60% of the continent's total labour force (AGRA 2018). Notably, in 2016, agricultural land as a percent of total land area was 43.6% in Sub-Saharan Africa and 33.3% in MENA. With its vast agricultural potential, Africa's agribusiness sector is predicted to reach US$ 1 trillion by 2030, becoming the 'new oil' on the continent (AfDB 2018).

Despite the varying significance of the agriculture sector across the African economies, this segment remains one of the most critical sectors in terms of livelihood, food security, exports and national income. Africa holds more than half of the world's fertile unused land. However, the continent imports a substantial volume of food to cater to its population. The continent's food import bill is estimated to be a staggering US$ 30–50 billion. The demand for food will double by 2050. This will also result in a higher import bill if no intervention takes place (AGRA 2017: p. vi). Cereals, which is a staple food item in the African, diet, accounts for one-third of the imports. This is an alarmingly high figure given the importance of the crop.

The agriculture productivity in Africa is also relatively low (little more than a half of the world average productivity) as the farmers are largely engaged in subsistence farming rather than intensive farming that can also be commercialized through structured interventions.

Need for Transforming the Agriculture Sector in Africa

Despite the availability of large tracts of cultivable land, Africa is unable to meet its basic food needs due to scarce water resources, inadequate agri-infrastructure, and inefficiencies in the production practices. The production practices lack usage of modern implements, high-yielding variety seeds, fertilizer and irrigation techniques. Though the usage of fertilizers (kilograms per hectare of arable land) in Africa has increased marginally over the years, from 15.53 kg per hectare in 2010 to 16.16 kg per hectare in 2016, it is one of the lowest when compared with the rest of the world at 140.553 kg (World Bank 2016).

The population pressure aggravates the availability of per capita food production that has led to the health concerns in the population. Despite having huge volumes of cultivable land and food imports, the African continent has a very high incidence of undernourishment, about 243 million Africans (FAO 2017). According to the African Development Bank, the undernourished population is expected to go up to 320 million by 2025 (AfDB 2016).

Another major reason for the need to develop the agricultural sector on the African continent is to enhance cross-border trade within the continent. While several countries in Africa are land-locked, it is estimated that only 22% of all African trade takes place within Africa (Afreximbank 2018: p. 9). The food imports of some countries could be catered through production enhancement in other countries in the neighbourhood/region, and thereby increasing the cross-border trade in the African continent. Given the uneven distribution of food production across Africa, regional trade can potentially allow the consumers greater access to high-quality foodstuffs, while reducing the volatility of prices by ensuring a stable supply from within the continent.

Key crops that could be cultivated in select high potential countries in Africa are given in the Table 14.1.

Strategic Focus for Transforming Africa's Agriculture

This paper suggests a four-pronged strategy to transform the African agricultural sector. These are:

1. Productivity Enhancement

There is a need for a strong and committed national policy, which focuses on augmenting agriculture productivity. This is because in most

Table 14.1 Key crops that could be cultivated in select high potential countries in Africa

Country	Key crops that could be cultivated
Ethiopia	Wheat, rice, maize, soybean, chickpea, dry pea, sugarcane, lentils, sweet sorghum
Kenya	Wheat, rice, maize. soybean, chickpea, sugarcane, lentils, pigeonpea
Madagascar	Wheat, rice, maize, dry pea, palm oil, soybean, sugarcane, lentils
Malawi	Wheat, rice, maize, soybean, chickpea, dry pea, sugarcane, lentils, pigeonpea
Mozambique	Wheat, maize, rice, sugarcane, sweet sorghum
South Africa	Wheat, rice, maize, soybean, sugarcane, sweet sorghum
Sudan	Wheat, rice, maize, chickpea, sugarcane, sweet sorghum
Tanzania	Wheat, rice, maize, chickpea, dry pea, palm oil, soybean, sugarcane, pigeonpea
Uganda	Wheat, rice, maize, chickpea, dry pea, soybean, sugarcane, pigeonpea
Zambia	Wheat, maize, soybean, rice, sugarcane, sweet sorghum

Source Exim Bank of India (2017)

African countries, the productivity level of crops is lower than the world average, which cripples the potential of agricultural producers to earn more. This is further exacerbated by the slow growth in productivity, thereby constraining Africa's structural transformation process and economic diversification. Low productivity also translates into very low average incomes. Since 2008, agricultural productivity in 34 sub-Saharan countries averaged just US$ 318 per worker annually, compared to a world average of roughly US$ 1000 per worker during the same period (EXIM Bank of India 2017: p. 20).

2. Investment in Agriculture Research and Development (R&D)

In order to transform agriculture, there is an urgent need to undertake Research and Development (R&D) in the agriculture sector. These may include identifying appropriate irrigation technologies, soil testing and selection of appropriate crops for rotation, development of high-yielding varieties and recognize appropriate technologies for interventions for productivity enhancement. Most African countries may not have the technical and financial capabilities to undertake R&D activities in such areas. However, this could be achieved through collaborative efforts with

countries, such as India that have used R&D as a tool for transforming the agricultural sector.

3. Development of Agri-Logistics

The agri-logistics, particularly towards the development of agri-value chain is another important area for transforming African agriculture. During the production stage, it is pertinent to develop hinterland infrastructure, such as appropriate roads, electricity transmission lines and irrigation systems. Infrastructure in Africa is of a poor standard. Access to roads in Africa is poor. It is estimated that the Rural Access Index for sub-Saharan Africa is at 33.9% (World Bank 2016: p. 3). This index measures the fraction of people who have access to an all-season road within a walking distance of approximately 2 km (Mikou et al. 2019).

Road connectivity is vital as it can link the farmers to procure essential inputs such as seeds and fertilizers, besides offering them competitive markets to sell their produce. For the post-production stage, there is a need to develop storage, warehouses and cold-chain infrastructure. These are essential elements to reduce post-production losses. It is estimated that the level of post-production losses averages 13.5 per cent for sub-Saharan Africa, which means that the region loses over US$ 4 billion approximately every year (FAO 2011). This waste, if prevented, could contribute to the food security of the region.

To overcome the above-stated limitations, the African Development Bank (AfDB) launched the 'Feed Africa Strategy' for transforming agriculture in Africa, in May 2016.

Box 14.1 Feed Africa Initiative of the African Development Bank (AfDB) Group

To end hunger and rural poverty in Africa during the next decade, the AfDB, launched its 'High-5' priority projects, and one of them was the 'Feed Africa: Strategy for Agricultural Transformation in Africa, 2016–2025'. This project focuses on transforming and, scaling up agriculture as a business through value addition. It advocates innovative financing mechanisms wherein it envisages a lead role by the private sector that is enabled by the public sector.

The 'Feed Africa' strategy illustrates the drive to change African agriculture into a globally competitive, inclusive and business-oriented sector that creates wealth, generates gainful employment and improves the quality of

life. It also seeks to scale up the existing and successful initiatives across Africa and beyond.

The 'Feed Africa' project envisages lifting 320 million people out of undernourishment by 2025. In addition, 130 million people are expected to be lifted out of extreme poverty, simultaneously. The program also hopes that Africa will turn into a net exporter of agricultural commodities and be able to substitute US$110 billion worth of imports. This could potentially lead to opening up Africa's agribusiness which could be worth more than US$100 billion per year, by 2025 (EXIM Bank of India 2017: p. 11).

This transformation would require mobilizing resources and capital, representing a significant opportunity to drive inclusive and green growth actors along the value chains. According to AfDB, transforming an initial set of agri-value chains will require approximately US$280–340 billion over the next decade. Such an investment would likely create new markets worth US$56–65 billion per year by 2025 (EXIM Bank of India 2017: p. 22).

Source EXIM Bank of India (2017).

4. Technological Collaboration

The smallholder farmers in Africa cultivate low-yield staple food crops on smallholdings with minimal use of critical inputs. These farmers depend on rainwater, thus subjecting production to the vagaries of the monsoon. Given their limited ability to mobilize capital, most farmers in Africa are not even aware of the latest technologies that would help them in productivity enhancement or minimizing costs. Technological partnerships have the potential of filling in the critical gaps along the entire value chain. Technologically empowered farmers can make Africa the world's breadbasket and the employment opportunities in the agriculture sector can lift the people, particularly the agricultural labourers, from the grips of poverty.

While it may be difficult to overcome the challenges intrinsic to agriculture in Africa, collaborative efforts from all the stakeholders working together over a sustained period of time can unlock the agricultural potential of the region and help the continent tackle the issue of food insecurity.

Agricultural Transformation—Sharing of Indian Experiences with Africa

Indian agriculture sector has graduated from traditional agriculture in the 1950s to a technology-driven one, where farmers can afford the inputs for such an intervention. Agricultural commodities include food crops, non-food crops and horticulture. In the initial years of the transformation, the growth in agriculture production was achieved through horizontal expansion (i.e. through the increase in the area under cultivation). The latter phase witnessed improved agricultural production through a rise in technological interventions. Some of the achievements of Indian agriculture that may serve as learning for the African context are given below.

The Green Revolution

Earlier, India was a food-importer and depended on food supply from North America under the PL-480 scheme.[1] In order to achieve self-sufficiency, India embarked upon the Green Revolution in 1966. This encompassed the usage of high-yielding varieties (HYV) of seeds, modern agri-implements, fertilizers and pesticides, technological interventions in farming methods, including irrigation. A combined strategy of technological interventions, institutional interface for financing, and government policy support contributed to the growth in agriculture production and productivity over the years. However, the Green Revolution has not been without its challenges and limitations or pitfalls. Thus, the Indian case offers Africa the advantage of hindsight to adapt the Green Revolution to suit its local circumstances and try and factor in the solutions to the challenges faced by India at the very outset (Modi 2017). The Green Revolution also spurred its share of unintended negative consequences, often not because of the technology itself but rather, because of the policies that were used to promote rapid intensification of agricultural systems and increase food supplies. Even where the Green Revolution successfully increased agricultural productivity, it was not always the panacea for solving the myriad of poverty, food security and nutrition problems facing poor societies (Pingali 2012).

[1] The P. L. 480 agreements aimed at supply of surplus agricultural commodities from the USA against payment of the rupee equivalent of the dollar cost of these commodities plus 50% of the ocean freight cost (Laxminarayan 1960).

Contract Farming

Contract farming is another modality, which brings corporate interface to agricultural development. Though the contract farming technique has not been widely prevalent, it has been gaining currency in India. Many companies, including multinational corporations (MNCs) operating in India, such as Hindustan Unilever, ITC, PepsiCo, Rallis India, Reliance, among others, have been engaged in contract farming in India. Under the typical contract-farming model, the processor provides key inputs such as seeds, finances the farmers for procurement of other agri-inputs to enhance productivity and quality and transfers knowledge of good agricultural practices. The farmers benefit with the knowledge transfer, besides an assured market with contracted price, while the processing company benefits from supply-chain efficiency.

Technology in Farming

India has also been experimenting with modern technology in farming. For example, the traditional farming techniques follow tasks such as planting, irrigating or harvesting against a predetermined schedule. By collecting real-time data on weather, soil and crop maturity, farmers can make informed decisions. There are various types of Information and Communications Technology (ICT) tools that can be used to provide such real-time data. Usage of robots and drones in various farming practices could contribute to the precision farming techniques, and thereby increase productivity. However, it needs to be clarified that a bulk of the Indian farming sector engages smallholder farmers who cultivate less than 2 hectares per family and continue to practice rainfed traditional forms of agriculture as technology driver farming is capital intensive.

Irrigation Techniques

Low-cost and water-efficient irrigation technologies such as water pumps and drip irrigation that are being used in India have the potential to greatly expand small-scale irrigation in Africa. Irrigation techniques such as drip irrigation can serve as transformational technology for small producers in Africa. As per India's experience, drip irrigation contributes to the water saving to an extent of 45% in banana cultivation, 68% in cauliflower and chilli cultivation, 42% in tomato cultivation and 66% in water-melon cultivation (National Committee on Plasticulture Applications in Horticulture). Using solar-powered pumps or powered by other

renewable energy sources to irrigate the land allows further savings in cost of irrigation.

Supply of Equipment

Usage of farm machinery is important to increase food production in Africa. The main objective of farm mechanization is to increase the agricultural productivity with low cost of operations that the 'triple A' technology in India offers. India has, over the years, developed technologies and production capacities in building modern agricultural implements, such as tractors, harvesters, threshers, planting and seeding and tillage equipment. In light of a rapidly growing demand for food crops in agricultural production, India has immense potential to provide solutions to promote sustainable agricultural practices for Africa.

Agricultural Markets

Good agricultural produce needs to reach the market for sale to recover the cost and create profits. India has taken several initiatives, like farmers' market, minimum support price and public procurement for distribution, to develop the agricultural market. India also launched the National Agriculture Market (e-NAM) in 2016 with the objective of the integration of agri-markets across the country through an e-platform. This also creates a unified national market for agricultural products. This initiative integrates all the markets under one platform and helps discover the best price for the farmers.

The launch of eNAM created an immediate interest in favour of the online agricultural commodity marketing. With the overall success of 585 mandis in Phase 1 and further expanding its wings to integrate 415 new mandis in Phase 2, the e-NAM platform, in May 2020, had a total number of 1000 mandis across 18 States and 3 Union Territories. The e-NAM in 2019 achieved a milestone by commencing inter-state trade between *mandi*s (market place) of two different states. Earlier trade happened either within the Agricultural Produce Market Committee (APMC) or between two APMCs situated within the same state (PIB 2019). But after three years since its launch, the initiative is struggling. The annual production of agriculture and horticulture produce is estimated to be about 590 million tonnes. The traded volume on eNAM, as on March 2020 reached 3.43 crore tonnes of commodities and 38.16 lakh bamboo and coconuts. Currently, 150 commodities, including food grains, oilseeds, fibres, fruits and vegetables, are traded on e-NAM (PIB 2020).

Institutional Support System

India has established the Agricultural Research Institute (IARI), Central Institute for Cotton Research (CICR), National Dairy Research Institute (NDRI), Central Institute of Agricultural Engineering (CIAE), Indian Institute of Agricultural Biotechnology (IIAB), among others to support the agriculture and allied sectors. These institutions range from seed research to soil research, from harvesting to crop processing technologies, sector- /area-specific development agencies, marketing cooperatives/ agencies, financial institutions and export promotion agencies, besides an apex-level financial institution for agricultural and rural development. These institutions exhibit successful interventions to the development of India's agricultural sector. For instance, in the area of research IARI emphasizes utilization of global plant genetic resources, including conservation of agriculturally important microbial, cyanobacterial (bacteria that obtain their energy through photosynthesis) and insect resources, to produce efficient, productive and stable genotypes of crops, especially hybrids and improve bioenergetics. Some of these institutions are already sharing their knowledge and expertise with select African nations. India has sent teams of farm experts from the Indian Council of Agricultural Research (ICAR) to Zambia, Ethiopia and South Africa and several African countries to get firsthand knowledge of how African countries may explore ways of improving their agricultural practices.

Moreover, Platform for India-Africa Partnership in Agriculture (PIAPA) has been set up by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Agriculture Consulting Group (IACG) and the Indian Council of Agricultural Research (ICAR) to bring various stakeholders on board as consortium partners to create better policies, more effective institutions, improved infrastructure and better access to markets and higher-quality inputs, particularly for dry land farmers in India and Africa. Therefore, there is further scope for strengthening the partnership and scale up India's role as a driver of Africa's agriculture and rural development.

Policy Support

India has established the Duty Free Tariff Preference (DFTP) Scheme for Least Developed Countries (LDCs) at the First India-Africa Forum Summit (IAFS I), held in New Delhi in 2008. The DFTP Scheme grants

duty-free access on 94% of India's total tariff lines to be implemented over a period of five years. Agro-products of relevance to Africa, which are covered by the DFTP, include cotton, cocoa, cashew nuts and sugar cane. In order to expand trade with Africa, India amended its DFTP scheme in 2014 to cover around 98% of the tariff lines. After the amendment, there are 97 products in the Exclusion List and 114 products under the Margin of Preference (MOP) List. In other words, it means that barring 211 tariff lines, India provides duty-free market access to LDCs for the Indian market on all the remaining products (EXIM Bank of India 2017: p. 46).

India-Africa Agriculture Cooperation: Win-Win Strategies

Agricultural sustainability is intrinsically linked to food security and therefore critical to the progress and socio-economic development of Africa and India. In view of the complementary sectoral priorities and the role played in the evolution of world food markets—be it as a major producer or as major consumer—numerous opportunities exist for collaboration between India and Africa in the agricultural sector. Although both the regions share similar characteristics, in various sectors, the regions are at different maturity and transformation levels.

Given the nature of landholdings in Africa, where a large proportion of farmers are smallholders or subsistence-based farmers, skill transfer for the development of agriculture, viz., quality inputs, markets for the produce, soil research, farm mechanization and techniques, innovative financing tools, etc. are needed for sustainable agricultural production in Africa. In order to overcome these challenges, Africa could collaborate with India—a key partner in Africa's development with whom it shares a long history of friendship and cooperation. The knowledge and expertise of India in its successful development of the agriculture sector would be useful to the African nations. Such an approach would help Africa to emerge as a self-sustaining region in food production.

The bottlenecks in Africa, in terms of inadequate agricultural infrastructure and low average productivity in spite of the availability of land and natural resources, provide opportunities for India to engage with Africa to add vigour to the region's agriculture sector. Africa too can offer valuable learning and agro-products to India in this win-win development strategy. For example, Africa could play a significant role to cater to the

demand for pulses in India. While India is self-sufficient in the production of cereals—especially wheat and rice, production of pulses and oilseeds, at times are in short supply with the growing demand for this highly valued legumes and frequent shift in the decision to cultivate or drop the farming of this crop, which in turn is contingent on various external and internal factors. Increasing the production to meet the growing demand with limited land and water resources also remains a challenge. The declining land-base for agricultural operations, diminishing water tables, shortage of farm labour, increasing cost of inputs and uncertainties in monsoon impacts the viability of increasing productivity and acreage. External factors such as market prices and the government's minimum support price for the produce also impact the decision to cultivate pulses and oilseeds.

The Government of India (GoI) has been encouraging outward foreign direct investment (FDI) in agriculture in Africa. This would help the Indian companies to lease agricultural land for cultivation in Africa. It would also help serve the local communities through the creation of employment opportunities, skill transfer, development of rural infrastructure and enhancing agricultural productivity, thereby resulting in increased income generation for the locals. Eventually, with such interventions, Africa would emerge as a self-sufficient region in food production. Indian investment in African agriculture sector could emerge as one of the solutions to India's policy framework towards addressing her food import requirements too, in particular, pulses and edible oil.

However, at the ground level Indian investments such as in Ethiopia and Kenya have run into a rough patch as land is a highly emotive and contested issue in Africa. In many cases, the situation is ambiguous due to ill-defined property rights, with informal land rights based on tradition and culture. Who actually owns the land in Africa varies from country to country. In some cases, such as Ethiopia, land is owned by the state while elsewhere it may be owned by local or village councils (Hallam 2009).

Offshore agricultural engagement is being practised by many nations that have a deficiency in domestic food production. There is ample scope for India to enter into agricultural ventures in Africa, which provides opportunities for large-scale commercial farming. India can also offer solutions with regard to managing small farm holdings in Africa through setting up of farmer cooperatives, creation of common facilities, and the establishment of network of field workers, input providers, etc.

African nations can take advantage of the DFTP Scheme to export to India (especially pulses and oilseeds). With India's cooperation countries in Africa can enhance productivity and cater to their domestic demands as well. This could be a win-win situation for both India and Africa.

Indian Investments in Agriculture Sectors Abroad

A few Indian companies have also been investing abroad for agriculture cultivation through acquisition of large tracts of land (e.g. in Ethiopia and Kenya for floriculture). Olam International,[2] a Non-Resident Indian (NRI) company is successfully doing commercial farming in Argentina on 700 hectares of land on long lease basis. They procure peanuts, soya and white beans, most of which are being exported to Europe and Africa (EXIM Bank of India 2017: p. 28).

The profile of Indian companies that can get into commercial farming abroad would largely depend upon the capabilities and sustainability of the company and the host nation. The role of government support is also essential when the nature of institutional and policy issues in host countries are considered. In most African countries, where surplus land exists, the fundamental issue is the fragility of land rights and the weakness in governance. This would imply that agreements with buyers/lessees may not have undergone inter- alia; due diligence, especially in regard to field verification of the lands being offered, terms of contract which are unduly favourable to the investor and expropriation risk. Therefore, it is necessary to think in terms of a pre-investment consultative process, which would take on board the interests and concerns of local stakeholders. Such a consultative process would have to be country specific as the situation varies from country to country. Thus, the government would need to design a policy framework, which addresses these issues, including those of commercial risks, institutionally.

It is widely accepted that the role of the government is more that of a provider and facilitator. However, without the government's risk-mitigating intervention, private investments on a large scale may not happen in the agriculture sector in Africa. It is also important to define the facilitating role of the government and of developing guidelines and

[2] Olam International is a leading food and agri-business company in the world, operating from seed to shelf in 70 countries, supplying food and industrial raw materials to over 23,000 customers worldwide. Olam is one of the world's largest suppliers of cocoa beans and products, coffee, cotton and rice.

policies for responsible agricultural investments, particularly to reconcile food security in the context of both the home and host countries.

Financing Africa's Agriculture Development

According to the World Bank, agriculture and agribusiness together could be a US$1 trillion sector in sub-Saharan Africa by 2030, up from US$313 billion in 2010 (World Bank 2013; Byerlee et al. 2013). However, to reap Africa's agricultural potential substantial investments are required.

According to AfDB estimates, the total cost for agricultural transformation for the priority commodities and agro-ecological zones is estimated between US$315 billion and US$400 billion over 10 years, equivalent to between US$32 and 40 billion per year. Current finance for agricultural development originates primarily from three sources:

- Funds from sovereign and non-sovereign investments into agriculture from multilateral and bilateral development partners including the AfDB;
- Public sector spending; and
- Private sector investments into agriculture.

Overall, these total US$9 billion per year of investments into African agriculture (AfDB's level of spend is assumed to be US$2.4 billion per year, rather than the current US$0.6 billion per year), leaving a gap of US$23 billion to US$31 billion per annum to be mobilized in order to drive the transformation (AfDB 2016).

The financing needs of African agriculture are not confined only to the pre-production or post-production stages. They are required throughout the value chain; for procuring seeds, tilling the land with machinery and equipment, maintaining and ensuring the land from uncertainties, harvesting mechanically, storage in warehouses, post-harvest processing, if required, adhering to the quality and labelling standards and sale in the market. To meet the entire gamut of the financing needs, banks and financial institutions need to look at long-term agricultural finance to create agriculture-related infrastructure.

There are three approaches to achieve success in promoting private investments in the agriculture sector. These are:

a. Make local partnerships through joint ventures;
b. Acquire land on long-term lease basis; and
c. Contractual farming with pre-harvest commitment.

Providing financial support to Indian entrepreneurs is crucial to the realization of our objectives. The existing sources of agricultural finance in Africa are broadly classified into multilateral institutions (engaged in agriculture development), private/commercial banks (for commercial agricultural activities), external country-specific agencies such as the EXIM Bank of India and Development Finance Institutions, and international development agencies such as Japan International Cooperation Agency (JICA), the World Bank and the Islamic Development Bank.

Role of the EXIM Bank of India

Within the various segments of the value chain, agriculture financing requirements would include project financing for new agricultural investments to assist Indian investors in financing large investments in Africa and financing of trade. This would involve assisting Indian investors already present in the segment to finance operational and trade activities.

The EXIM Bank of India[3] has been partnering with Africa in its development by financing activities in the continent across a wide range of sectors with agriculture being one of the important ones. A key financial instrument of the Bank is the Lines of Credit (LOCs) extended to overseas financial institutions, regional development banks, and foreign governments and their agencies in Africa.

As on 30 June, 2018, Africa's share in the total value of EXIM Bank's LOC programme stood at US$ 9.4 billion, which constituted 41% of the total LOC portfolio—of which around US$ 2 billion has been to the agricultural sector alone (EXIM Bank of India 2017). These have been provided to as many as 25 African countries for projects as varied as acquisition of tractors, harvesters, agricultural processing equipment, farm mechanization, setting up plantation projects and processing plants, development of sugar industry, procurement of design, supply, installation and commissioning of fuel storage facilities, irrigation network, commissioning of sugar processing facility, rice self-sufficiency programme;

[3] Hereinafter referred to as 'the Bank'.

including setting up of the agri-related institutions like the Mahatma Gandhi Institute of Technology and Biotechnology Park in Cote d'Ivoire.

The Bank, through its Overseas Investment Finance (OIF) programme (non-concessional credit) has also been supporting investments abroad, including in the African region. In the field of agriculture, it has facilitated investment by many Indian companies in Africa.

The Bank also has a strong research and analysis capabilities to undertake studies on specific sectors/sub-sectors, countries/regions, and on international trade-related subjects. It has published more than 165 Occasional Papers, over 30 Working Papers on a variety of topics. Apart from research, it also publishes a quarterly newsletter—the 'Export Advantage', which provides information on export opportunities, and highlights developments that have a bearing on international trade and investments. In addition, the 'Agri-Export Advantage', a bi-monthly newsletter is also published in English and eleven other Indian languages and provides information on export markets, agri-products, case studies, organic farming and events. The Bank also provides marketing advisory services to cater to the growing needs of firms, particularly in the Micro, Small and Medium Enterprises (MSME) sector.

The EXIM Bank of India is uniquely placed as a key financial institution, with experience as an actual practitioner, to synthesize the needs of a newly industrialized economy with contemporary experience from developing and developed countries. It has been engaged by many developing countries in creating new institutions as well as for capacity building of the existing institutions. The Bank is a partner to the International Trade Centre (ITC), Geneva and Department for International Development (DfId),[4] UK, to enhance exports from East Africa (Ethiopia Kenya, Tanzania, Rwanda, and Uganda) to India, under the Supporting Indian Trade and Investment for Africa (SITA) Project. This could be very well achieved by encouraging Indian investments into Africa in exchange for a host of benefits. This exchange will be advantageous in the following ways:

[4] Merged with the Foreign and Commonwealth Office to form the Foreign, Commonwealth and Development Office as of 2020.

- Expertise and technology from India will play a crucial role in improving the skills and capacities of businesses and institutions in Africa and transfer knowledge;
- African companies will gain greater access to the Indian market; and
- Increase the competitiveness of East African companies, and improves the business environment, and thus pave the way for a greater flow of goods and services between Africa and India.

India-Africa Agriculture Cooperation: The Way Forward

The poor presence of Indian agribusiness entrepreneurs is largely due to a lack of understanding of the available opportunities in the region. This requires awareness building and publicity exercises. The entry of large Indian businesses into this region will encourage and stimulate many players from India including small and medium enterprises to explore opportunities in this continent. Public Sector Undertakings (PSUs) should also be encouraged to lead by joining hands with the private sector companies, on commercial principles. There should be sufficient leverage and freedom for Indian corporations (PSUs or private corporations) determined by global market forces, which in turn are influenced by demand and supply, and not necessarily on Indian markets. It should also be kept in mind that India's presence in the African agriculture sector may lead to other spin-offs as well. These could include the possibility of exporting tractors, agri-implements, irrigation systems, seeds, etc. It is also important to project Indian participation with the objective of creating 'Brand India', as has been the case of the Indian information technology (IT) sector. Generating local employment should be a priority in India's participation in the African agriculture transformation.

Agricultural investments are generally of long gestation and so are the funding requirements. Many interested players may not have significant experiences in overseas agricultural activities, while for others, raising resources and risk mitigation may be a difficult task. Funding for development of the African agriculture by India could be undertaken through a two-pronged approach. The first could be towards creating the necessary agri-infrastructure, and the second approach could entail catalyzing cultivation through inter alia, the supply of requisite inputs and agriculture implements. Thus, the appropriate needs of agriculture in Africa could be

taken into consideration while at the same time, addressing the challenges inherent in the African agricultural segment.

Support Towards Creating Agri-Infrastructure

Most of the African nations have huge tracts of cultivable land; however, these do not have adequate infrastructure like connecting roads, transportation networks, power transmission, communication channels and irrigation canals (Transport & ICT 2016). Firms that are interested in undertaking cultivation activities in Africa need to make huge upfront investments for creating such agri-infrastructure, to make the available tracts of land cultivable. Such investments have a significant impact on the commercial viability of agriculture operations. The firms are reluctant to undertake such huge upfront investments due to paucity of funds and high investment risks.

While the investment funds from the domestic private sector are not likely to come up in many African countries, the governments in African nations look at external sources of funds to build such infrastructure. It is, in this context, proposed that the necessary funds could be sourced from India's development assistance scheme.

As has been explained in Fig. 14.1, the African nations could avail development assistance from India to create agri-infrastructure. The agricultural land supported by such eco-system could be leased to Indian firms for cultivation. This approach would mitigate the risks associated with upfront investments of the Indian investors. The annual lease rentals could serve as cash flow to service the debt.

Support Through a Dedicated India-Africa Agriculture Development Fund

The Government of India has been encouraging outward FDI in agriculture in Africa which would not only help Indian companies to purchase land abroad for cultivation but will also help serve the local communities by creating employment opportunities, enhancing productivity, thereby resulting in increased income generation for the local population. These efforts would help Africa in serving its objective of becoming a self-sufficient region in food production, while India is able to cater to its import needs.

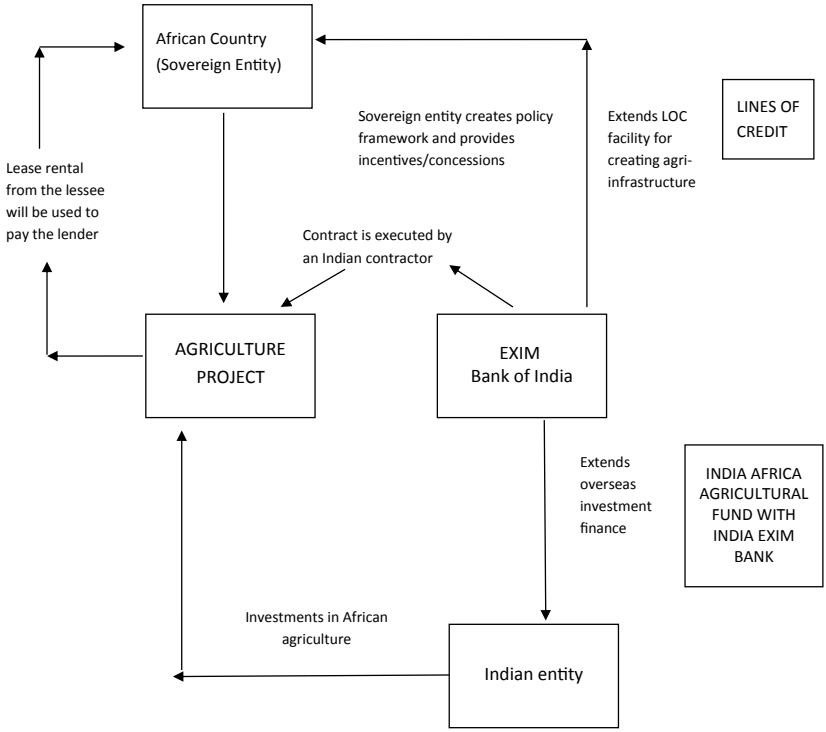

Fig. 14.1 Support towards creating agri-infrastructure (*Source* Author's compilation)

Indian investors would require funds to pay upfront lease rentals, besides sourcing of agri-inputs and implements. The funding requirements could be met by the EXIM Bank's Overseas Investment Finance programme. However, it is proposed to create a dedicated India-Africa Agriculture Development Fund to support the Indian investments in African agriculture sector.

This would entail setting in place an appropriate institutional mechanism for the management of this Fund. It is here that the role of the EXIM Bank, the country's apex export finance institution is significant, as it has been actively financing overseas direct investment through this flagship programme. The funds could be utilized to extend medium

to long-term foreign currency finance to Indian enterprises planning to invest in the African agriculture and allied sector.

Box 14.2 Win-Win situation for India-Africa Cooperation in Farm Investments

Better interventions

There exist significant gap in the potential and actual yields in Africa, which provides huge scope for further interventions.While investing in African soil, India will be bringing in better seeds and improved farm technology, apart from introducing successful models.

Utilising disguised unemployment, better remuneration

There is a significant amount of disguised unemployment in Africa, which if properly tapped could increase the earnings of the local populace, thereby providing better remunerations to those working in farms and generating better employment opportunities.

Realizing the 'Feed Africa' Objective

Increased yileds and utlisation of surplus land will significantly augment agricultural ouptput in Africa, helping it realize the 'Feed Africa' objective. Over time, the region would become a net exporter of food with some exports happening to India as well.

Arable land available

While India would like to expand its production base, Africa provides opportunity to utilise its vast tract of arable land which would be mutually beneficial from the point of view production, consumption, employment, and trade for both India and Africa.

(EXIM Bank of India 2019)

Conclusion

The African continent is one of the most important regions from the viewpoint of global food security. It has substantial arable land, almost half of the world's fertile unused land, but unfortunately it imports a large amount of agriculture produce to cater to the food requirements of the region. The agriculture productivity in Africa is relatively low (little more than a half of the world's average productivity) as the farmers are largely engaged in subsistence farming rather than intensive farming. Further, the number of undernourished peoples is expected to reach 320 million in 2025 if there are no serious interventions in place. In fact, Africa remains

the continent with the highest Prevalence of Undernourishment (PoU), that affects almost 21% of the population (FAO 2018).

The Feed Africa project of the African Development Group envisages lifting 320 million people out of undernourishment by 2025. In addition, 130 million people are expected to be lifted out of extreme poverty, simultaneously. The programme also hopes that Africa will turn into a net exporter of agricultural commodities and be able to substitute US$110 billion worth of imports. However, to achieve that the continent will have to apply multiple strategies which would focus on productivity enhancement, investment in agriculture R&D, development of agri-logistics and technological collaboration (EXIM Bank of India 2017: p. 23).

India's economy is almost the same size as that of the African continent and her population is just a little over the number of people residing in Africa. It may be noted that India, soon after independence was majorly a food importing country and depended on schemes such as PL-480, to meet her food requirements. However, in the 1960s, with the introduction of high-yielding variety seeds in the Indian agricultural space, the country soon achieved its objective of self-sufficiency in food production except for a few essential commodities such as pulses and oilseeds. India produces the required tonnage of cereals and has an export surplus overall, but its demand for pulses and oilseeds has been largely met through imports, including from Africa.

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CHAPTER 15

The Impact of India's Lines of Credit on the Future of India-Africa Partnership in Agriculture

Karin Costa Vazquez and Vyshali Kottam

Abstract Despite its abundant resources, the African continent still lags behind the rest of the world in terms of agricultural output and productivity, and remains one of the most food-insecure regions worldwide. By sharing its development experience, India can help transform Africa's agricultural landscape. Agriculture has become a key area of India-Africa partnership with the Lines of Credit (LOC) issued by the EXIM Bank of India as one of its main pillars. Indian LOCs have helped build infrastructure and add value to agriculture and allied sectors across 29 African

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countries. Yet, the widening gap between India's commitment and actual disbursement of LOCs to Africa creates barriers to the full realization of mutual gains. At a time when India-Africa's engagement is scaling new heights, this paper examines the challenges ahead Indian LOCs and their likely implications on the future of India-Africa partnership in agriculture.

Keywords Lines of Credit · India · Africa · Development finance · South-South cooperation · Agricultural development

Introduction

Africa is one of the most food-insecure regions in the world. Approximately, 57% of Africa's population live in rural areas and depend on agriculture for their livelihood (UN DESA 2018). This number is projected to increase by 63% in the next decades, placing Africa as the only region where rural population will continue to grow after 2050. Though food accounts for two-thirds of the household budget, agriculture contributes to less than one-third of Africa's GDP (Veras 2017). The large number of smallholder farmers cultivating low-yield staple food; the limited availability of machines, irrigation systems, fertilizers, pesticides, supporting value chains; and the dependency on rainwater are some of the causes for the low profile of the agricultural sector in the African economy (NEPAD 2013). In order to cope with these challenges, Africa's annual expenditure with food imports is expected to rise from US$ 35 billion to US$ 110 billion by 2025 (Ojukwu 2016). More recently, erratic weather conditions and climate change have made African agriculture even more vulnerable, pushing millions of Africans into hunger and starvation (EXIM Bank 2017a).

Africa's untapped agricultural potential can turn the region into an agribusiness powerhouse and food provider for the rising world population (Veras 2017). With over 65% of world's arable land, Africa's agricultural landscape serves as an investment destination with promising growth potential in areas like value addition and processing of agricultural commodities (EXIM Bank 2017b). Initiatives such as the Comprehensive

Africa Agriculture Development Programme,[1] the African Union's 2014 Year of Agricultural Transformation and Food Security in Africa, and the African Development Bank's 'Feed Africa' programme further indicate the growing importance of the African agricultural sector to the continent and the world (Johm et al. 2016).

India has made significant strides in agricultural production since the introduction of high-yield variety seeds and advanced agricultural technologies during its Green Revolution. Despite the relatively lower success of the Green Revolution in less irrigated areas and places where government subsidy to essentials of the agricultural supply chain was limited, the country still has valuable lessons to share with Africa (Modi et al. 2018). These lessons include strategies for augmenting Africa's agricultural output through low-cost technology solutions, capacity-building, and improved agricultural machinery (AfDB 2017). It is in this context that agriculture has become central to India-Africa partnership. Indian Lines of Credit (LOCs) have been instrumental in this process by financing infrastructure development and adding value to agriculture and allied sectors across Africa. Yet, challenges in both India and Africa have widened the gap between commitment and actual disbursement of Indian LOCs to the continent, posing barriers to the full realization of mutual gains.[2]

At a time when India-Africa partnership is scaling new heights, this paper examines the role of the EXIM Bank of India's LOCs in supporting agricultural development in the African continent. It investigates the causes behind the widening gap between commitment and disbursement of India's credit to agriculture and allied sectors in Africa between 2004

[1] Comprehensive Africa Agriculture Development Programme (CAADP) is a continental framework for the acceleration of agricultural growth, poverty reduction, and achieving food and nutrition security. It is based on four pillars of intervention, namely:

- Pillar I. Extending the area under sustainable land management and reliable water control systems
- Pillar II. Improving rural infrastructure and trade-related capacities for market access
- Pillar III. Increasing food supply, reducing hunger, and improving responses to food emergency crises
- Pillar IV. Improving agriculture research and technology dissemination and adoption (NEPAD 2009: p. 8).

[2] The challenges to the full realization of Indian LOCs to Africa are discussed in detail in the latter sections.

and 2017, and the implications that such a gap may have on the future of India-Africa partnership.

India-Africa Partnership in Agriculture

In the 1960s, famine outbreaks in Eastern India revealed the country's dependency on food imports and how the then prevailing agricultural model was no longer a viable option. Since then, India has taken bold steps towards food security, including through state-led investments in research and development, the introduction of high-yielding variety seeds, and the use of advanced agricultural technology to increase production and productivity. The Green Revolution allowed India to become an agricultural powerhouse and a lead producer of staples like rice, wheat, cotton, sugarcane, vegetables and tea worldwide (Chakrabarty and Mishra 2016; Modi et al. 2018). The introduction of the Public Distribution Scheme (PDS) further allowed Indian families below the poverty line to access food grains at subsidized prices (Modi et al. 2018). These experiences, coupled with similar agroecological conditions and smallholder-based farming systems, could inspire policies to increase agricultural production and productivity as well as access to food across the African continent (Chakrabarty and Mishra 2016).

Against this backdrop, agricultural cooperation was placed at the core of the three India-Africa Forum Summits (IAFS) held in 2008, 2011 and 2015. The IAFS I and IAFS II Forum Summits prioritized agricultural cooperation at various levels, including capacity building, technology transfer, agricultural education and research and development (Ayyappan 2015). At the second India-Africa Forum Summit, India and participating African countries committed to cooperate to increase agricultural output and halve the proportion of people who suffer from hunger and undernutrition (Ayyappan 2015). They also agreed to collaborate in the implementation of the Comprehensive Africa Agriculture Development Programme to ensure food security and to make food affordable for all (MEA 2011).

India and Africa reiterated their commitment towards agriculture at IAFS III by pledging to improve farming techniques through affordable technology and crop varieties, to provide access to irrigation facilities, and to promote investments in agri-business and agro-processing industries (MEA 2015a). The third Summit took agricultural cooperation to

a higher level by establishing a US$ 100 million India-Africa Development Fund and underscoring the need for partnerships to accelerate the Green[3] and the Blue Revolutions.[4] The resulting 'Delhi Declaration 2015' and the 'India-Africa Framework for Cooperation' outlined a multifaceted strategy to allow dovetailing of India's growth story with Africa's Agenda 2063 and to spur mutual benefits (MEA 2015a). It is within this context that India's LOCs became an important tool to finance India-Africa cooperation in agriculture and allied sectors.

The Role of LOCs in India-Africa Agricultural Partnership

Indian LOCs are coordinated by the Development Partnership Administration (DPA-I) at the Ministry of External Affairs and handled by the EXIM Bank of India. They consist of a long-term loan extended to overseas financial institutions, regional development banks, sovereign governments and other entities to enable buyers to import development and infrastructure projects, equipment, goods and services from India on deferred credit terms (MEA 2015b). The interest rate differential on these concessional loans is borne by the Government of India. Indian LOCs have financed agriculture-related infrastructure as well as capacity development projects in Africa (Fiscal Year 2004–2005 to 2016–2017).

India-Africa cooperation in agriculture and India's LOCs to Africa, in particular, has not been without challenges. The IAFS narrative of a mutually beneficial partnership is supposed to legitimize India's economic interests in the continent. This is clear in the Federation of Indian Chambers of Commerce and Industry (FICCI) report 'India-Africa Partnership in Agriculture: Current and Future Prospects', which highlights Africa's untapped potential as a market for Indian technologies and machinery in agriculture, agro-processing, agribusiness and other allied sectors. LOCs can help Indian businesses not only to access African markets and natural resources, but also consolidate and expand their presence in the region

[3] The Green Revolution refers to a series of research, development, and technology transfer initiatives, occurring between 1943 and the late 1970s that increased industrialized agriculture production in India. However, the yield increase has also occurred worldwide (Ameen and Raza 2018: p. 129).

[4] The Blue Revolution refers to the optimum utilization of the oceans and water bodies to harness the marine resources for enhancing food and nutrition security (MEA 2015b).

(FICCI 2016; EXIM Bank 2017b). Such a trade pattern, however, is criticized for reproducing colonial practices and perpetuating the structural conditions that have led Africa to poverty and conflict in the past (Aneja 2015).

The IAFS narrative is also criticized for being a pillar of India's soft power strategy to establish itself as a leader of the developing world, particularly with respect to China, with little commitment to African development (Aneja 2015). Indeed, evidence of the impact of India's LOCs on African development remains limited. Indian agribusiness firms procured in projects funded through LOCs are suspect of evading taxes, violating local environmental regulations, land-grabbing, and displacing local populations while bureaucracy in both India and African countries has resulted in delayed funds disbursement and project execution. These challenges will be discussed in the next sections.

What is reasonable to contend, however, is that concessional finance, mainly LOCs, have become an important instrument of India's development cooperation. Concessional finance has been used to fund initiatives under the India Development and Economic Assistance Scheme (IDEAS), which aims to share India's development experience through capacity building, skills and technology transfer, trade, and infrastructure development (EXIM Bank 2016). The EXIM Bank of India's 'Focus Africa' policy also uses concessional finance to deepen ties with countries in the continent (Mawdsley and McCann 2011).

Africa's share within total Indian LOCs went from 35% in 2004 to 55% in 2019 (EXIM Bank 2015). India's LOCs extended towards African agriculture and allied sectors are also on the rise. Between 2004 and 2019, over US$ 2.6 billion LOCs were extended to 51 projects in agriculture and allied sectors in 30 countries across Africa (see Table 15.1).

Peaks in India's LOCs extended towards African countries (for projects in all sectors as well as in agriculture and allied sectors) can be observed around the years 2007, 2012 and 2015, coinciding with IAFS I, II and III (see Fig. 15.1). Data on Indian LOCs approved in 2017–2018 and 2018–2019 further indicate that a new peak is in the horizon with the upcoming IAFS IV after 2020 (see Fig. 15.1). These numbers suggest that LOCs have been integral to India-Africa cooperation in agriculture. In 2019, 44 (27%) from the 162 operating Lines of Credit towards Africa are in the agriculture and allied sectors (EXIM Bank 2015).

Table 15.1 EXIM Bank of India's LOCs extended/disbursed to agriculture and allied sectors in Africa (Fiscal Year 2004–2005 to 2018–2019)

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Angola	Setting up a textile project (cotton ginning & spinning)	15	12.44	2009–2010	2010
Benin	(A) Railway equipment (US$ 10.25 million), (B) Agricultural equipment (US$ 4.25 million) and (C) Feasibility study for setting up a cyber city (US$ 0.50 million)	15	14.93	2009–2010	2009
	Tractor assembly plant and farm equipment manufacturing unit	15	14.88	2012–2013	2012
Burkina Faso	Agricultural projects including acquisition of tractors, harvesters, agricultural processing equipment	30	29.42	2005–2006	2005
Burundi	Farm mechanization	4.22	0	2012–2013	2014
	Preparation of detailed project report for an integrated food processing complex in Burundi	0.17	0	2012–2013	2014

(continued)

Table 15.1 (continued)

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Cameroon	(i) Maize farm plantation projects (US$ 18.77 million), (ii) Rice Farm Plantation Projects (US$ 18.88 million)	37.65	37.46	2008–2009	2009
	Cassava plantation project	42	0	2011–2012	2012
Chad	Cotton yarn plant, bicycle plant, Industrial transport equipment and rolling plant mill, agro-processing plants for tomato and mango and Irrigation equipment	50	49.98	2005–2006	2005
	For financing extension of spinning mill [addition of weaving and processing capacities]	15.90	14.64	2011–2012	2012
Côte d'Ivoire	Renewal of urban transport system and for agricultural projects in the field of vegetable oil extraction, fruits and vegetable chips production, production of cocoa, coffee	26.80	26.7	2005–2006	2005

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
	(i) Mahatma Gandhi IT and Biotechnology Park, (ii) Fisheries Processing Plant and (iii) Coconut fibre processing plant	25.5	10.68	2007–2008	2008
	Rice production programme	30	17.98	2009–2010	2010
D. R. Congo	Installation of hand pumps and submersible pumps	25	24.99	2009–2010	2009
Eritrea	Multipurpose agricultural projects and educational projects	20	19.95	2009–2010	2009
Ethiopia	Development of sugar industry (total from 2007–2012)	639.54	517.94	2007–2008	2007
Gambia	Supply of tractors by Mahindra and Mahindra	6.7	5.83	2005–2006	2005
Ghana	Rural electrification, agricultural and transportation projects	27	26.92	2004–2005	2005
	Foreign Policy Training Institution, railway corridors and agro-processing plant	25	20.96	2007–2008	2008

(continued)

Table 15.1 (continued)

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
	(i) Improved fish harvesting and fish processing project and (ii) Waste management equipment and management support project	21.72	18.58	2008–2009	2010
	Sugar plant	35	35	2011–2012	2012
	Sugarcane development and irrigation project	24.54	0	2014–2015	2016
	Strengthening of Agriculture Mechanization Services Centres	150	0	2014–2015	2019
Guinea Bissau	Electricity project, mango juice and tomato paste processing unit and purchase of tractors and water pumps for development of the agricultural sector	25	22.77	2005–2006	2007
Kenya	Agriculture Mechanization project	100	0	2015–2016	2017
Lesotho	General purpose: Contracts approved include export of pump sets, consultancy services and irrigation equipment	5.00	4.97	2003–2004	2004

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Madagascar	Project for rice productivity and project for fertilizer production	25	25	2008–2009	2008
	Completion of unfinished fertilizer plant project	2.5 0	0	2016–2017	2017
Malawi	Supply of irrigation, storage, tobacco threshing plant and one village one project	30	29.99	2007–2008	2008
	Cotton Processing Facilities, Green Belt Initiative and One Village One Product Project	50	49.84	2010–2011	2011
	Irrigation Network and Sugar processing equipment and fuel storage facility	76.5	76.49	2011–2012	2012
Mali	Rural electrification and setting up of agro machinery and tractor assembly plant	27	27	2005–2006	2005
	Agriculture and food processing projects	15	14.41	2009–2010	2009
Mauritania	Potable water project (US$ 4.896 million) and Milk Processing Plant (US$ 11.30 million)	21.8	13.31	2009–2010	2009

(continued)

Table 15.1 (continued)

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Mozambique	Enhancing productivity of rice, wheat, maize cultivation	20	17.69	2010–2011	2011
	(*)Construction of borewells with hand pumps and Small Water Systems	38	N/A (*)	2017–2018	2019
Niger	Buses, automobiles, flour mills and motor pumps.	17	17	2005–2006	2006
Rwanda	(i) Export Targeted Modern Irrigated Agricultural Project (US$ 60.22 million); and (ii) Extension of Export Targeted Modern Irrigated Agricultural Project (US$ 59.83 million)	120.05	5.20	2013–2014	2013
	(*) Three Agriculture Project Schemes i.e. (i) Warufu Multipurpose Irrigation Project, (ii) Mugesera Irrigation Project, and (iii) Nyamukana Irrigation Project	100	N/A (*)	2018–2019	2018

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Senegal	Development of rural SME and purchase of agricultural machinery and equipment	15	14.99	2004–2005	2004
	Irrigation Project	27	27	2005–2006	2006
	Supply of 70 multipurpose oil presses, 70 mini bakeries and 70 cereal and fruit processing units for women poverty alleviation and supply of 320 pickup vehicles and 80 station wagons for support of decentralized administration.	11	11	2006–2007	2007
	Rural electrification project and Fishing Industry Development Project	25	25	2008–2009	2008
	Fisheries Development Project	19	0	2011–2012	2012
	Setting up a Modern Abattoir, Meat Processing, Cold Storage, Rendering and Tannery Plant and Market Place	41.96	0	2012–2013	2013
	Rice Self Sufficiency programme	62.95	9.76	2014–2015	2014

(continued)

Table 15.1 (continued)

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
Sierra Leone	Procurement of tractors and connected implements, harvesters, rice threshers, rice mills, maize shellers and pesticide spray equipment	15	14.62	2008–2009	2008
	Irrigation Development in Tomabum	30	0	2013–2014	Not yet signed
Sudan	Supply of agricultural inputs for the Sudanese Agricultural Bank, technical and laboratory equipment to Higher Educational Institutions, scientific equipment for Ministry of Science and Technology, solar electrification & meeting requirements of Sudan Railways	48	46.62	2006–2007	2007
	Singa-Gedarif Transmission line extension to Galabat, micro-industrial projects and development of livestock production and services	52	35.57	2007–2008	2007

Country	*Purpose*	*Amount of credit (US$ million)*	*Disbursement by India's EXIM Bank (US$ million)*	*Year of approval*	*Year of signing*
	Mashkour (earlier Elduem) Sugar Project at White Nile State (1st tranche of US$ 150 million)	25	23.46	2007–2008	2009
	Mashkour sugar project (2nd tranche of US$ 150 million)	125	0	2012–2013	2013
Swaziland	Agricultural Development and Mechanization of Agriculture	37.90	34.29	2011–2012	2012
Tanzania	Export of tractors, pumps and equipment	40	40	2007–2008	2009
Togo	Farming and cultivation of rice, maize and sorghum	13.10	12.54	2011–2012	2012
Uganda	(*)Development of Infrastructure for Agriculture and Dairy sector	64.5	N/A (*)	2018–2019	Not yet signed
Zambia	Agricultural mechanization	40	0	2015–2016	Not yet signed
	Total	2647	1497.8		

Source Authors' calculations, based on EXIM Bank of India database

*When the research was conducted in 2018, the EXIM Bank of India website contained the amounts of LOCs extended and disbursed until FY 2016–2017. When the review and update of the research was conducted in 2019, the same website only contained the amounts of LOCs extended until FY 2018–2019. The author opted to limit the analysis of Indian LOCs up to FY 2016–2017 in order to work with the complete dataset (amounts of LOCs extended and disbursed).

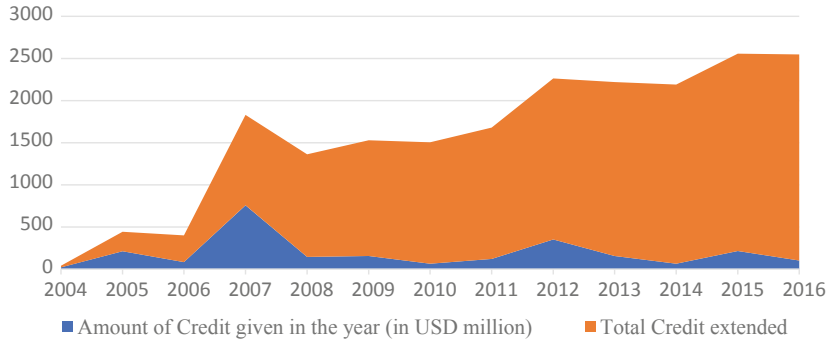

Fig. 15.1 Amount of credit given by the EXIM Bank of India to Africa (all sectors) x Total credit extended by the EXIM Bank of India to Africa (agriculture and allied sectors) (Fiscal year 2004–2005 to 2016–2017) (*Source* Authors' calculations based on EXIM Bank of India database)

The impact of India's LOCs on agriculture development in Africa has been mixed. In Senegal, India's LOCs have helped develop agriculture-related infrastructure and local capacities leading to enhanced productivity and local population's access to food. In 2006, the Ministry of Agriculture signed a contract to install 2394 pump sets and accessories like pipes, trolleys, hoses, pontoons and valves financed through an Indian soft loan. The US$ 27 million-value machinery was procured to irrigate 65,000 hectares of farmland across the northern provinces of Dagana, Podor, Matam and Bakel and to rehabilitate the Grandik pumping station in Saint-Louis. Two years later, Senegal harvested over 60,000 tonnes of paddies in the first-ever dry season harvest, partly due to the improved irrigation system. By 2011, this figure rose tenfold to over 760,000 tonnes of rice (Modi 2013). Approximately 50% of the rice demand in the Northern part of the country is now met by local production as opposed to 19% in 2006. The irrigation system helped reduce Senegal's import bill by 31% and was found to be more economical than earlier pumps, with lower running and maintenance costs (EXIM Bank 2017a).

In Mali, Ethiopia and Mozambique, however, evidence of India's LOC contribution to improving local population's access to food is either uncertain or non-existent. In Mali, India's LOCs financed the construction of a plant for agricultural machinery, which helped increase the availability of low-cost 'made in Mali' tractors and in turn, reduce the

country's dependency on imported machines and equipment. Dubbed as the 'state-of-the-art' tractor assembly plant in West Africa, it helped increase agricultural production and productivity by 30% (EXIM Bank 2017b). However, there is no evidence of Indian LOCs contribution to improve the local population's access to food.

In Ethiopia, a US$ 640 million Indian LOC financed the construction of the Wonji/Shoa, Fincha and Tendaho sugar factories. According to Ambassador Gennet Zewide, the country used to be a net importer of sugar. On completion of the projects, the three sugar plants increased production capacity to 93 million cubic litres of ethanol, created more than 81,000 jobs, and generated economic gains worth US$ 966.65 million per year (Kumar 2015). In Mozambique, India's LOCs helped the country build a new agro-processing industry and become an exporter of non-traditional staples such as raw cotton and nuts. According to the Minister of Foreign Affairs, José Pacheco, India's LOCs helped increase Mozambican export of pulses without imposing priorities or conditions on the partner country (ORF 2014). Although Indian LOCs allowed Ethiopia and Mozambique to transition from a net importer to a net exporter of sugar and pulses respectively, they contributed very little towards the improvement of food security of local farmers (Aneja 2015).

The Increasing Gap Between Commitment and Disbursement of India's LOCs to Agriculture and Allied Sectors in Africa

India's LOCs have been lauded for fostering mutually beneficial relationships with borrowing countries, yet they are plagued with challenges. One major challenge has been the widening gap between commitment and disbursement of India's concessional credits (Samuel and George 2016). In 2015, India announced a US$ 2 billion LOC to Bangladesh to finance social and infrastructure development projects.[5] Almost one year later, the EXIM Bank of India had approved only four of the eight projects submitted by Bangladesh's Economic Relations Division (Jacob 2017). In April 2017, India announced a US$ 4.5 billion LOC—the biggest offered by India to any country at one go—taking India's total LOC to

[5] The projects span a variety of sectors like power, railways, road transportation, information and communication technology, shipping, health and technical education.

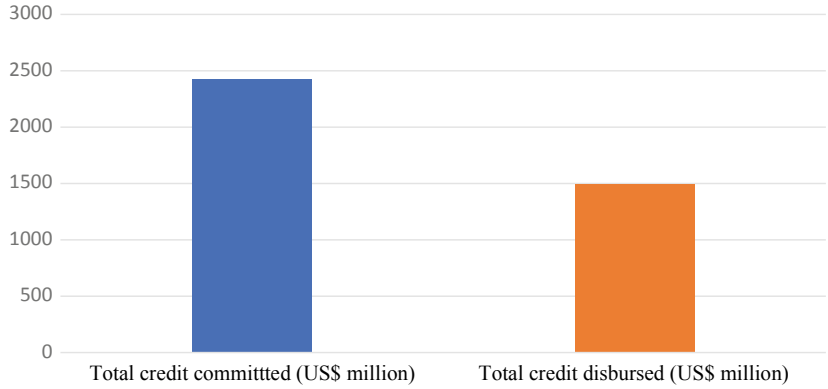

Fig. 15.2 Total credit committed and disbursed by the EXIM Bank of India to the agriculture and allied sectors in Africa (Fiscal Year 2004–2005 to 2016–2017) *Source* Authors' calculations based on EXIM Bank database

Bangladesh to US$ 7.8 billion. However, only 4.5% (US$ 356.56) of it had been disbursed (EXIM Bank 2016).

The case of India's LOCs to Africa is not different. Even though the total credit that India committed to African countries between 2004 and 2017 is close to US$ 9.1 billion, only US$ 3.8 billion had been disbursed, as of 2017 (EXIM Bank 2016). This indicates that only 42% disbursal actually took place. Between 2004 and 2017, 26% (US$ 2.4 billion) of the total credit extended to Africa was committed towards agriculture and allied sectors in 29 African countries. However, only 39% of the amount committed (US$ 1.497.8 million) had been disbursed as of 2017 (see Fig. 15.2).

The gap between credit committed and disbursed by the EXIM Bank of India to agriculture and allied sectors in Africa was already evident in 2007 and became chronic after 2011—when it started to widen, until it peaked in 2015 (see Fig. 15.3).

The Widening Gap Between Commitment and Disbursement of LOCs

The widening gap between commitment and disbursement of India's LOCs is symptomatic of the multiple issues that affect the implementation of LOCs in India and the borrowing country. From the 57 LOCs extended to agriculture projects in Africa between 2004 and 2019, 13

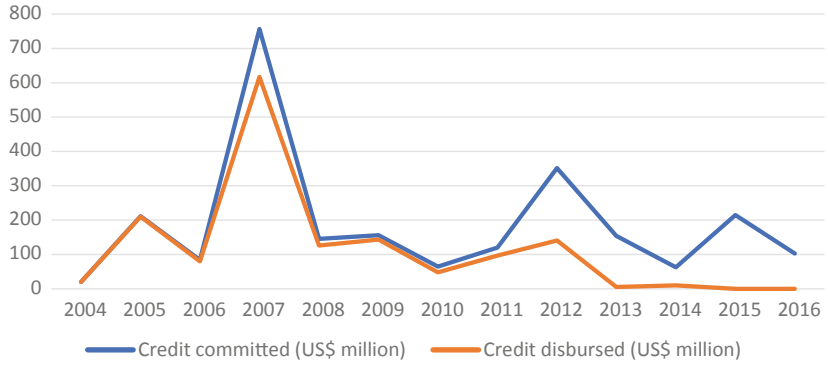

Fig. 15.3 Widening gap between credit committed and disbursed by the EXIM Bank of India to agriculture and allied sectors in Africa by year (Fiscal Year 2004–2005 to 2016–2017) (*Source* Authors' calculations based on EXIM Bank 2016)

(22%) were signed after one or more years of approval of the credit (see Table 15.1). Furthermore, the delays during project validation and implementation have not been captured by this data.

In India, the primary reason for this gap is inherent in the structure of the LOCs. The EXIM Bank of India requires that 75% of project goods and services are sourced from India. Despite requests for relaxation from borrowing countries, this is limited up to an additional 10% (EXIM Bank 2020). Moreover, negotiations can create delays for the approval and implementation of LOCs. A review of India's approach to LOCs also noted that the Engineering, Procurement and Construction (EPC) companies selected to deliver project-related goods and services usually view projects as one-time engagements and tend to exit them as soon as it is completed. There is little commitment from these companies to deliver projects on time or to ensure their long-term sustainability, further explaining the delays in implementation of several projects and in the gap in disbursement of LOCs (Kumar 2015: p. 23).

India has also downplayed the risks associated with investing in non-democratic or conflict-affected countries. Taraporevala and Mullen estimate that approximately 60% of India's LOCs in 2014 were routed through countries with authoritarian regimes, limited civil liberties and political participation. The potential scope for uprisings and regime

changes in many of these countries is high and yet India did not account for the associated risks, which eventually lead to potential loan delays and even defaulting (Taraporevala and Mullen 2014).

Indian LOCs have also been plagued by the lack of capacity and/or sectoral competence of public and private Indian companies. Preliminary exploration indicates that Indian companies that have taken up LOCs tend to have very little visibility in India and no specific core competence to deliver on their bid under the LOC. As a result, these companies outsource most of the work, a process that creates further delays and higher overhead costs (Kumar 2015). Examples include the construction of the Wonji/Shoa plant in Ethiopia, which was awarded to the Uttar Pradesh based company called Uttam Sucrotech International Ltd. The plant was completed in December 2013, with more than one-year delay. Another Ethiopian project, the Fincha plant, was undertaken by the Mumbai-based company Overseas Infrastructure Alliance (OIA). The company received US$ 132 million, of the US$ 640 million LOC, but the closure of the project was delayed by more than two years. In 2008, the contract for the construction of the Tendaho plant was also awarded to OIA, two years after the beginning of the Fincha project (Sugar Corporation 2019). The first phase of the Tendaho plant was subject to multiple delays resulting from information gaps and coordination failures in project implementation (Kumar 2015: p. 17). Trial production began in 2014, however, the factory was idle until 2017, due to shortage of sugarcane (Voice of Africa 2019).

Structural issues, coupled with the overall lack of commitment of the awarded Indian companies to serve the interest of the borrowing country, are a recipe for disaster. Instead, these projects should be seen as an opportunity for Indian companies to establish a long-term presence in the borrowing country; for the Indian government to access new markets for its goods and services; and for the borrowing country to benefit in a more sustainable way (Kumar 2015).

The DPA-I has been trying to streamline the completion of projects under LOCs and prevent contracts from being awarded to only a handful of Indian firms through close monitoring and evaluation of contracts (EXIM Bank 2015). This is particularly true for the LOCs extended to Africa.[6] Between 2004–2014, one single Indian firm, the Delhi-based

[6] Interviews conducted with Indian and African government representatives between June–September 2018.

Angelique International Ltd., was awarded 62 out of the 510 projects awarded under Indian LOCs, in the same period. This represents 16.8% (US$ 1.22 billion) of the total contracts (worth US$ 7.3 billion). Besides Angelique International Ltd., three other companies—Overseas Infrastructure Alliance, Lucky Exports and Jaguar Overseas—had altogether 110 approved projects in 2015 (Iyer 2015; Mitra 2017).

From the perspective of the African countries, poor accessibility, difficult site conditions, weak governance, and administrative and procedural issues are some of the main challenges faced during the implementation of LOCs. Project proposals often include outdated, rehashed Detailed Project Reports (DPRs) and feasibility reports prepared by aid consultants or agencies hoping to receive the finalized contract themselves (Saxena 2016). According to an African government representative, 'we realized that the success of the project depends on a good DPR. When you do not have a good DPR or it is vague or not a detailed one, then the project would be delayed and have cost overruns'.[7]

The hand-holding of agencies and companies by the Indian government during the project identification and formulation phase has proven to be unsuccessful. The creation of a dedicated Project Preparation Facility (PPF) to assign and send experts to handhold for project preparation is still in the pipeline. The lack of capacity to guide the procurement of the execution agency also causes delays and other inefficiencies, like tweaking project specifications to benefit certain private sector contractors (Singh 2018).

Borrowing countries are also plagued with structural supply issues, including their own companies' limited capacity to carry out the projects. The LOCs usually stipulate that the implementing partner should select an Indian project implementing firm, while the sub-contracting firms can be a locally hired. However, the selection of the sub-contractors can become an extremely difficult task due to asymmetric and often limited information. In the case of the Ethiopian sugar industry, more than 18 companies participated in the process. The selection involved division of tasks across several companies with one appointed as the Engineering, Procurement and Construction (EPC) bidder. This kind of 'clubbing' of two or more companies led by one EPC bidder was difficult to manage, and the dispute between the bidder and its sub-contractors was taken to

[7] Interviews conducted with an African government representative between June–September 2018.

the Indian court. The responsible Ethiopian government department was compelled to visit the EXIM Bank of India headquarters after the Bank stopped releasing money against the LOC commitments (Kumar 2015).

In Mozambique, a US$ 20 million LOC was extended to support a scheme intended to enhance productivity and ensure food security in rice, wheat and maize cultivation. This project should have started in 2011, but in 2013, it was found that the selected EPC bidder was still grappling with initial planning. There was no involvement from either the Indian Council of Agricultural Research (ICAR) or any other Indian agriculture research institution—which caused considerable delays to the project (Chaturvedi 2016).

Internal turmoil, particularly political in nature, also constrains the ability of the borrowing country to repay the loan. For example, Sudan has been unable to honour payments to India since South Sudan's secession in 2011. The default has triggered interest penalties and caused setbacks to the financial health of the overall portfolio (Saxena 2016). The EXIM Bank of India had to capitalize interest to the tune of US$ 45 million under operative LOCs for change in terms of the existing LOCs.[8]

Borrowing countries are also said to resort to bargaining for the conditionalities. Resource-rich countries, in particular, often play India and China against each other, sometimes even after the conclusion of documentation and negotiations, to relax terms and waive conditions (Saxena 2016). Chinese and Indian investments in Africa indeed create reasonable speculation around the idea that the two countries are in a race to extend their sphere of influence into the continent. Prime Minister Narendra Modi toured Rwanda and Uganda ahead of attending the 10th BRICS Summit in Johannesburg in 2018, which was right after the four-nation Africa tour of the Chinese President, Xi Jinping's visit. During the Africa tour, Modi extended two lines of credit worth US$ 141 million and US$ 64 million for electricity lines, agriculture and dairy production. He also extended a US$ 200 million credit line to Rwanda.

The key difference between New Delhi and Beijing's engagement in Africa is the availability of financial resources. With its deep pockets, China seems to have been an obvious choice for African leaders, at times with the inherent problem of accumulation of debt. From 2000 to 2014, China spent US$ 350 billion on various forms of financial assistance to

[8] As indicated in EXIM Bank of India's database statistics.

developing countries, making it one of the world's largest contributors, particularly to Africa (Vazquez and Dwivedi 2018).

Implications of the Gap Between Commitment and Disbursement of India's LOCs to Africa

The issues affecting the implementation of Indian LOCs have widespread economic, political and financial implications. The overall lack of companies' capacities, coupled with administrative and procedural hurdles often result in project delays and increased costs. This further constrains the borrowing country's repayment ability and India's own financing muscle.

Since IAFS-III (2015), the Indian government has been proactive in terms of trying to close the chasm between commitment and disbursement of LOCs. As of February 2020, the gap had already been reduced from over 40% to less than 20% (EXIM Bank 2020). The adoption of new guidelines in 2015 has put in place more stringent pre-qualification processes for bidding companies (Singh 2018; EXIM Bank 2015).

Nevertheless, continued defaulting and excessive bargaining for relaxation of conditionalities could reduce LOCs predictability. Even though LOCs are guaranteed by the African governments and counter-guaranteed by the Indian government, invoking guarantees could further create a dangerous precedent to future lending. Financial instability could also affect Indian and African imports and exports, leading to a fall in domestic economic growth, an increase in the reliance of African countries on imports, and greater susceptibility to shocks in food supply. The challenges to the implementation of LOCs could also dent the goodwill and trust that the African countries have for India. This could potentially result in the loss of support for Indian-led initiatives and decisions at the United Nations, the International Court of Justice, the World Trade Organization and other international or multilateral bodies.

Besides the financial implications, these challenges may impact the sustainable development of the borrowing country and its people. In the absence of robust project guidelines, or poor implementation and delays by the private sector actors, development gains could be compromised (Samuel and George 2016).

Conclusion

One of the world's most food-insecure regions in the world, Africa, is now facing an agricultural conundrum. Although the majority of the African population is dependent on agriculture, the sector contributes to less than a third of the continent's GDP. The continent owns a vast resource base, yet growth potential in agricultural yield and productivity remains untapped. By sharing its development experience in agriculture and allied sectors, India can help transform Africa's agricultural landscape. It is in this context, that agriculture has emerged as a key area of cooperation between India and Africa.

LOCs have provided the much-needed support for a stronger India-Africa partnership in agriculture, as seen in the number of LOCs entended to the sector throughout the three India-Africa Forum Summits. LOCs have provided a large market for Indian exports and minimized the risks taken by Indian countries while doing business on the continent. They have also facilitated the access of African countries to cheaper technologies that best suit their context and requirements. Besides the relative success in increasing agricultural production and productivity, there are still a number of unanswered questions around the contribution of Indian LOCs towards improving the access of the local population to food. The development impact of Indian LOCs is therefore limited in terms of the targets set in the Comprehensive Africa Agriculture Development Programme (CAADP) and India's own experience of the Green Revolution.

LOCs are bound to grow in size and volume, further boosting agriculture in Africa and strengthening India's relations with the continent. In the run-up to IAFS IV, it is an opportune time to reflect on the reasons that constrain the efficient functioning of India's LOCs and make the necessary modifications and address the challenges facing the implementation of LOCs. If treated as a priority, LOCs could change the face of the African continent and strengthen India-Africa ties even further.

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CHAPTER 16

Development Finance: The IBSA Fund and Development Impact Bonds

Francisco Simplicio and Camila Amorim Jardim

Abstract Achieving the Sustainable Development Goals (SDGs) will demand a significant growth in the volume and effectiveness of development resources, mostly in Asia and Africa. In that regard, the India, Brazil and South Africa Facility for Poverty and Hunger Alleviation (IBSA Fund) and the concept of Development Impact Bonds (DIBs) are innovative multi-stakeholder initiatives of development cooperation. On the one hand, the IBSA Fund is a unique Southern initiative under the United Nations, constituting an institutional framework that allows for low cost and high impact projects. On the other hand, DIBs are projects in which the private sector gives the capital upfront and, in the case that the agreed upon impact is achieved, costs are paid back with interests by a donor agency avoiding bureaucratic and ineffective management. This paper aims to briefly analyze these initiatives, as a means to show some of the

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diversity and complexity of development cooperation. This paper argues that impact has to be planned, measured, monitored and reported. But even beyond that, in the context of developing countries and institutions, the capacity to learn and react quickly to adjust, correct or adapt is also essential. They need to be a complimentary part of the same process, most probably because development situations always include some unplanned or unseen. The possibility of rearrangements in inputs and learning by doing are demanded by the dynamic nature of development cooperation projects, to which traditional cooperation arrangements are less able to respond.

Keywords IBSA Fund · Development Impact Bonds (DIBs) · International Development Cooperation · Multi-stakeholder partnerships

Introduction

There is a massive need for new sources and mechanisms of financing to achieve the Sustainable Development Goals (SDGs),[1] even when the traditional and emerging donor's capacities are combined. The financing gap is widely recognized and is estimated to be of US$ 2.5 trillion a year (Koening and Jackson 2016). In the current context of wide-ranging unemployment, poverty, food shortages and other developmental challenges, the SDGs will demand a significant growth both in the volume and effectiveness of developmental resources (Belt et al. 2017).

Asia and Africa are the main locations where such mobilization of capital will be needed. Agriculture and food security are relevant issues to be tackled that could generate local development spillovers, which would help in achieving the SDGs. These regions have high populations and the world's low-income countries. At the same time, these regions are also

[1] No poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequality, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace and justice strong institutions, partnerships to achieve the goal (UNDP 2016).

expected to be the ones to boost the world's growth rates in the twenty-first century. Thus, any sustainable development strategy needs to focus on innovative mechanisms that take into consideration their specific needs and multiple realities and present a flexible framework of solutions.

India will play a major role in the 2030 Development Agenda, as a consistently fast-growing country in Asia, as a country committed to the SDGs for its own development as one of the majors emerging partners in South-South cooperation and as a key player in international politics (NITI Aayog 2018). The country is expected to have the world's largest population and the third largest economy in the next couple of decades.

In the global scenario, India graduated as a middle-income country in the 1990s and since then has reduced its role as recipient of cooperation from traditional donors and increased its role as provider of South-South and Triangular cooperation (SSTC). The emergence of new development country partners such as the IBSA countries in the 2000s along with consolidated initiatives based on South-South cooperation principles (already established by the Buenos Aires Plan of Action [BAPA] of 1978 and, later, reinforced by the High-level United Nations Conference on South-South cooperation in Nairobi in 2009) has established paradigms of a demand-driven cooperation approach (Mawdsley 2012). This approach is one without conditionalities, which respects national ownership and horizontally guarantees mutual benefit and complementarity to North-South cooperation (Mawdsley 2012; Simplicio et al. 2013).

In this context, the IBSA Fund, operational since 2006 and managed by United Nations Office for South-South cooperation (UNOSSC),[2] has emerged as an innovative initiative and has inaugurated a new perspective for Southern trust funds in the United Nations (UN). The IBSA Fund was relatively small (in terms of size of the contributions) and initiated with an almost experimental institutional arrangement. This arrangement stressed upon the leadership of the recipient partner country as the main decision-making actor, but also emphasized a participatory approach. This approach was through the IBSA countries, local UN agencies, local government and local civil society organizations as relevant know-how sharers, being articulated by the UNOSSC. This multi-actor partnership allowed an operational framework of low cost and high impact projects.

[2] At the time it was UNDP's Special Unit for South-South cooperation (SU/SSC). It is a UN Office hosted by UNDP.

The engagement of the private sector is another strong trend in recent multi-actor partnerships for development cooperation, adding to emerging partners of the South and international institutions. In fact, the call for business engagement in the 2030 Agenda has been answered by various corporations and lobby groups (Abshagen et al. 2018). This call is understood mainly under the necessity of amplifying the resources directed to the field, increasing effectiveness and stimulating innovation and flexibility in the application of resources. Currently, elements such as effectiveness of aid are called into question, as well as adequate mechanisms of assessment, monitoring and evaluation. New practices such as 'paying for results' are well known in the private sector. This is an emerging experiment in development cooperation where partners receive payment only if a project delivers the agreed results.

In that regard, Development Impact Bonds (DIBs) are an emerging practice between the initiatives involving the private sector in the development cooperation landscape. It is yet to prove itself and demonstrate whether the private sector would actually participate and promote an increase of resources and efficiency, or, if it would act mostly as competitor for grants (which are already scarce) or even use it for its own commercial purposes.

Considering both these approaches (small southern-led trust funds in the UN and the engagement of the private sector in development cooperation through DIBs), this paper aims to briefly analyse these initiatives, as a means to show some of the diversity and complexity of the contemporary field of development cooperation, as well as the emerging possibilities to think about development in India-Africa partnerships.

Beyond highlighting the importance of building the proper institutions to support development cooperation with new actors, this text aims to stress two different observations with regard to the cooperation impact. How to improve the chances that cooperation initiatives produce positive development impact? The first observation is based on the view that impact rarely happens by chance. It has to be planned, measured, monitored and reported. But these good practices do not guarantee impact or even results. For example, 'lack of political will' is a well-known label among development practitioners for projects that expend too much effort in its broad planning to end up unfeasible. Beyond that, in the context of developing countries and institutions, the capacity to learn and react quickly to adjust, correct or adapt is also essential. This is because development situations always include uncertainty and are rarely a 'copy

and paste' of a previous experience. In this regard, both IBSA Fund and DIBs somewhat address the need for continuous feedback mechanisms leading to learning and adapting to the very dynamic nature of development cooperation projects.

IBSA Fund: A Unique Southern-Led Initiative

The IBSA Fund formed in Brasilia is a development initiative of the IBSA countries managed by the UNOSSC. The IBSA Fund, which became operational in 2006, was in part inspired by the IBSA Forum created in 2003, a dialogue process established by the three Southern like-minded countries. Its agenda is divided into three main areas:

1. Acting as a coalition in multilateral negotiations and international organizations;
2. Operating as an initiative of intra-group development cooperation, mainly through sectoral ministerial cooperation, but also through civil society forums; and
3. As a southern-led initiative of development cooperation towards least developed and other developing countries. The IBSA Fund became one of its implementing mechanisms.

Each IBSA country committed to contribute US$ 1 million dollars annually to the fund. This contribution is relatively small when compared to bilateral development programmes from Brazil, India and South Africa. However, the IBSA Fund is considered to be one of the most successful activities under the IBSA Forum and has been showcased as a very innovative southern-led initiative. Its relatively small budget led to a framework that prioritizes low cost and high impact initiatives, using local capacities and developing projects that could be easily replicable or expanded.

Working under a demand-driven logic, it provides grant finance for projects in many different areas, such as health, education and agriculture. In this sense, the IBSA Fund presents itself as a horizontal cooperation initiative that seeks to develop projects based on the demand of the recipient country and through partnerships with local government, national institutions and partners. The choice to operate under the UN framework

could also be interpreted as a political statement in support of multilateralism and South-South cooperation principles, being open to the demand of any southern UN member state facing development challenges.

Placing the central management of the Fund in New York has also helped to solve a coordination challenge between the partner countries and makes facilitation of meetings easier and helps decision-making without incurring the high costs of creating a new institutional arrangement.

The IBSA Fund relied on UNDP and other UN agencies to have an extensive presence in each country and a decentralized structure. Some other advantages in holding funds and projects under the institutional framework of the UNDP are that the IBSA Fund benefits itself from a somewhat more neutral institutional framework, technical know-how; strategic positioning within the UN system. It places an emphasis on capacity development and a demand-led approach to programming, with flexibility to respond at the country level (UNDP 2017).

International agencies in general are challenged in managing funds that have such a limited budget, considering their large and relatively inflexible funds management costs (given very high levels of transparency and accountability). Nevertheless, a UN Office hosted by UNDP (UNOSSC or SU/SSC by then) saw this as a part of its mandate and agreed to support the development of an innovative institutional framework (that became the IBSA Fund) as well as helped in promoting a deeper comprehension of South-South cooperation partnerships.

The IBSA Fund was designed as an experimental initiative and conceived as an impact fund, in the sense that all resources should be applied in a results-oriented way, allowing that relatively small projects could provide real impact. To guarantee the high impact, operational and management costs were kept minimal, but the IBSA countries were expected to support projects with expertise and knowledge, technical visits and analysis.

The IBSA Fund has proven itself to be a mechanism of institutional learning for the IBSA countries and also influential to the development cooperation framework and debate in the United Nations on the South-South cooperation framework, even though some early analysis considered that the IBSA Fund provided no systemic impact (Stuenkel 2013).

According to the IBSA Fund Guidelines document, project proposals are presented by the requesting governments to IBSA focal points in their

respective countries. Focal points in IBSA capitals (New Delhi, Brasilia and Pretoria) will analyse it in line with the following principles:

- Reduction of poverty and hunger;
- National ownership and leadership;
- South-South cooperation principles;
- Use of IBSA country capacities;
- Strengthening local capacity;
- Ownership;
- Sustainability;
- Identifiable impact;
- Replicability; and
- Innovation.

Other criteria involve a time frame between 12 and 24 months and medium-size projects, usually around US$ 1 million.

If pre-approved, the projects are sent to the Board of Directors of the IBSA Fund in New York, which is composed of the respective Ambassadors, heads of the permanent missions at the UN. The board meets up to four times a year and has a much more participative and active role in the approval of projects and allocation of resources than in other trust funds, where the decision-making is usually held by the managing institution. Furthermore, the IBSA Ambassadors and UNOSSC are very close to the representatives of the beneficiary countries for asserting national priorities and leadership.

Up to 2017, the fund received US$ 35 million in contributions from India, Brazil and South Africa. 27 projects have been developed in 21 partner countries, mainly Least Developed Countries (LDCs), in Africa, Asia, Latin America and Arab States, representing a tangible Southern initiative to the SDGs. Most of the projects supported by the IBSA Fund were focused on agriculture, health care and livelihoods; no resources were to be applied to the IBSA countries themselves and were mostly dedicated to LDCs (UNOSSC 2017).

Above all, the fund has proved to be effective in its resource management (considered a central challenge in most trust funds). In its first 10 years of operations, all the available resources were allocated and implemented (or were under implementation), with enthusiastic acknowledgement by the beneficiary countries.

IBSA Fund Quick Learning Example: The Case of Guinea-Bissau

The project 'Development of Agriculture and Small Animal Herding' in Guinea-Bissau was the very first project implemented by the IBSA Fund. Nevertheless, the continuous dialogue with Guinea-Bissau's government and local agencies led to a strengthened partnership, which provided opportunities for a total of four completed phased projects implemented in the country by 2017. The active participation through monitoring and more frequent meetings typical of the IBSA Fund Board of Directors proved to be crucial in promoting the development impact of the fund and collective learning and quick reaction during all phases of the project's life cycle.

In that sense, the continuous dialogue with Guinea-Bissau's government and local partners led to the building of know-how and allowed for scaling up of projects. The active participation and frequent meetings of the IBSA Fund Board of Directors proved to be crucial in looking after the development impact of the fund and reflected the commitment to promote collective learning and quick reaction during all phases of the project's life cycle. This has been particularly relevant in projects in Guinea-Bissau.

Consider for example the Rural Electrification through Solar Energy Systems (project VI in Guinea-Bissau, from July 2011 to May 2015). The initial design of the project intended to support basic health services by providing electricity to 18 rural community centres with solar panels. As part of the national plan, this initiative would power local fridges for conservation of vaccines and support basic operation of a health community centre. Once communities were finally reached and understood the new potential, they requested an extension to the plan to include an electric water pumping system powered by the same solar panels to improve access to water. The IBSA Board reviewed the monitoring reports presented by UNOSSC and the project was adjusted to include that request. Following the installation of the equipment, the long-term maintenance of the equipment, originally part of the government responsibilities, was put in question. A relevant experience was brought up by UNOSSC from India on the management of micro-utilities by the Barefoot College, based on a previous best practice report. The new phase of the project brought this experience to, as the solar panels were installed, the local community was also trained (mainly women) to maintain and manage the services and establish local community leadership.

The key question is if the project's final impact could be fully designed upfront. The typical approach would be to spend most of the project resources in pre-studies, pre-assessments and consulting for a comprehensive project design. Often these projects are also declared unfeasible due to lack of funding or limited 'political will'. In the South-South approach followed by IBSA, the initial support was to meet a health-focused objective of the country's national plan, as requested by the government. But the IBSA Fund was quite fortunate to rely on leadership and an institutional design that mobilized institutional partnerships to support the process of promoting further impact to its partners. Gathering and digesting information, monitoring, learning and adapting with quick decision-making is costly. In the case of the IBSA Fund, the IBSA countries carried out these activities for the partners as an additional in-kind contribution. UNOSSC provided essential support by dynamically coordinating and consolidating information from the several partners.

In conclusion, promoting impact has a high fixed cost and in small to medium scale projects, which may take a large proportion of the budget in pre-studies, pre-assessments and consulting for a comprehensive project design. In the South-South approach, the partners can provide such a strategic management cost as an in-kind contribution, so the net resources are applied to the project itself. But this also requires decision-making capacity for quick reaction and learning. If the fund directors and project managers were not willing to pay for the process of promoting impact (with quick reaction and learning), could they really expect an impact to be created?

Development Impact Bonds (DIBs) and the Private Sector in Development Cooperation

Development Impact Bonds (DIBs) are part of an emerging initiative in the development cooperation landscape promoting the engagement of the private sector, under the paradigm of 'payment by results'. It has evolved from the Social Impact Bonds (SIBs), alongside the Results-Based Aid (RBA) and the Results-Based Financing (RBF). The SDGs highlight multi-stakeholder partnerships for development as essential mechanisms for achieving sustainable development and, in that regard, the participation of the private sector is not only important to achieving the SDG 17, but all SDGs.

DIBs consist of a mechanism of development financing in which the private sector provides the project's investment upfront to an implementing agency and, if the project succeeds in terms of upfront agreed outcomes, the donor pays the investors back with returns. If the project fails, nil or reduced payment is due. It could be understood essentially as a Public–Private Partnership (PPP) engagement, and it best applies when a government is unable to invest in a development project despite the expectation of accruing both cost savings and positive social or environmental outcomes. But above all, DIBs are risk management tools. Therefore, it is best applied when the grant supplier is not ready to take the project's risks upfront, as it happens in many cases of initiatives involving health or political risks.

DIBs usually involve a six-agent setup: an investor, an intermediary (not obligatory), an implementing agency, the target population, the validating agency and the outcome payer. Considering that the investor will be from the private sector and usually not directly involved in monitoring the project's implementation, usually DIBs involve an intermediary. According to the Department for International Development (DfId),[3] one of the leading agencies implementing DIBs, the intermediary plays a different role from the validating agency and it is important to keep them different to avoid conflict of interests. While the first is entitled to monitor and push for the service improvement and delivery of results, the validating agency verifies the final results to recommend the final donor's payment back to the investors. To guarantee the investment's credibility, DIBs usually require a very robust and rigorous monitoring process, data-intensive and often based on quantitative variables that should be adjusted or even developed in regard to the specificities of each project (due to the multiplicity of different factors in each case) (Drew and Clist 2015).

One of the specificities of DIBs is the donor's ability to play a 'hands off' role and, if willing to participate more directly in the roles of the other institutions involved, the donor could compromise the benefits of DIBs, reducing the possibilities of innovation, flexibility, longer time horizons and results focus. In that regard, the intermediary will typically take the lead in deciding the role of the other agents (Drew and Clist 2015).

Nevertheless, risk transfer is not the only rationality for DIBs, as in most cases it would be only useful if it leads to increased effectiveness

[3] Merged into the Foreign and Commonwealth Office to form the Foreign, Commonwealth and Development Office as of 2020

with its focus on impact. Reimbursement only happens when the agreed impact or outcome is achieved therefore reducing considerations on the means to achieve them.

Selected Examples of DIBs

DIBs can be applied both to large- and small-scale development initiatives and in many areas of work. The three select examples below highlight DIBs application in the agricultural sector in Africa, India and South America. The first example provides details on the agreed outcomes, results achieved and corresponding payments to support better understanding of the DIB concept. The second highlights the engagement of USAID and DfId, two large traditional agencies in development as outcome payers. Both agencies have been looking for the right opportunity to test the model and the chance to 'get involved with aggressive results-based financing' (Saldinger 2017; Village Enterprise 2017). The example in India highlights the importance of the flexibility allowed by DIBs to improve implementation strategies to reach successful outcomes, a key argument of this paper.

Indigenous Ashaninka People in Peru—A Case in Agriculture

This DIB focused on strengthening and modernizing cocoa and coffee production among the Ashaninka indigenous communities in Peruvian Amazon, in Latin America. The goal was to assist the local cooperative (Kemito Ene Association) of the indigenous Ashaninka people of Peru in restoring the growing plots and improving their collection and postharvest techniques.

This DIB is said to be one of the first in the commodities sector. It was structured by the Common Fund for Commodities (CFC) in partnership with the US-based Schmidt Family Foundation (SFF, the investor) and the Rainforest Foundation UK (RFUK, the service provider). The Royal Tropical Institute was the independent party responsible for verifying the accomplishment of the jointly agreed results. It was an experiment between SFF, RFUK and CFC to try the DIB approach, so the DIB was a small pilot initiative, not exceeding US$ 110,000, from 2013 to 2015 (Belt et al. 2017). The agreed results are summarized below.

Expected outcomes/goals of the DIB:

1. 60% of Kemito Ene members to increase their supply to the Association by at least 20% thereby improving their income received from Kemito Ene;
2. At least 60% of Kemito Ene members improve their cocoa yield to 600 kg/ha or more;
3. At least 35 tonnes of cocoa bought and sold by Kemito Ene in last year of the project;
4. By the end of the project, 40 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties (Belt 2015).

The payment for results was agreed as shown in Table 16.1.

The project presented successful outcomes in 3 of its 4 goals, exceeding the expectations in two of them (goals 3 and 4), partially achieving goal 1 and not achieving outcome/goal 2, due to unrealistic expectations and unexpected challenges. The achieved outcomes had the following payment for results (Table 16.2).

The second target reflects a characteristic of DIBs: No results—no payment. It is agreed that expected results may prove unrealistic as it involves many unexpected variables. In the case of cocoa productivity, the target was too high (600 kg/ha, considering that 400 kg/ha would already have been optimistic), a plant pest devastated cocoa productivity in 2015. The misreading of expectations happened particularly due to the difficulty in accessing the required data and uncertainty over what kinds of data requirements should be fulfilled to establish the different impact indicators. Even though formally the results did not meet the established goals, in practice the local producers did improve their productivity. Twenty-one farmers reached a yield of 500 kg/ha and 26 farmers yielded 450 kg/ha (Belt 2015: pp. 9–10).

Furthermore, another challenge according to Belt et al. is the idea that the investor will assist and participate more closely to the implementation

Table 16.1 Agreed payment by results achieved

Percentage of the target achieved (%)	*Amount (US$)*
100	27,500
At least 75	20,625
At least 50	13,750
Less than 50	0

Source Belt (2015: p. 4)

Table 16.2 Achieved outcomes of the DIB project

Achieved outcomes	*Payment for results (%)*
From a total of 99, 45 managed to increase their sales by 20% or more, so the achievement of the indicator falls between 59 and 41%, less than the 60% target.	75
15 members of the 99 members included the 2013 baseline did reach the target of a cocoa productivity of 600 kg/ha or more. This represents 15% of the baseline; the 99 members Kemito Ene had at the end of 2013. This means this target has not been achieved.	15 (No payment if below 50%—chart 1)
In 2015, Kemito Ene sold a total of 47,428 kg of cocoa to different buyers. The indicator has exceeded the target of 35 MT, implying a full achievement of this indicator.	100
62 farmers have installed 0.5 ha of improved coffee varieties, exceeding the target of 40 producers.	100

Source Belt (2015: p. 8)

of projects. Even though it would contribute to a more entrepreneurial result-oriented pattern, guaranteeing more financial return, it did not happen in this specific DIB (Belt et al. 2017).

Still, the project was considered very successful for a pilot initiative. Some of the main lessons and areas that still need to be empirically studied and clarified are: the design of an impact bond involves intensive preparation during a longer time and potentially high transaction costs; there is a need for a outcome matrix that is easily measurable; the investor can play an important role cooperating with the implementer to guarantee the project's success (Belt et al. 2017). A comparison between benefits to the local community and the value-added of DIBs in comparison with conventional development projects will tend to be limited by the typical lack of objective and detailed data of the second.

Village Enterprise DIB—A Case in Sub-Saharan Africa

The Village Enterprise (NGO) was one of the first DIBs engaging the two major donors, USAID and DfId, and is considered a relatively large DIB with a total budget over five million dollars (US$ 5,260,005). The DIB

focused on poverty reduction in sub-Saharan Africa and aimed at stimulating entrepreneurship and innovation, using a combination of training and cash grants to help communities start micro-enterprises, building their assets and savings, with a special focus on women. It reached about 12,000 households in 3.5 years and created over 4000 sustainable enterprises for the poor population in Uganda and Kenya (Saldinger 2017; Village Enterprise 2017). Poverty is defined by the PPI (Progress out of Poverty Index) now run by an independent institution (PPI 2019).

Its implementation started with group training, followed by the formation of three-person-groups identifying a business they would like to create. They were provided with a US$ 100 grant for the purchase of key assets. The group was assisted by business mentors for six months. At the end of that period, the businesses that have shown stability and growth receive a second grant. After one year, the entire leadership is transferred back to the community. Some of them even create business savings groups to improve their own financial mechanisms (Saldinger 2017).

The DIB gave Village Enterprise access to a larger capital to scale up their activities, but more importantly, it was a more flexible capital than the ones from traditional grants. The funding was responsible for doubling the number of people reached by the Village Enterprise. Village Enterprise was also responsible for raising and managing money from investors, what is usually a responsibility of the intermediary, which in this case was carried out by Instiglio (Instiglio 2014). This structure is said to secure cheaper capital, as intermediaries might give preference to quick capital and the implementer could be pickier about which money to take (Saldinger 2017). Other partners included: The Global Development Incubator and IDinsight (Village Enterprise 2017). This DIB was structured to allow a faster DIB launching and reducing costs by making the service provider responsible for a larger part of the project (Saldinger 2017).

In this DIB, poverty reduction was assessed by increases in consumption and net assets. Investment was to be returned at a rate between 16% and 18%, if there was an improvement of about 25% (considered to be an ambitious rate). If there were no significant outcomes, the return was agreed at 1% or 2%.

Educate Girls DIB—A Case in India

One of the world's first DIB in the education sector was conducted across 166 schools across 140 villages in Bhilwara District, Rajasthan, India, from 2015 to 2018. It focused on educating out-of-school girls (between the age of 7 and 14) and improving the quality of education for children in rural, remote and marginalized communities of India. The DIB's implementer was the Indian NGO Educate Girls and the project was considered very successful, achieving 116% of its enrolment target and 160% of its learning target by the final year, which guaranteed a payback of 15% to the initial investor (UBSOF 2018). The DIB had five key participants:

1. UBS Optimus Foundation (UBSOF) as the social investor, providing upfront capital of US$ 270,000;
2. The local implementer, the NGO Educate Girls (EG);
3. Instiglio (a non-profit impact bond and results-based financing organization) as the intermediate, advising the design, project management and perform management assistance of EG on behalf of UBSOF;
4. IDinsight, the non-profit evaluation firm, the one responsible for evaluating the project; and
5. Children's Investment Fund Foundation (CIFF) the final outcome payer (UBSOF 2018).

The project needed important corrective measures between years two and three, when only 75% of targets had been achieved. Hence, the flexibility allowed by DIBs structure to change its implementation strategies was essential to the final successful outcomes, which probably would not have been achieved otherwise. The changing measures were important and included, for example, shifting from a classroom-focused to a group-focused approach, based on the competency levels of the children; implementing a child-centric curriculum focused on building and tracking micro-competencies achievement in year three; increasing the number of teaching sessions (including holidays and home visits); and working more closely with families and raising parents awareness of relevance of girls' education (UBSOF 2018).

One could argue that this DIB was successful particularly because it was scaling up and improving an earlier project of Educate Girls. It also

shared the main targets and organizational structure used for an outcome-driven approach and was familiar with the monitoring, evaluation and learning processes (UBSOF 2018). The change in its implementation strategy thought, argued otherwise.

Pros and Cons of DIBs

Current available financing and grants are hardly enough to respond to the commitments of the SDGs and new approaches are welcomed. The DIB is an additional tool, with new partnerships and operational modality that adds energy to an area with large demand and need. In any case, it would be hard to advocate in favour of guaranteeing private profits in development cooperation if there were no expectations of increased effectiveness. The quest for development effectiveness is well established in most Organization for Economic Co-operation and Development (OECD) development partners most of which count with Independent Offices of Evaluation (IOE) and many mechanisms to evaluate efficiency of their contributions. DIBs are expanding exactly among the agencies most pressured by the quest to increase effectiveness.

The inclusion of the private sector in the international development landscape is a welcoming tendency and may contribute to different project management settlements, with more dynamic, flexible and responsive feedback loops, which has been proven to be central to real impact in development cooperation initiatives. It is expected that the inclusion of the private sector will amplify resources—as it allows for attracting funding to places and projects that donor agencies and governments are not willing to fund directly—and lead to improved social outcomes, as the risk is, to some extent, assumed by investors (Belt 2015; Belt et al. 2017).

The fact that the outcome payment is reduced, and the investor may take a loss (in case of project failure), promotes a change in the mindset of the involved in the project. But a great potential mindset change might emerge from monetizing development outcomes and being able to compare the investment required to achieve specific results. For example: What is the required investment needed to increase the income of 12,000 poor households by 25% in 3–5 years? (as in the case of the Village Enterprise DIB above) is US$ 5 million dollars a sound development investment for this outcome? In any case parties including the private sector could bring in different knowledge and push towards inventive

solutions in measuring performance data and establishing more dynamic and real-time feedback mechanisms. On the other hand, a majority of investors in practice do not get involved in the implementation and monitoring of projects (Drew and Clist 2015). If they do, there is the risk of lobbying in favour of lower standards of evaluation to make sure that their investment is paid back (UNDP 2016). Therefore, expected roles, checks and balances are yet to be clarified.

Recent research has indicated that impact bonds have the potential to contribute to the improvement of development service delivery, though thus far, the deals have been complex time and expertise intensive. According to the Center for Global Development and Social Finance, out of the 22 DIBs, 21 have reported positive outcomes; 12 have made outcome payments; and 4 have fully repaid investors (CGDSF 2013).

To facilitate an overview of the current understanding of the many facets of DIBs, we have consolidated a SWOT matrix (strengths, weaknesses, opportunities and threats), compiling many references Table 16.3.

Final Remarks

There is no singular answer to development cooperation needs and demands, and a multiplicity of mechanisms reflects the singularity of the needs. The 2030 Agenda highlights that SDGs will only be achieved if those specific mechanisms, responding to specific needs and possibilities, can emerge and develop. Initiatives such as the IBSA Fund and DIBs are complementary to a universe of funds, stakeholders and initiatives. Neither of them can face the contemporary challenges of development alone.

Beyond the importance of building the proper institutions, this chapter has highlighted the relevance of improving mechanisms of learning during the implementation of projects. This is due to the more frequent and horizontal participation of partners such as in the IBSA Fund, or through an outcome-oriented approach as in DIBs. Both focus on results and impact in a transparent and accountable manner, making inputs relatively flexible to feedback effectively monitored during the implementation of the projects.

It could be said that these new mechanisms are a response to the need for real-time feedback loops in development cooperation and the possibility of learning by doing to generate impact, which are still limited in traditional cooperation projects. Multi-stakeholder partnerships such as in the IBSA Fund and DIBs are a strong trend in the development

Table 16.3 SWOT matrix applied to DIBs

Strengths	*Weaknesses*
– Creates a working modality for PPP and multi-stakeholders' collaboration; – Focuses efforts on achieving outcomes instead of outputs; – Strengthens implementation with entrepreneurship; – Reduces the financial and operational risks for the funding partner; – Offers a 'mission-aligned' investment opportunity to investors, as well as a potential return on investment; – Supports continuity with access to upfront funding for the delivery of the services; – Helps to introduce outcome-based management practices and higher standards in project design and delivery; and – Stimulates innovation.	– Requires measurable quantitative outcomes as metrics are hard to produce; – Complex structure of negotiations, coordination and implementation; – Investors presented little or no interest in participating actively in the project design and managing, reducing the possibilities of learning from the private sector; – Comparatively complex and time-consuming to set up; – Comparatively high administrative costs. Still lacks further analysis to understand its value-added possibilities (although objective comparison with other strategies will always be challenged by their lack of outcome metrics); and – Need to develop adequate supervision frameworks.
Opportunities	*Threats*
– Comparable monetization of outcomes; – Targeting untapped resources; – Coordination of fragmented/segmented investments; – Potential economies of scale with successful delivery of outcomes;	– Investors may lose their investment if the outcomes are not achieved; – Investors may lobby for easier to achieve outcome thresholds; – Profit as incentives may compromise impact in exchange for greater revenues or lesser risks; – Profit as incentives may compromise impact in exchange for greater revenues or lesser risks;

(continued)

Table 16.3 (continued)

Opportunities	*Threats*
– Establishment of sectoral funds to reduce costs; and – Promoting innovation for achieving impact; and – Success in reusing and recycling.	– May compete with grants for resources; and – May drive to less risk initiatives and areas

Source Author's compilation

cooperation landscape. Some contend that multi-stakeholders' partnerships also imply increased transaction costs due to added coordination requirements. Nevertheless, it may also lead to value addition such as increased effectiveness in achieving actual results and impact, factors hardly attainable if there is no effort to achieve them.

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CHAPTER 17

South-South Collaborations in Agriculture: A Concluding Note

Renu Modi and Meera Venkatachalam

This volume has attempted to analyze the agricultural transformation in Africa within the framework of South-South cooperation that is being increasingly complemented by North-South collaborations. The scope of the subject is indeed extensive and only select thematic areas, namely knowledge sharing; value addition to agriculture through G2G partnerships; public–private partnerships; augmenting food security through trade in agro-commodities; and financing the development of the agriculture and allied sectors, have been discussed. While chapters in the book cover disparate aspects of actual or potential cooperation, put together, they offer the reader a composite picture of the wide ranging and lesser-known areas of engagement between India and Africa in the agriculture segment.

A key objective of the Africa Union's Agenda 2063 is 'doubling productivity in agriculture and banishing the hand held hoe' (AUC 2015:

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p. 13). As agriculture employs a bulk of the population in Africa and provides them with livelihoods, investing and supporting this sector is crucial for countering extreme poverty in a continent where 23 out of the world's 28 poorest countries are located and a third of the population is below the poverty line (Asadullah and Antonio 2019). It is estimated that over 300 million people in sub-Saharan Africa will continue to live in extreme poverty by 2030 (the end period for the SDGs). Therefore, eliminating poverty and hunger (SDGs 1 and 2) hinges on poverty reduction in Africa (Asadullah and Antonio 2019).

Further, given that 'Africa is at the threshold of harnessing the demographic dividend, increased economic diversification and a shift from agrarian and commodity-dependent economies, towards agricultural led industrial development and manufacturing – which are linked synergistically in that the latter can provide the tools and ready markets for agricultural goods, industrial base for job creation and inclusive growth'—could prove beneficial for the continent (UNECA and AUC 2011: p. 7).

Boosting agriculture and allied sectors is the most effective pathway for poverty reduction for three reasons—firstly, the continent has natural resources such as land and water, which have not yet been harnessed to their full potential; secondly, the farming sector offers an avenue for the absorption of unskilled labourers, provides them with livelihood, and thereby ensures food security and poverty reduction; and lastly, the agricultural sector stimulates a series of backward (production) and forward (consumption) linkages, and consequently addresses food security. Generally, manufacturing through small and medium scale agro-processing activities which provide an avenue for wage generation has been a critical factor for poverty reduction in India and China, for instance. An overall increase in national wages because of manufacturing and manufacturing-related services, has led to a broad spillover effect towards lifting wages in the agriculture sector of these two Asian economies. Therefore, an industrial policy that makes use of tariffs and subsidies to support the domestic manufacturing base could be an effective way to support the agricultural sector in Africa, which continues to be the dominant sector in terms of employment generation across several countries on the continent. Agricultural growth has proven to be one of the most effective ways of reducing poverty—roughly three times more effective than growth in other productive sectors such as industry and the service sectors (for

details, see Modi 2019: pp. 400–402; see also Dror, Chapter 5 and Venuprasad et al., Chapter 9, this volume).

The editors underscore six key discernible trends in the ongoing discourse on the subject under study. These are:

South-South and North-South Cooperation for Food Security

Over the past decade, there has been a recasting of the paradigmatic notion of South-South cooperation,[1] particularly in a post-hegemonic world, against the backdrop of low levels of multilateralism from the North. South-South cooperation has come a long way from the solidarity politics and anti-North alliance formed at Bandung in 1955. Today, it is based on multi-stakeholder approaches and also acknowledges the significant role of the private sector and civil society in furthering the global development objectives (see Nairobi Outcome Document 2016: p. 2). Further, there has been an ascendance of the 'emerging economies' from amongst the countries of the Global South as reflected in the rise of power blocs such as the BRICS; new forms of development finance such as sovereign wealth funds, and new donors. These new occurrences come at a time of declining aid flows through North-South cooperation, more so in the aftermath of the global financial crisis of 2008, and the global Covid-19 pandemic.

Common global challenges, inter alia; the lack of availability of food and water, widespread hunger and malnutrition, climate stress, cross border forced migrations, threats from pandemics that impact humans and animals alike, have resulted in concerted collaborations between the new emerging economies from the Global South and the traditional donors from the North. To face the ongoing insurmountable challenges, countries in the North and the South are sharing knowledge, finances and trading bilaterally through G2G, private, as well as private–public partnerships (see Modi and Venkatachalam, Chapter 3; Chakravarty et al., Chapter 4; Dror, Chapter 5; Venuprasad et al., Chapter 9; Saran, Chapter 10; and Simplicio and Jardim, Chapter 16, this volume).

[1] South-South Development cooperation is much wider in ambit than South-South cooperation (SSC) and includes inter alia: credit lines/less concessional loans, exports promotion, tariff reductions, private sector development and student scholarships which are excluded from the OECD (OECD, n.d.).

Shifting Discourse: From 'The Green Revolution' to a 'Sustainable Green Method'

In the 1960s and thereafter, India was faced with low agricultural productivity and severe famines. At this time, India had to contend with the foreign policy imperatives of dependence on food imports and food aid via the Public Law 480 programme, which clearly proved unviable in the long run. To bolster food security, the country embarked on a policy initiative that replaced traditional agricultural practices and launched a new technological intervention in the farming sector—the much-lauded Green Revolution. High Yielding Variety (HYV) seeds were introduced which led to an exponential rise in productivity. Today the Green Revolution is being critically evaluated to assess its achievements, scalability and replicability in other parts of India as well as globally, particularly in Africa.

On the positive side, the Green Revolution led to an increase in food productivity in some states and crops. It had a disadvantageous impact on the agricultural landscape, as the technological intervention was a success only in areas with water sufficiency and access to irrigation, and agricultural output rose only for a few crops such as wheat and rice. Alongside, the Green Revolution had adverse environmental consequences associated with the use of high cost inputs such as herbicides and pesticides which led to indebtedness of small-scale farmers and further aggravated the already existing social and economic chasms in rural India (Ladejinsky 1973: p. 135)

Steadfast Support from the State

The new technology was a success only in those states where the government policies and machinery stood steadfast in support of the farmers. It needs to be noted that after independence and prior to the introduction of the Green Revolution, India went through several state-led laudable land reforms such as, ceilings on land holdings in favour of the peasants, security of tenant cultivators', tenancy rights and rent fixations at reasonable rates. A host of government supported subsidies on electricity, water, fertilizer and a range of other essentials of the agricultural supply chain, investments in research and development (R&D) and the extension of minimum support prices (MSP) also contributed hugely to the success of the Green Revolution (Shiva 1991; Kumar 2016). The role of

the state in enhancing agricultural productivity was conclusive and significant. Punjab, for example, is one of the biggest success stories of this intervention (see Iyer and Mazumdar, Chapter 14; Vasquez and Kottam, Chapter 15, this volume)

That the new technology had its own set of in-built challenges has become evident over the years. In retrospect, it is felt that government incentives, subsidies and a guaranteed purchase at MSP, led to the 'misalignment of crop patterns' which needs to be reoriented (PIB 2019). The HYV seeds require a high input of fertilizers, which has led to a decline in the quality of soil, over the years. And, with a reduction in the size of agricultural landholdings, fragmentation of land and depletion of water resources, India is now focusing on resource efficiency for sustainability, especially in smallholder farming.

At the policy level, the GoI has proposed a shift from a 'Green Revolution'-led productivity to a 'green method'-led sustainability (see Economic Survey 2018–2019 cited in PIB 2019). Enhanced productivity and sustainability are to be achieved through:

i. Policies to incentivize farmers to improve water use and shift from 'land productivity' to 'irrigation water productivity'. Agriculturists are encouraged to use micro-irrigation, to overcome the problems of waterlogging and salinity, which impairs agricultural productivity in the long run (PIB 2020).
ii. Reorientation of cropping patterns towards less water intensive crops such as millets (more so with the onset of climate change and a drop in water tables). In India, about 89% of the groundwater extracted is for irrigation, of which paddy and sugarcane consume more than 60% of this scarce resource (PIB 2019).
iii. A reduction in the indiscriminate and excessive usage of fertilizers (which has risen constantly since 2002 but declined after 2011) because of a 'declining responsiveness of soil fertility to fertilizer application' (PIB 2019).
iv. A gradual shift from chemical fertilizers and pesticides, to organic agronomic ways, based on soil health report cards. Currently, organic and natural farming techniques, including Zero Budget Natural Farming (ZBNF), are being implemented to augment water

use efficiency and soil fertility. Neem-coated urea (NCU), micro-nutrients, organic fertilizers and water-soluble fertilizers have also been introduced[2] (PIB 2019).

v. Increased reliance on information and communication technology (ICT)-based climate smart and climate responsive farming (PIB 2019).

The current approach to agriculture, arguably, is more in sync with the global practice for climate resilient and sustainable agriculture that is based on agro-ecological concepts and principles. This space needs to be watched and its outcomes evaluated in order to replicate the good practices globally, for furthering food security. With the shift in agricultural modality in India—from a 'Green Revolution'-led productivity to a 'green method'-led sustainability—it is hoped that India's export of agricultural models to Africa too will change. A switch from the industrial model (based on high usage of petrochemical fertilizers, herbicides and pesticides) and the support for hybrid and expensive genetically modified organisms (GMOs),[3] to the practice of more 'organic agronomic ways', could facilitate traditional seed exchange practices at community levels in Africa, and between India and Africa, to preserve the seed diversity and lower the costs of inputs, which will be highly beneficial for the partner countries.

Learnings from the Green Revolution

Africa has the advantage of hindsight and can emulate the positive aspects of the Green Revolution and sidestep the pitfalls, i.e. adapt the Indian model to suit the local conditions to arrive at a sustainable 'African Green Revolution', for enhancing productivity in the farming sector. It also needs to be highlighted that India's Public Distribution Scheme (PDS) network, that provides access to essential food grains at subsidized rates to those below the poverty line, can be created in Africa to afford access

[2] Mentioned in Economic Survey (2018–2019) presented by the Union Minister for Finance and Corporate Affairs, Smt. Nirmala Sitharaman tabled in the Parliament on July 4, 2019 (PIB 2019).

[3] GMOs threaten to narrow the seed diversity and exacerbate power asymmetries and income inequalities in a country, as payment towards royalties extract wealth beyond the continent.

to essential food items subsidized by their respective governments, and thus provide food security to those who fall below the safety net (NCBI 2019).

In addition to domestic mechanisms, external measures such as FDIs in 'unutilized' land can potentially help bolster food security in Africa. States could utilize land and water resources with the introduction of technology and capital, and turn these areas into productive farmlands. The gainful usage of land can assumedly lead to increased agricultural output and employment generation through value addition to agro-products—for domestic consumption and exports in intra-regional and international markets. However, a word of caution needs to be inserted here, because not all parcels of agricultural land in Africa have a land title document, and large tracts of these so-called unutilized lands are actually community-owned resources. They have complex patterns of customary usages by pastoral and localized groups, who have used these lands and water resources for grazing their cattle, rearing livestock and subsistence farming, for several generations. Conflicts over land have been pervasive across the continent, including for opposing FDI in land, such as in Ethiopia. In the aftermath of the 2008 global financial and food crisis, as a strategic response to problems of food security in countries with limited land and water resources, land acquisition took place at an unprecedented scale across Africa. Several of these deals ended up in huge controversies and conflicts between the state and external investors (see von Braun and Meinzen-Dick 2009).

Move from Foreign Direct Investments in Land to Contract Farming

In the past decade, private sector companies from India increased their footprints in the agriculture sector through Foreign Direct Investments (FDI) in land, for instance, in Ethiopia and Kenya. Land Matrix,[4] a global land monitoring initiative, has ranked India as one of the top ten investors in land for agricultural purposes abroad (Nolte et al. 2016: p. 22). India is the fifth largest investor on the continent with cumulative investments of US$ 54 billion, which has led to job creation for local citizens (MEA 2020). Incentives like good agro-climatic conditions,

[4] Land Matrix, 2018. Available at http://www.landmatrix.org/en/get-the-detail/all/.

abundant water resources, low labour costs, tax breaks, relaxed regulations and 'cheap' land rents have been pull factors for investments to countries in East Africa. Ethiopia, for instance, is classified as an LDC and is a member of several large trading blocs such as the Common Market for Eastern and Southern Africa (COMESA). The East African nation is also a signatory to the Africa Growth and Opportunity Act (AGOA), and offers its foreign investors privileged access to foreign markets, amongst other benefits (Mossneau and Sosnoff 2011: p. 16). Land deals in Ethiopia were also possible due to the strong convergence in the domestic political-economic policies of India and Africa. Both regions advocate privatization of public assets and reliance on free trade and open markets. Alongside, Ethiopia's developmental policy has been based on the commercialization of agriculture and reliance on foreign investments (Anwar 2015).

But land has proven to be an emotive and a highly contentious issue in Ethiopia, and across Africa. However, it is the case of the Bangalore-based agribusiness company, Karuturi Global Ltd. that grabbed headlines. It acquired large tracts of land in Ethiopia (and Kenya) on lease at 'throw-away' prices, to develop agricultural plantations, grow flowers, food crops and agro-fuels, mainly for exports (see Mittal 2013; Human Rights Watch 2012: p. 11; Nolte et al. 2016). In Ethiopia, the so-called vacant lands leased to foreign companies involved the forced relocation of about 1.5 million indigenous peoples who had usufructuary rights to these lands for generations, for cattle grazing and farming. The investing companies faced insurmountable problems, including lack of good infrastructure such as roads and electricity in remote areas; flooding of low-lying farms; more significantly, policy changes on investments in land; and protests by indigenous peoples. Amidst allegations against the company, of violations of human rights of indigenous peoples, non-payment of loans, and the cultivation of a mere 5% of the allocated land by 2014, the Ministry of Agriculture, Government of Ethiopia, revoked the contracts of Karuturi Global Ltd. in 2015 (Chandran and Gardner 2017). Subsequent to prolonged litigation with the government, the company was allowed to recommence commercial farming operations on a small scale. The first lot of crops was harvested in early 2019 (Karuturi 2019; Fikade 2018). In the given scenario, most of the other Indian companies that invested in land either withdrew or scaled down their operations. India's development cooperation with Africa through FDI in land has been cautious in anticipation of such sudden policy changes by the host governments.

It has been fraught with legal wrangles and has proven to be a difficult modality of investment.

The food crisis in India has led companies to explore the option of outsourcing food supply in order to maintain food prices and prevent them from rising uncontrollably. However, cognizant of the inherent risks involved, companies in India are now exploring, albeit cautiously, alternative mechanisms for collaborations in agriculture in Africa through approaches that are potentially synergetic, such as through contract farming with smallholder farmers. The specifics of the venture in the long run would be contingent on the type of crops to be cultivated, the scale of operations, the perceived spillovers and the benefits to the host community (Hallam 2009). New investment avenues in agriculture, which are a mix of production for exports and for the domestic markets, could garner the much-needed finances and technology for the agriculture sector, and work well for the recipient as well as for the partner countries that make these investments (see Saran, Chapter 10, this volume). Achieving food security in India and Africa through international trade, based on the logic of comparative advantage, has gained traction over the past decades, though this pathway has not been without several inherent limitations.

International Trading in Agro-Commodities

Opportunities for India and Africa

Agriculture contributed over 11% of Africa's total exports to India in 2017. Trading in agro-commodities between the partners was pegged at US$ 5.3 billion in the same year and is expected to grow over time (EXIM Bank of India 2019a). Thirty-three LDCs in Africa are beneficiaries of India's DFTP scheme that provides duty free market access to 98.2% of India's total tariff lines[5] (UN 2018). The top five products that Africa exports are 'edible fruit, nuts (largely unshelled fresh or dried cashew nuts) and peel of citrus fruit or melons'. Products in this category constitute 68.5% of India's imports of agro-products from Africa (EXIM Bank of India and Afreximbank 2018: pp. 26–27). In fact almost

[5]The DFTP scheme now provides duty free market access on about 96% of India's tariff lines (at HS 6 digit level of classification and 2.2% of the lines are under preferential duties). Only 1.8% of the tariff lines have been retained in the 'Exclusion List', with no duty concessions. Available at https://commerce.gov.in/writereaddata/pdf_download/DFTP.pdf.

90% of raw cashews are sourced from Africa, in addition to pulses, spices, fruit and nuts, and the most recent addition is mangoes from Malawi (Siddiqui 2019). The exclusion list of agricultural commodities includes milk and cream (with sugar), whole milk powder, some fruits and vegetables (e.g. apples and onions), processed cashew nuts, coffee, tea, some spices and oilseeds (e.g. linseed, sesame), wheat flour, beer, wine, etc. (INTRACEN 2015: p. 13). However, the main commodities imported from Africa under the DFTP scheme are minerals and fuels, pearls and precious stones, iron and steel, and copper.

Challenges Ahead

The two main hurdles in the export of agro-products from Africa are, inter alia: firstly, limitations to exports from LDCs, as several of the agro-products in Africa are on India's exclusion list, and secondly, knee-jerk policy changes by the stakeholders and its adverse impact on trade and investments (see Kulkarni, Chapter 11; Andrew, Chapter 12; and Mushi and Doctor, Chapter 13, this volume).

The exclusion list is a critical factor in deciding the value of agricultural exports from the continent to India. The import of agro-commodities from several LDCs will continue to have limited access, as there is little complementarity between the products from Africa and India's import requirements. At times, trade relations could be adversely impacted by unexpected changes in trade policies, as highlighted by the unprecedented ban by India, on the bilateral trade in pigeonpeas from Tanzania in 2017.

Impact of Policy Changes at Short Notice

In a knee-jerk reaction, the GoI banned the imports of pigeonpeas from Tanzania in 2017 (while India continued to import from Mozambique). During his four-nation visit (including Tanzania) in 2016, Prime Minister Narendra Modi encouraged the smallholders in Tanzania and Mozambique to grow pulses for exports, through the DFTP channel to India. The following year, many Tanzanian farmers who made a shift from growing cash crops to the cultivation of pigeonpeas were unable to sell them to India, because of a ban imposed by India on the imports of the pulses crop (see Kulkarni, Chapter 11 and Andrew, Chapter 12, this volume). The exports of the agro-product declined substantially due to quantitative import restrictions imposed by India. Since India imported

about 95% of all pigeonpea exports from Tanzania, the effect on trade and farmer livelihoods was grave (EAGC 2018).

The production of pulses in Tanzania too marked a decline from 2 MT in 2018 to 1.88 MT in 2019 (Ministry of Agriculture 2019), which may be a sign of farmers being demoralized due to withdrawal of an assured Indian market. Almost 73,000 MT of pigeon peas (worth US$ 100 million) remaining unharvested in Tanzanian farms (EAGC 2018). Tanzanian pigeonpea exports to India declined steeply from 132,178 MT (of the total exports of 144,451 MT) to 35,638 MT in 2020 (ITC 2020). The future of Tanzania-India trade has been downscaled. Traders in Tanzania have found new trade destinations, mainly in Asia and the Middle East and beyond—Pakistan, Oman, Egypt, Europe (mainly Portugal) and America, which have eased the problem for Tanzanian farmers to a large extent. The export data for 2018 indicates that Tanzania exported pigeonpeas to the tune of 85,865 MT valued at US$ 26.817 million (INTRACEN 2018). Many exporters in Tanzania are now installing processing facilities for value addition to pulses and sell ready for consumption pulses. This will increase competition for India in the international markets, because India currently exports processed pigeonpeas to several countries, including the USA (40.79%), UAE (18.28%), Canada (11.28%), UK (10.75%) and Singapore (5.11%) (Ministry of Agriculture 2019).

However, since India's carry over stock is not very high (Ministry of Agriculture 2019), she is expected to go back to countries like Tanzania and the international market very soon. Andrew, in Chapter 12 of this volume, provides critical perspectives on the exacting outcome of the knee-jerk policy changes on smallholders, such as through the ban on the imports of pulses by the GoI (see also Kulkarni, Chapter 11; and Andrew, Chapter 12, Mushi and Doctor, Chapter 13, this volume).

Trade Liberalization and its Impact on Africa

The lucrative business of trading in pulses with India has encouraged many farmers in Tanzania to shift from the cultivation of other cash crops to growing pigeonpeas. Trade liberalization premised on the logic of comparative advantage has led to distortions in trade, globally, wherein developing countries have become major exporters of agricultural cash crops such as tea, coffee, cocoa and tobacco. Denationalization of the food security agenda—i.e. with the shift in acreage of limited agricultural

resources like land and water—towards the cultivation of non-essential agricultural products for exports, has led to increased or total dependence of several African countries on imports of basic food grains to meet their domestic requirements. Food security declines in a country where 'national development becomes international and local economies become global' (Barkin 1987: p. 275). Trade liberalization has led to surges in imports at higher costs across several countries in Africa (Kwa and Shah 2008: p. 7; Modi 2014: pp. 73–76; UNECA and AUC 2011). The resultant denationalization of food policy by the respective state governments in Africa, has had disastrous consequences for the beleaguered agriculture sector and food security in their home contexts (Nanda 1995: pp. 20–30; Modi 2014: pp. 66–67).

The Coronavirus Disease: An Alert for Furthering Regional Food Security

The ongoing Covid-19 pandemic has led to a global lockdown and the unforeseen closure of state borders—regional and international. The resultant ban on travel has disrupted and brought to a grinding halt the movement of people and commodities, including agricultural products. With the disruption of long-established logistics and international supply chains of essential items, such as food and medicines, globalization per se and free trade based on the theory of comparative advantage, is under serious scrutiny. Strategies for the future will need to be reassessed and recalibrated for achieving food security at the district, national and the regional levels. Towards this end, governments need to increase public investments in agriculture with more expansionary fiscal and monetary policies than the International Monetary Fund (IMF) advises[6] (Rowden 2019). To sum up, the denationalization of the agricultural sector adversely affects both the food security and the poverty reduction agendas.

Thus far, countries in Africa have been incentivized for premature trade liberalization in order to earn foreign exchange through exports, more so in the backdrop of the declining sources of finances through external avenues. It needs to be noted that the rich countries actually protected

[6]The IMF pushes inflation and fiscal deficits to unnecessarily low levels, but few dare to do so at the risk of being cut off from the fund (Rowden 2019).

their industries by keeping import tariffs high until their domestic industries could compete in the international markets. But for much of the 1980s and 1990s, trade liberalization was a binding condition on African countries for access to loans from the IMF and the World Bank, and since 1995, a rule for membership to the World Trade Organization (WTO), albeit with a different timetable for the LDCs. Further, liberalization of import tariffs is often a requirement for free trade agreements at the regional and international levels, which may not work to the advantage of the domestic agriculture sector in several African countries.

Funding Agriculture: A Complex Landscape

A combination of factors such as the limited capabilities of African states to generate revenue from domestic resources for development (including a lack of political will to adopt progressive taxation structures and wealth taxes),[7] and a funding crunch due to the decline in Overseas Development Assistance (ODA) from traditional donors, has resulted in a marked decrease in bilateral and multilateral sources of funding to the continent in general, and the agriculture sector in particular. Further, the limited funds extended are being channelled to the social sectors—i.e. health and education. Therefore, the need for additional avenues of financing agriculture is essential for bridging the funding gap for this critical sector across the continent, particularly in the aftermath of the global financial crisis of 2008.

The shortfall in funding is currently being met through multiple avenues, which have added to the complexity of the development landscape on the continent. Private foundations and remittances from the diaspora (neither of which can be a substitute for public investment as a percentage of GDP) further complicate the dynamic and complex funding scenario on the continent. Countries in Africa have been exploring both domestic and external avenues for financing development. There are major investment gaps in key sectors such as agriculture. While international and domestic public finance remains essential to meet the SDGs—'poverty reduction' (Goal no. 1) and 'zero hunger' (Goal no.

[7] Progressive taxation, particularly wealth taxes on land holdings, would require more from the domestic elite. Instead, states follow the IMF advice to rely primarily on Value Added Taxes (VAT), which make the poor pay disproportionately more than the rich and keep the tax bases inordinately low.

2)—public resources alone will not suffice. With reference to the farming segment, there is a limited availability of resources through domestic funding channels, inter alia, agricultural and commercial banks, cooperatives, microcredit, and revenues from taxation. Therefore, there has been an ongoing and increasing reliance on external finances extended by the public and private sectors, and philanthropies from traditional donor countries of the Global North, and emerging economies of the Global South (Brazil, China, India, Turkey and others) over the past decade. China and India, amongst others, have been two key players in this domain. What is evident, however, is a palpable shift in the sources and the target sectors of ODA finances—from the public to the private sector, and from agriculture to the social sectors of health and education.

One significant source of financing development of the agriculture and allied sectors in Africa by India has been through the LOCs, extended by the EXIM Bank, at the behest of the GoI.

LOCs from India: G2G Partnerships

The GoI has extended trade finance via concessional LOCs across the agricultural sector and related value chains via long-term loans for sustainable agricultural development, food security and poverty reduction. The impacts of these LOCs and the associated inputs of technology and capacity building are evident in the upstream, midstream and the downstream sectors. These gains are perceptible and can be quantified in terms of increased agricultural output; of sugar, rice and cotton crops, and a decrease in the volume of imports of food grains in beneficiary countries in Africa. Several countries have worked for upscaling their agricultural outputs through these LOCs for improved storage facilities and agribusiness activities such as processing for value addition to agro-commodities (see Iyer and Mazumdar, Chapter 14; and Vazquez and Kottam, Chapter 15, this volume).

Streamlining of LOCs

Over the past years, concerns with regard to the implementation of the LOCs have amplified, in particular after the third India-Africa Forum Summit (IAFS-III) of 2015. In the immediate aftermath of IAFS III, the LOCs were streamlined to infuse greater transparency, accountability and accessibility to the bidding process for contracts associated with the

LOCs. The vast majority of the bids go to Indian firms and are therefore considered tied to 'project exports' to the tune of 'at least 75% of the value of the goods and services related to the contract, with a relaxation of 10% on a case-to-case basis' (EXIM Bank of India 2019b: p. 20) The LOCs benefit Indian companies and promote trade and investments in Africa, within the wider ambit of South-South cooperation. Over two-thirds of India's LOCs in the past decades have been extended to countries in Africa.

What is noteworthy is that over the past two years, there has been a gradual reduction in the gap between the amount of LOCs committed and their disbursal, mainly due to the evaluation of performance of older projects. Currently, 199 LOCs (2002 to March, 2020) valued at about US$ 12 billion have been extended to Africa, and the actual amount disbursed is US$ 9.72 billion (EXIM Bank 2020). Therefore, the gap in disbursement is about US$ 2.25 billion, or 19%, of the amount committed—a reduction from about 40% in the pre-2015 payouts of LOCs and shortly thereafter, to under 20% at present (see Vasquez and Kottam, Chapter 15, this volume).

Over the past few years now, there has been a growing emphasis on the role of the private sector in financing and partnering for development.

Enhanced Role of the Private Sector

The Financing for Development (FfD) document envisions that the role of 'international public finance, including ODA, is to catalyze additional resource mobilization from other sources, public and private' (UN 2015: para. 54, p. 27). Private enterprise and capital may have a crucial role to play in driving sustained economic growth and development in Africa.

There has been an enhanced role of the private sector, subsequent to the call for business engagement in Agenda 2030 to 'engage as partners in the development process, invest in areas critical to sustainable development and share their creativity and innovation for solving sustainable development challenges' (UN 2015: para. 35, p. 17). The private sector is diverse and ranges from micro-enterprises, cooperatives to multinationals (UN 2015: para. 35, p. 17). The nature of private international capital flows is wide ranging and includes, inter alia, FDI and blended finance (private capital + philanthropic funds). FDI is concentrated in a few sectors and often has short-term goals. The challenge is particularly acute in the Least Developed Countries (LDCs), which have experienced a

recent decline in Official Development Assistance (ODA) and find it difficult to attract private sector investments, including FDIs. Of all the private finance mobilized by official development finance (2012–2017), only about 6% went to the LDCs. The top five recipients of blended finance are; Angola, Senegal, Myanmar, Bangladesh and Zambia, accounting for 44% of the total volume of private finance mobilized (UNCFD, n.d.). Over 70% of blended finance is extended to middle-income countries wherein the preferred sectors are energy, banking and financial services.

India will play a major role in shaping the outcome of Agenda 2030, as an emerging economy, a leading partner in South-South cooperation and a major player on the international stage. India and Africa are working on multi-actor partnerships for an operational framework of low cost and high impact projects through the IBSA Trust Fund. It is hoped that these shifts from the traditional aid regime will amplify the resources directed to the field, increase aid effectiveness and encourage innovation and flexibility in the use of limited resources. The thrust is on effectiveness of aid, assessment, monitoring and evaluation mechanisms. This is to ensure that the stakeholders are 'paying for results'—such as through the new mechanism of the private sector-led Development Impact Bonds (DIBs) in the development cooperation landscape, including in the farming and related sectors (see Simplicio and Jardim, Chapter 16, this volume).

The Way Forward

The contributions of agriculture and the allied sector towards poverty reduction is proven across a range of countries, including in India and China (for details, see Modi 2019: pp 401–406). While several collaborative initiatives (some of which have been outlined in this book) are being undertaken between Africa and its global partners like India, the efficacy of these initiatives could be enhanced through increase in state capacity in Africa—to design, plan and implement the continent's development goals, such as for food security. After the Structural Adjustment Programmes (SAPs) imposed in the 1980s, several states on the continent embarked on the route of 'trade liberalization and economic deregulation that weakened the capacity of states—including their capabilities to develop domestic manufacturing—which has impeded the realization of Africa's development goals' (UNECA and AUC 2011: p. 1). Today, a number of countries on the continent have allocated Africa's natural resources towards the production of cash crops for exports, which has

resulted in a concomitant shortfall in food grains for domestic markets and led to a surge in the imports of food (UNECA and AUC 2011: para. 13, p. 3).

Clearly, the 'roll back' of the state within the neoliberal framework, and the denationalization of the food security agenda, has been inimical to the food security situation in several countries across the continent (UNECA and AUC 2011: para. 18, p. 4).

Lessons from across the world, including from China and India, acknowledge the central role of the state in the development of the agriculture sector, based on their nationally determined goals for upscaling food security and poverty reduction. The ongoing discourse on enhancing food security in Africa also emphasizes the supporting role of 'external players, including the private sector, for financing development', to expedite growth and structural transformation (UNECA and AUC 2011: p. 8) (see also Singh, Chapter 2; Krishna Kumar and Sharma, Chapter 7; Venuprasad et al., Chapter 9; Saran, Chapter 10; and Simplicio and Jardim, Chapter 16, this volume).

The Amplified Role of the African State

African states have a more onerous role to play at this juncture in order to effectively monitor and regulate the private sector, so that they work in a transparent and accountable manner. Alongside, states have the responsibility of facilitating a business-friendly environment, putting in place adequate infrastructure and a stronger regulatory framework for a 'predictable investment climate, contract enforcement and respect for property rights, labour rights, environmental and health standards as per international standards' (UN 2015: p. 17).

The Civil Society Organizations (CSOs) are key stakeholders while planning and working on development sectors, such as farming and poverty reduction (see UNECA and AUC 2011: pp. 10–11; see also Nanavaty, Chapter 8, this volume). CSOs in Africa have expressed concerns about whether the African governments have ownership of the development process while engaging with emerging actors, such as China and India.[8] This concern is perhaps borne out of the reality that there

[8] Integrating South-South cooperation, North-South cooperation and multilateral donor frameworks, has been an ongoing challenge for the African Union (AU). The impact of climate change, for instance, predictably, will be damaging on the African subcontinent.

is very little information and transparency, for instance, in the leasing of land to foreign investors or the sensitivity of the impact of FDI on the land rights and livelihoods of peasant farmers.

The global community has attempted to create a set of higher benchmarks for the private sector, in areas of human rights, labour, environment, anti-corruption and sustainable development. Multilateral bodies such as the United Nations have outlined the UN Global Compact and the Voluntary Guidelines on Responsible Governance of Tenure of Land and Other Natural Resources (FAO 2012).

For a broader consensus, there is a need to appraise the outcomes and impact of the South-South (and North-South) flows of investments, capacity building initiatives, and trading between India and Africa, in the farming sector. There is a scarcity of global resources, mutual learnings and sharing of developmental experiences in the agriculture sector. Therefore capacity building through collaborations between India and select countries in Africa for scientific interventions; cost effective and appropriate technologies; value addition to agro-commodities, and synergetic modalities of investments in agriculture can support smallholder agriculturists in both geographies. State-led partnerships with multiple stakeholders, including the private sector, wherein the latter can work in tandem with the nationally determined priorities of the states can 'better align [its] incentives with public goals such as poverty reduction and inclusive growth' (UN 2015: p. 17). Partnerships between India and Africa to bolster food security and reduce hunger amongst their two billion inhabitants can contribute to societal benefits and further the SDGs of 'no poverty' and 'zero hunger' (Global Goals no. 1 and no. 2, respectively).

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Amidst these challenges, to secure and enhance agricultural productivity, implies the need for the implementation of coherent and integrated policies, at the national, regional and international levels.

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Appendix I: List of African Least Developed Countries (LDCs) under the Duty Free Tariff Preference Scheme[1]

1. Angola
2. Benin
3. Burkina Faso
4. Burundi
5. Central African Republic
6. Chad
7. Comoros
8. Democratic Republic of the Congo
9. Djibouti
10. Eritrea
11. Ethiopia
12. Gambia
13. Guinea
14. Guinea-Bissau
15. Lesotho
16. Liberia
17. Madagascar
18. Malawi

[1]As of 2018, out of the 47 LDCs under the DFTP scheme, 33 are in Africa

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19. Mali
20. Mauritania
21. Nepal
22. Niger
23. Rwanda
24. Sao Tome and Principe
25. Senegal
26. Sierra Leone
27. Somalia
28. South Sudan
29. Sudan
30. Togo
31. Uganda
32. United Republic of Tanzania
33. Zambia

Source United Nations (UN). (2018). List of Least Developed Countries (as of December 2018). *Committee for Development Policy (CDP)*. https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/ldc_list.pdf. Accessed 13 December 2019.

Appendix II: First India-Africa Forum Summit 2008, New Delhi: India-Africa Framework for Cooperation 2008

The Heads of State and Government and Heads of Delegation of Africa, representing the Continent, the African Union and its Institutions along with the Prime Minister of the Republic of India, recognizing the rich history of Africa-India relationship and noting with satisfaction the existing close, deep and multi-layered relations between the two sides and realizing the need to give a new dimension to this cooperation, have decided to adopt this Framework for Cooperation between Africa and India.

The two parties agree to cooperate in the areas enumerated herein.

Economic Cooperation

As a conducive and supportive international economic environment is important for Africa and India in their quest for a mutually beneficial economic development, the two parties hereby recognize the need to foster such environment by reinforcing efforts to promote between them, trade and industry, foreign direct investment (FDI), development of small and medium-scale enterprises (SMEs) and Africa's regional integration. In this regard, the two parties have agreed to cooperate in the following areas:

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i. *Agriculture*: Africa and India agree that agricultural development is an effective approach to ensure food security, eradicating poverty and improve peoples' livelihood, and agree to strengthen Africa and India cooperation in this sector in order to improve the food security of Africa and to increase its exports to world markets. They emphasize sustainable development of agricultural and animal resources with effective support for scientific research for conservation of land and environment. The cooperation will focus on the following areas:

- Capacity building and sharing of experience in policy analysis and planning relating to agriculture sector;
- Cooperation in water resource management and irrigation practices, agro-infrastructure development, transfer of applied agricultural technology and skills transfer;
- Cooperation to combat agro-based diseases;
- Capacity building/training for increasing the capacity of small landholder African food producers to comply with the required quality and safety standards, including extension activity and agricultural credit policies;
- Sharing experiences and information on appropriate storage and processing technologies and jointly promoting the uptake of African and Indian developed technologies for diversification and value addition in relations to food and agricultural products;
- Sharing of expertise and information between commodity boards of Africa and India with a view to learning from each other's experiences in farm mechanization, post-harvest technology, organic farming, policy and regulatory frameworks and setting up of cross-border commodity exchange boards;
- Enhancing market opportunities for African value-added agricultural products;
- Cooperation in livestock management, breeding technologies, meat processing, dairy industry development, fisheries and aquaculture, including exchange and transfer of applied technology;
- Establishing linkages between agriculture and industrial development in order to support and nurture agro-processing industries;

- Enhancing cooperation between agricultural training centres and relevant research institutes.

ii. *Trade, Industry and Investment*: Africa and India recognize the need to expand the two-way trade, greater market access and investment facilitation and decide to take the following steps:

- Technical assistance and capacity building in trade negotiations, dispute settlement and implementation of different agreements under WTO, as well as in enhancing competitiveness in the world economy;
- Strengthening linkages of enterprises on both sides with a view to developing global markets for products and services available on both sides;
- Maximizing the benefits of trade liberalization through improved market access for products of export interest to African countries and India, including striving to provide duty-free and quota-free market access for African products;
- Promoting and facilitating enhanced trade cooperation between the two sides, including through value addition/processing;
- Organization of business delegations and participation in trade fairs and exhibitions;
- Preparation of a Joint Strategy and Action Plan for mapping of resources and opportunities for entrepreneurship development and facilitation aimed at mutual growth;
- Developing and implementing projects for information dissemination regarding entrepreneurship opportunities on both sides, business-to-business contacts, such as through business conclaves and upgrading of trade facilitation through commercial missions of both sides;
- Enhancing corporate governance and social responsibility;

iii. *Small and Medium-Scale Enterprises (SMEs)*: Africa and India recognize that for a sustainable and successful industrial policy, development of micro, small and medium-scale enterprises is necessary as the first step towards industrialization in African countries. With that objective in focus, the following steps will be taken:

- Capacity building through entrepreneurship development programmes;
- Capacity building on policy formulation and institutional framework development for the SMEs;
- Promotion of joint ventures between business enterprises of Africa and India;
- Training in Africa and India for upgrading of skills in the areas of conventional and hi-tech training;
- Promoting the export of SME products, including projects on turnkey basis.

iv. *Finance*: Recognizing the importance of the financial sector, cooperation in the following areas is decided:

- Sharing of experiences and capacity building on policy and regulatory frameworks in the financial sector including the microfinance sector;
- Sharing of experiences in mobilization of domestic savings;
- Capacity building in development of automated trading systems for stock exchange and development of cross-border stock exchanges, such as Pan-African stock exchanges;
- Mobilization of financial resources to fund the various projects envisaged in the areas of cooperation.

v. *Regional Integration*: Recognizing the importance of regional cooperation and economic integration in development endeavours, Africa and India decide as follows:

- Provision of financial support to mutually agreed integration programmes carried out by the African Union and the RECs, especially those of inter-regional and continental importance;
- Promotion and support for regional and inter-regional projects, including infrastructural development; and
- Provision of technical assistance to support the establishment of the financial institutions of the African Union.

Political Cooperation

Bearing in mind that peace, security and development are inseparable as there can be no lasting development without peace and recognizing the need for closer cooperation in the field of governance structures and civil society, India resolves to support Africa in meeting her objectives of sustainable development, prosperity and peace through the following steps:

i. *Peace and Security*:

- Cross-fertilization of the experiences of the AU and India in peacekeeping and post-conflict reconstruction efforts taking into account the AU's Policy Framework for Post-Conflict Reconstruction and Development (PCRD);
- Cooperation in undertaking lessons-learned exercises and sharing of experiences regarding the role of women in peacekeeping operations;
- Cooperation in developing and implementing training of trainers towards enhancing the civilian component of peacekeeping operations;
- Technical assistance and capacity building to tackle the challenge of money laundering and terrorist financing;
- Cooperation in duplication of the Female Formed Police Unit;
- Cooperation in developing and implementing a Training of Trainers Programme towards effective policing and police support as part of peacekeeping operations;
- Sharing of experiences and information to enhance capacity to fight international terrorism, including through the African Centre on the Study and Research on Terrorism;
- Cooperation in combating drug trafficking, as well as trafficking in women and children; and
- Technical assistance and capacity building in disaster management and humanitarian intervention.

ii. *Civil Society and Good Governance*:

- Cross-fertilization of ideas on decentralization of governance and building capacity of local governments through administrative reforms and enhancing public participation in local and central government;

- Establishing a platform to initiate, deepen and maintain cooperation in civil establishments and training institutes in Africa and India on various relevant issues;
- Create a joint platform for discussion of global political and economic issues with a view to reinforcing South-South positions that will enable Africa and India to have greater leverage in the international fora;
- Cross-fertilization and sharing of experiences on public service reforms and human rights regimes with a view to strengthening mutual competences in these areas;
- Sharing of experiences on strategies for deepening democratization at the local level, management of ethnic diversity and wealth distribution in a democratic context and the professionalization of the public services;
- Exchange of expertise and sharing of experiences on the conduct of elections in vast and complex terrains;
- Sharing experiences in harnessing resources from Diaspora;
- Helping to strengthen the African Court on Human and Peoples' Rights;
- Interaction of legal experts/lawyers through Bar Associations;
- Cooperation in legal research methodology and in emerging international legal issues, such as the mechanisms, processes and regulatory frameworks that support outsourcing.

iii. *Science, Technology, Research and Development*:

a. Science and Technology:
- Developing robust networks among leading institutes for Science and Technology for collaborative research and development;
- Sharing experiences in technology transfer and development of appropriate technology;
- Sharing experiences in capacity building for strengthening the role of science and technology;
- Cooperation in setting quality standards and recognition awards in science, technology and innovation;
- Cooperation in management of intellectual property, including indigenous knowledge.

b. Information and Communication Technology (ICT):
- Recognizing that information technology is emerging as one of the major vehicles of economic growth and has

become fundamental part of infrastructure and improvement of myriad sectors of socio-economic activities, Africa and India agree to take the following steps:

- Cooperate closely to ensure quick and effective implementation and roll-out of the Pan-African E-Network Project being funded by India. The project will be a major step forward in removing the digital divide, ensure connectivity of all African countries and provide much-needed telemedicine and tele-education to the masses of African countries;
- Cooperate in the implementation of the digital solidarity mechanism developed within the framework of NEPAD;
- Cooperation in capacity building in devising model legal and policy frameworks for ICT, such as on e-Commerce, e-Governance, e-Health, etc.
- Cooperation and information sharing among ICT regulatory bodies;
- Development of Information and Communication Technology tools and applications aimed at improving public administration at different levels of government, taxation management, public financing and delivery of public services;
- Promotion of cooperation in the range of non-material knowledge-based human resources such as technology, organization, information, education and skills development;
- Cooperation in setting up Community Information Centres using IT to accelerate socio-economic development, with a view to providing rural connectivity and bridging the digital divides.

Cooperation in Social Development and Capacity Building

i. *Education*:

Africa and India recognize that human resource development is vital to achieve the socio-economic development goals of Africa and universal mass education is a key factor in this endeavour. To achieve universal

education with special emphasis on quality and gender equality, Africa and India will collaborate in the following areas:

- Sharing experiences and building capacity for educational policy planning and administration through the effective utilization of financial and statistical information on education;
- Increasing the scholarships available for Africa from the Indian Technical and Economic Cooperation (ITEC) programmes with focus on science, technology and information technology-related courses;
- Sharing of experiences and best practices in 'Mid-day Meal Programme';
- Collaboration in the development and production of teaching and learning materials, including equipment for teaching science and technology and textbooks, especially for universities;
- Collaboration in designing and implementation of Open and Distance Education/Learning Programmes with attendant capacity building for personnel required, such as teachers and ICT technicians;
- Establishing programmes for exchange of students and staff through twinning leading African and Indian Universities;
- Cooperation in equipping scientific laboratories and training workshops for Technical and Vocational Education;
- Cooperation in establishing programmes in capacity building and entrepreneurship for youth through ICT.

ii. *Health*:

Africa and India acknowledge that upgrading and streamlining healthcare systems and increasing access to health care for the people of Africa and India is a critical issue and agree to increase cooperation in the field of health promotion and healthcare systems through the following areas of cooperation:

- Sharing experiences, information and expertise on traditional systems of medicine within recognized intellectual property regime;
- Training and capacity building for health professionals and physicians;

- Sharing experience and information on healthcare systems development and community health programmes;
- Linking the centres of excellence in the health sector, such as research and training institutes;
- Focus on cooperation in devising and implementing programmes for enhancing universal access to adequate medical services, including developing the telemedicine infrastructure and technology to enable patients to receive quality health services, such as medical diagnostic and other services to which they would not ordinarily have access due to distance and/or limitation in the availability of specialists;
- Strengthen the indigenous manufacturing capacities and to make available affordable and quality pharmaceutical products, especially essential medicines. This may also include exchange of technical experts and collaborative efforts;
- Enhance cooperation in controlling HIV/AIDS, TB, Malaria and other communicable diseases; cooperation in combating the proliferation and dumping of counterfeit medicines; local production of oral rehydration therapy.

iii. *Water and Sanitation*:

In both Africa and India, many communities lack access to adequate and safe drinking water, as well as basic sanitation resulting in prevalence of diseases related to poor hygiene and environmental sanitation. In order to achieve the MDGs and the Johannesburg Declaration on Sustainable Development and Plan of Action, efforts have to be doubled particularly during 2008, the International Year of Sanitation. In this connection, cooperation could focus on sharing experiences and promoting programmes in the following areas:

- Development of sanitation infrastructure, particularly in urban and sub-urban settings;
- Urban development, in particular, combating the mushrooming of slums and shanty towns;
- Waste management, putting in place appropriate framework for water quality control and water treatment.

iv. *Culture and Sports*:

Recognizing the need to enhance mutual understanding and friendship between different nations and ethnic groups and achieving common prosperity and progress of mankind, as well as underlining the importance of cultural exchanges and cooperation, Africa and India resolve to enhance cultural relations between the two sides. To this end, focus will be given to the following areas:

- Encourage people-to-people contacts and exchanges to deepen the traditional friendship between the two sides;
- Strengthen contacts among young people through encouraging and supporting exchange of students among schools and universities;
- Encourage the visit of professors under the bilateral cultural exchange programmes at prestigious universities in Africa and India and encourage creating/maintaining chair of African/Indian studies;
- Encourage bilateral cultural exchange programmes of performing art troupes and art exhibitions;
- Foster closer linkages in the film industry sector and encourage holding of film festivals, as well as increase interaction and cooperation for the film industry of Africa and India;
- Cooperation in the area of sports.

v. *Poverty Eradication*:

A significant percentage of the population in Africa and India live below the poverty line and many of the working poor lack social protection. Unemployment and underemployment, particularly for the youth, resulting in internal and external migration are contributing to unplanned rapid urbanization. These are serious issues for both Africa and India and both can cooperate to resolve these problems in the following areas:

- Strengthening cooperation in the framework of the implementation of the Millennium Development Goals (MDGs);
- Cooperation in the implementation of poverty alleviation strategies;
- Sharing experiences in employment creation and business management;

- Development of social security systems;
- Sharing of best practices in development of credit unions, especially in rural settings.

Tourism

As a significant industry that provides economic benefits and promotes friendship and sociocultural understanding among nations, Africa and India hereby resolve to continue to promote the growth of tourism, as well as expand people-to-people exchanges in their two regions to further promote understanding, trust and cooperation between their peoples. To this end, focus will be given to the following areas:

- Promotion of close interaction between relevant authorities in Africa and India to facilitate coherence of policies and initiatives related to tourism development;
- Adoption of appropriate measures to prevent all threats to tourism, which may have direct impact on tourism;
- Strengthening of partnership with the private sector especially travel agencies, hotels, airlines and other tourism-related establishments, as well as the media, with a view to advancing tourism development between the two regions;
- Promotion of general tourism and offering joint tourism packages, including eco-tourism, to utilize the geographical diversity of the two sides.

Infrastructure, Energy and Environment

Recognizing that energy and infrastructure is fundamental to the economic growth of developing countries and acknowledging that infrastructural development and environmental sustainability are some of the priority areas of NEPAD, Africa and India agree to place energy, infrastructure and environmental sustainability as one of the key areas of cooperation and commit ourselves to the following areas:

- Development of public–private partnerships in infrastructure development;
- Cooperation in the development of transport and telecommunications networks;

- Cooperation in the field of exploration and exploitation of natural resources, as well as value addition;
- Creation of enabling environment for investment and development of renewable and non-renewable energy sources;
- Cooperation and capacity building in best practices and adaptation on the impact of climate change and desertification;
- Exchange of experiences on recent advances on alternative energy sources and sustainable land management;
- Development of cooperation in fibre optic cables construction around and within Africa for broadband access network specifically for landlocked countries;
- Technical cooperation for Clean Development Mechanism (CDM).

Media and Communication

Africa and India agree that closer linkages and cooperation in the field of media and communications will generate greater synergy in their relationship, enhance a South-South communication culture, enable more systematic use of their shared cultural and social heritage and also improve the process of economic development in Africa and India. In this regard, they have decided to focus on cooperation efforts in the following areas:

- Cooperate to promote common South-South strategies on flow of information in media;
- Enhance linkages among news agencies;
- Enhance training in human resource development, corporate communications and modern technology in media developments.

Without prejudice to India's ongoing and future programmes at the bilateral, REC and other levels, we agree to develop jointly, within a period of one year, a joint plan of action at a continental level and an appropriate follow-up mechanism to implement our Framework for Cooperation.

Source India-Africa Forum Summit. (2008). First India-Africa Forum Summit 2008, New Delhi: India-Africa Framework for Cooperation 2008. *GoI*. http://iafs.gov.in/documents-detail.php?archive_id=3. Accessed 5 October 2019.

Appendix III: Second Africa-India Forum Summit 2011: Africa-India Framework for Enhanced Cooperation

The Heads of State and Government and Heads of Delegations of Africa, representing the Continent, the African Union and the Regional Economic Communities (RECs), along with the Prime Minister of the Republic of India, noting with satisfaction the progress made in the implementation of the Africa-India Framework of Cooperation and its Plan of Action of March 2010, and agreeing to give additional substance to the partnership and to widen its scope, decide to adopt this Framework for Enhanced Cooperation between Africa and India.

Africa and India agree to continue their cooperation in the areas enumerated below:

Economic Cooperation

Africa and India reiterate the mutual desire to expand economic cooperation and trade and investment linkages between them. Recognizing that trade and investment between Africa and India have increased, both Africa and India agree to take further measures to continue to create a positive ambience for such enhanced flows. Africa has also effectively utilized concessional financial flows from India to Africa for supporting the development of its infrastructure industry and services. Both sides agree to further expand cooperation and sharing of experiences to increase trade,

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investment and financial flows between India and Africa as they provide a common paradigm of cooperation in the true spirit of South-South engagement.

i. *Agriculture*

Africa and India reaffirm their commitment to cooperate for increasing agricultural output and achieving the Millennium Development Goal of halving the proportion of people who suffer from hunger and malnutrition by 2015. They emphasize the importance of harnessing the latest scientific research for raising productivity and for the conservation of land and the environment in order to ensure food security for their people and to bring down the currently rising cost of food prices so as to make food affordable for all. In this respect, they agree to collaborate in the implementation of the Comprehensive Africa Agricultural Development Programme (CAADP).

ii. *Trade, Industry and Investment*

Africa and India recognize that enhanced trade and economic linkages would further contribute to sustainable growth and economic development in both Africa and India and welcome the contribution by India to build value addition and processing facilities in Africa.

Africa values private investment and financial flows on a concessional basis, which have been received from India and wishes to enhance their usage for building its infrastructure and enhancing the capacity of Africa to increase its exports. The value addition provided by Indian investment in Africa contributes to Africa's exports to third countries and to the development of intra-Africa trade. Both Africa and India will continue to work together to take these initiatives further.

Africa has also welcomed the Duty Free Tariff Preference Scheme for Africa's LDCs unilaterally announced by India at the time of the first India-Africa Forum Summit in 2008. It has significantly contributed to the ability of African countries to access the growing Indian market and contributed to the creation of complementarity in their export baskets. Africa and India will together endeavour to increase awareness and usage of this Scheme.

In the Action Plan of the Framework of Cooperation of IAFS-1, several initiatives were taken to build African capacities so that African human resources could join the process of industrialization and development of the services sector. Africa and India propose to continue to develop more such initiatives so that the growing young population of Africa finds suitable training and integration into the increasing economic opportunities in Africa.

Support to the legal and regulatory environment for public–private partnerships, particularly in infrastructure, operationalization of bilateral agreements on investment promotion and protection between India and African countries and support to the development of capacities in the Chambers of Commerce in Africa, would be among the new priorities to be pursued.

African countries have found the India-Africa Project Partnership Conclaves to be useful vehicles for bringing Indian and African entrepreneurs and decision makers together. These would be continued.

iii. *Small and Medium Enterprises*

As Africa moves towards more rapid industrialization, there is a growing recognition that small, medium and micro enterprises offer significant avenues for supporting industrialization, generating employment and enhancing local capacities. Institutional support for the development of SMEs in Africa will be provided through the vocational training centres offered by India and the linkages between SMEs on both sides through the Conclaves and other activities by Chambers of Commerce and Industry. Africa and India will continue to work together on such initiatives, particularly to support the creation of entrepreneurship development and business incubators in Africa. It is the common endeavour of both that in the capacity building initiatives to be undertaken in the future, support to the private sector would be an integral part of the new efforts.

iv. *Finance*

One of the salient features of the first Africa-India Forum Summit and its Action Plan was the commitment by India for new financial flows to assist African countries in the true spirit of South-South cooperation. Besides the grants for establishing capacity building

institutions in Africa, there was an important commitment for concessional lines of credit to support the economic development of African countries and for regional integration. These have been augmented by significant private sector flows through FDI into Africa. Both Africa and India will work together to enhance the efficacy and spread of these financial flows so that the common objectives are fully met. India remains committed to supporting Africa with concessional lines of credit and suitable grants for mutually beneficial projects. Greater efforts will be made to utilize these flows for regional integration projects.

There would be an increasing focus to enhance engagement between African and Indian financial institutions and an encouragement for closer relationship between commercial banks in Africa and India. Encouragement will be provided to the opening of branches of Indian banks in Africa and African banks in India to participate in the growing matrix of financial flows between Africa and India.

v. *Regional Integration*

Africa and India reiterate the importance of the Regional Economic Communities in Africa and their contribution to economic integration within themselves and in Africa. India has an important engagement with the Regional Economic Communities of Africa as part of its multi-tiered cooperation. Both Africa and India recall the first-ever meeting of India with the African RECs held in November 2010. In recognition of this, both Africa and India agree to build capacities for effectively carrying out the implementation of the integration agenda among the Regional Economic Communities, including in providing financial support to regional integration projects and capacity building programmes among the RECs.

Political Cooperation

Africa and India are conscious of the important role they play in the world and agree to intensify political cooperation. Their common endeavour will be to continue to strive for peace and security as such harmonious policies will allow the fructification of the enhanced agenda of cooperation currently agreed upon. In this respect, the African Union would consider,

as soon as possible, the establishment of an office in New Delhi, India, as recognition of the close partnership that exists between Africa and India.

i. *Peace and Security*

Peace and security are essential to progress and sustainable development, which are common goals for Africa and India. Both Africa and India will continue their close cooperation, including through regular consultations at the United Nations, at the African Union and in New Delhi. Both will work towards an early operationalization of the African Standby Force through special training programmes.

ii. *Civil Society and Governance*

Africa and India recognize the importance of democratic governance and of promoting and protecting human rights. They also recognize the importance of decentralization, the promotion of local government and the need to strengthen the institutions of parliamentary democracy and elections. They agree to enhance cooperation by sharing of experiences and capacity building, where necessary, among Election Commissions, the institutions of parliamentary democracy and media organizations. They also agree to cooperate in the strengthening of the African Court of Justice and Human Rights through sharing of best practices and capacity building of the court. Africa and India will also encourage interaction of legal experts/lawyers through the Bar Associations. They will also exchange experiences on best practices, research and human resources within the framework of decentralization and local governance alongside the Conference of Ministers of Public Services and Administration and ECOSOCC.

Cooperation in Science, Technology, Research and Development

The development of science and technology and research capacities is an integral part of the process of development. Africa greatly values the progress made by India in its scientific and technological development and believes that it can engage with India in these sectors, especially knowledge and technology transfer for mutual benefit. Africa and India are convinced that harnessing the knowledge economy can make hunger

and want things of the past. They agree to intensify cooperation in the following areas:

i. *Science and Technology*

Africa welcomes the establishment of the Special Agricultural Scholarship Scheme and the Special Science & Technology Fellowship Scheme (CV Raman Fellowships) under the provisions of IAFS-1 and looks forward to continuing this engagement to build scientific and technological human resource in Africa, including through the Pan-African University for which Africa has requested India, to be the Lead Partner in the Life and Earth Sciences segment. Management of natural disasters, combating desertification and support to scientific institutions in Africa would continue. Initiatives to enhance linkages between scientific institutions in Africa and India would be undertaken and training on health-related issues like HIV, TB and Malaria will be explored. The African-Indian Science and Technology Conference will also be organized.

ii. *Information and Communication Technology*

Africa has immense regard and admiration for the strides made by India in the development of its information and communications technology. The contribution of the Government of India towards developing the infrastructure and the resourcefulness of the private sector and India's scientific and technological manpower in allowing this sector to make important contributions to the growth of GDP in India, are well recognized in Africa. Africa and India recognize the importance of an early introduction of information and communication technologies as key enablers of capacity building for youth and for poverty eradication and accelerated growth. Africa recognizes the important contribution made by the Pan-African E-Network Project to African countries in achieving these objectives and both Africa and India commit themselves to taking the lessons of the implementation and efficacy of the Pan-African E-Network Project further, so that the digital divide can be bridged and the socio-economic benefits of ICT can be harnessed for their mutual objectives.

Cooperation in Social Development and Capacity Building

Africa and India both recognize the importance of capacity building, particularly as both are young societies and want to translate the demographic dividend into effective growth. The successful utilization of the ITEC programme offered by India has been a manifestation of the South-South cooperation that effectively exists between Africa and India. The enhancement of scholarships and training positions under the ITEC programme, as well as the creation of new courses for training of African nationals in specified areas, all emerge from the Action Plan of the Framework of Cooperation of IAFS-1. Africa and India would endeavour to continue to take these important initiatives forward together. India is committed to their enhancement.

Africa has been appreciative of the 21 new capacity building institutions, which India is in the process of establishing in Africa in diverse sectors. These will greatly assist African human resource development for the development of industries and the service sector to contribute to growth. Both India and Africa will continue to strive to have an early conclusion of the implementation of the process to establish these new institutions in close collaboration between the Indian implementing agencies, the host governments and the African Union. They will make efforts to have effective governance strategies and business plans for these institutions to make them sustainable. India remains committed to further enhancement of this approach of building African capacities in Africa.

Pan-Africa E-Network Project: Africa and India have both recognized the successful implementation of this visionary project. It has added capacity and value in the critical fields of education and health care in African countries. Its fulsome utilization will remain one of the major objectives of the Framework of Enhanced Cooperation and efforts will be made to enhance its utilization, widen its scope and increase its success rate so that the true objectives of assisting Africa in meeting its millennium development goals on education and health could be achieved.

Africa and India will continue to work together to increase exchanges in education, health, water and sanitation, culture and sports and poverty eradication through innovative new programmes as well as commit themselves to effective implementation of programmes agreed upon earlier in the Action Plan for the Framework of Cooperation. Special care would be taken to encourage greater investment in some of these sectors as well as to increase financial flows from the government sector to achieve these

objectives. India is committed to continue with increasing number of scholarships both for undergraduate and postgraduate studies including in specialized areas like agriculture, science and technology and other priorities listed in this Framework for Enhanced Cooperation.

Cooperation in Health, Culture and Sports

i. *Health*

In the area of health, Africa and India reiterate their conviction that the promotion of health is critical in the development of the human capital necessary to drive socio-economic growth. They look forward to the outputs and recommendations of the India-Africa workshop on traditional medicine to be held in India and undertake to implement the outcome. They reaffirm their commitment to enhance collaboration in the application of advancement in science, technology, research and development to training in the area of HIV, TB and Malaria; the provision of basic medical services in rural areas, the deployment of Telecoms and ICTs in support of telemedicine and e-health applications; strengthening of public–private sector collaboration in the areas of pharmaceutical and procurement in Africa and India in the framework of the Pharmaceutical Manufacturing Plan for Africa, the fight against counterfeit medicines.

They also undertake to pursue dialogue on intellectual property rights and access to medicines; research and development in traditional medicine and practices in Africa and India; sharing of experiences, specialized expertise and best practices in health-care systems development and community health programmes; support for Africa's Campaign on Accelerated Reduction of Maternal Mortality in Africa (CARMMA); and training and continuing education for health professionals.

ii. *Culture*

Noting the role that culture can play in the development and integration of their societies, specifically through the use of creative and cultural industries, Africa and India agree to collaborate in the development of cultural policies and will undertake the following: Exchange of experiences in the area of the development of creative industries and cultural goods so as to increase the contribution of culture to the development of their nations and collaborate in

the organization of international training for trainers in the field of cultural goods protection.

iii. *Sports*

Considering the paramount role that sports can play in the development and integration of their societies, specifically through the use of sports as a tool for development and desirous to advocate for well-designed sports and play programmes, as powerful tools for fostering health, child and individual development, teaching positive values and life skills, strengthening education and improving health and well-being, Africa and India agree to collaborate in the development of sports policies, exchange of experiences in the area of the development of sports and the training of trainers in the field of qualified sports personnel.

Cooperation in Tourism

Africa and India are deeply conscious of their age-old ties at the people-to-people level. As neighbours across the Indian Ocean, Africa and India are in favour of providing greater connectivity between the countries of Africa and India and to increase the level of popular exchanges. Tourism and connectivity remain important areas which could provide economic benefits and also contribute to enhanced mutual understanding. Africa and India therefore agree to strengthen partnership with the private sector especially, travel agencies, hotels, airlines and other tourism-related establishments, as well as the media, and take other necessary steps that will enable harmonization of policies and norms in tourism with a view to advancing tourism development between the two sides.

Cooperation in Infrastructure, Energy and Environment

Africa and India, fully cognizant of the immense requirements of dealing with issues pertaining to infrastructure, energy and environment, reiterate their commitment to focus on these areas, particularly in the context of sustainable development as important areas of cooperation. They dedicate themselves to fulfilling programmes established under the Action Plan and to look at enhanced engagement in areas such as the continental NEPAD-identified infrastructure projects and PIDA, particularly with regard to increasing financial flows to these sectors. This will provide a better environment for greater investment in these sectors. They agree to work closely together in the interest of developing countries to set

an appropriate international agenda to benefit the development of both Africa and India. Efforts will be made to give more attention to new areas like new and renewable energies through training programmes and capacity building as well as in sustainable environmental practices. The concessional credit flows from India would be channelled in a wider manner into infrastructure projects. They agree to cooperate in the area of environment, including desertification and support for Africa's Great Green Wall project.

Cooperation in the Area of Media and Communications

The successful implementation of the decisions of the first Africa-India Forum Summit emanating from the Framework Cooperation and its Action Plan has brought qualitative change into the existing relationship between Africa and India. The depth and diversity of the relationship has significantly altered and the traditional engagement has successfully moved towards a modern functional partnership. However, there remains an uneven recognition of this, particularly in the public mind which requires to be addressed. At the same time, Africa needs greater opportunities to bring its own media and communications to an independent growth path in recognition of its multi-cultural and multi-ethnic identities.

Africa and India therefore agree to promote a larger number of visits between African and Indian editors and journalists, academicians, scholars and civil society representatives, so that closer interaction envisaged in this Framework for Enhanced Cooperation can be suitably disseminated. In this respect, consideration will be given to the training of African media personnel with a view to capacity building and improving their skills.

Without prejudice to India's ongoing and future programmes at the bilateral, REC and other levels, it is agreed to jointly revise, within a period of six months, the Joint Plan of Action to fully reflect the Africa-India Framework for Enhanced Cooperation. This Joint Plan of Action will also incorporate a follow-up mechanism which will ensure the effective implementation of programmes and activities agreed in the Plan.

Source India-Africa Forum Summit. (2011). Second Africa-India Forum Summit 2011, Addis Ababa: Plan of Action of the Framework for Cooperation on the India-Africa Forum Summit. http://iafs.gov.in/documents-detail.php?archive_id=5. Accessed 5 October 2019.

Appendix IV: Third India-Africa Forum Summit 2015: India-Africa Framework for Strategic Cooperation

Introduction

1. The Heads of State and Government and Heads of Delegation representing the continent of Africa, the African Union (AU) and its Institutions, and the Prime Minister of the Republic of India, met in New Delhi, India on 29 October 2015 for the Third India-Africa Forum Summit;
2. Reviewing the strategic partnership and the implementation of the Framework of Enhanced Cooperation adopted at the Second Africa-India Forum Summit held in Addis Ababa in May 2011 and the associated Plan of Action agreed upon thereafter;
3. Noting the synergies of their shared core priorities of working together towards an inclusive economic growth to eradicate poverty and allocate adequate resources for sustainable development, as defined in Africa's Agenda 2063 and its First Ten Year Implementation Plan as well as the Sustainable Development Goals under the 2030 Agenda for Sustainable Development, and the priorities of the Government of India;
4. Building on prior positive cooperation in various areas of common interest, agree to enhance their partnership with more substance, based on the aspirations of the African and Indian people to achieve

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development, integration and prosperity as indicated in the African Union Agenda 2063 and its First Ten Year Implementation Plan as well as the Sustainable Development Goals under the 2030 Agenda for Sustainable Development, and the priorities of the Government of India;

5. Noting the importance of urgently fulfilling the unmet challenges of providing access to quality education, skill development and capacity building, affordable healthcare, clean modern energy sources, infrastructure, suitable employment opportunities through development of all sectors of economy including agriculture, manufacturing and services, value addition and connectivity, climate change adaptation and mitigation, blue and ocean economy, and disaster management and disaster risk reduction among others;
6. This long-standing and multifaceted Africa-India relationship has fashioned a development partnership based on equality, friendship, mutual benefit and solidarity which represents South-South cooperation in all its dimensions. This partnership encompasses human resource development through scholarships, training, capacity building, financial assistance through grants and concessional credit to implement various public-interest projects including for education, health care and infrastructure, trade preferences, technology collaborations, humanitarian, financial and in kind assistance in emergency situations, deployment of peacekeeping troops, collective negotiations in multilateral fora for common causes and concerns, among others;
7. Africa and India have adopted this Framework for Strategic Cooperation between them which will comprise the following broad areas.

General Areas of Cooperation

8. The common characteristics of the African and Indian societies insofar as being multi-ethnic and multi-religious as well as the similar societal values have quite naturally cemented the bonds of friendship between the African and Indian peoples over the centuries;
9. Africa and India recognize the crucial need for gender equality for progress and sustainable development and are committed to

promote empowerment of women, which will greatly support efforts towards poverty eradication, protect and promote human rights and build more non-violent and environmentally sustainable societies;

10. The Africa-India Strategic Partnership represents a multi-dimensional South-South cooperation and needs to be strengthened to render it more effective;
11. In this regard, Africa and India resolve to:

- Facilitate greater mutual understanding of cultures, traditions and heritage and bringing our people closer through exchanges at various levels;
- Promote gender equality and empowerment of women, which will greatly support efforts towards poverty eradication, protect and promote human rights and build more non-violent and environmentally sustainable societies;
- Encourage use of modern social networks to build communities of mutual interest. Linkages between academia, journalists, media entities and civil society will be further encouraged inter alia through the Forum for Indian Development Cooperation (FIDC) to document successful development interventions by civil society among communities in developing countries;
- Promote good governance through the efficient use of emerging e-governance technologies. The empowering of peoples through enhancement of digital connectivity and access to these technologies that permeate all sectors of economy will help targeting of benefits to the needy, make delivery of services more efficient, catalyse development and increase citizen participation in governance and promote financial inclusion and empowerment through access to banks, credit and social insurance against diseases and accidents;
- Reaffirm our strong commitment to work together for a comprehensive Reform of the United Nations system, including its Security Council, to make it more regionally representative, democratic, accountable and effective;
- Deepen ongoing cooperation and sharing of experiences in ensuring free, fair and transparent parliamentary and electoral

processes, such as training and capacity building in tandem with current international best practices;
- Facilitate air and maritime connectivity and more liberal visa procedures and visa concessions to enhance tourism, trade and other people to people contacts;
- Support African Small Island States tackling the impact of climate change as well as their connectivity with mainland Africa.

Economic Cooperation

12. Africa and India emphasize their commitment to achieve sustainable prosperity and reaffirm their collaboration to promote inclusive and sustainable growth for a decent life for their peoples;
13. Africa and India acknowledge that expanded trade and economic ties would further contribute to sustainable growth and economic development in both sides and welcome the contribution by India to set up value addition and processing facilities in Africa;
14. Africa-India trade has multiplied in the last 15 years and doubled in the last five years to reach nearly US$ 72 billion in 2014-2015. There is growing investment by Indian companies, both multinational and SMEs, in Africa in a range of sectors. These include telecommunication, hydrocarbon exploration, agriculture, light manufacturing, IT and IT-enabled services, IT education, water treatment and supply management, petroleum refining and retail, chemicals, drugs and pharmaceuticals, coal, automobiles, floriculture, engineering consultancy and management, paper, textiles, among others. Such investment brings in capital and technology, assists value addition and industrialization, diversification of economic activity and most importantly generates employment and promotes skill development for local populations;
15. Both sides recognize that India was among the first emerging economies to propose a duty-free market access scheme for LDCs following the Hong Kong Ministerial Declaration of 2005. In 2014, India expanded its Duty Free Trade Preference Scheme (DFTP) for LDCs, launched in 2008 and which became fully operational in 2012, to now include 98% of tariff lines. The benefits of this unilateral scheme extend to 34 African countries to increase

their exports to India. India took note of the African request to provide technical assistance to the beneficiary countries of the DFTP Scheme in order to further enhance market access of their exports to India;

16. India takes note of the request by the African side to further expand its Duty Free Tariff Preference Scheme for Least Developed Countries for greater coverage. Efforts should be made to promote private and public investment from Africa into India;
17. Both sides recognize that the Indian experience in small, medium and micro enterprises offers significant avenues for further cooperation in industrialization, job creation and enhancement of local capacities of Africa, particularly in the field of managing and organizing industrial clusters, and attaching them to the feeding industries;
18. Africa and India welcome the organization, every year, of the Africa-India Project Partnership Conclave by Export-Import Bank of India (EXIM Bank) and the Confederation of Indian Industry (CII); both sides further recognize the importance of the Africa-India Project Partnership Conclaves as a platform for bringing together Indian and African entrepreneurs and decision makers, and therefore call for its continuation;
19. One of the most significant forms of Africa-India partnership has been the offer of concessional credit under the Indian Development and Economic Assistance Scheme (IDEAS) for implementing a range of projects as per the economic and social priorities of African countries in areas where Indian companies have relevant expertise. In the last decade, a total of almost US$ 9 billion in concessional credit has been approved for nearly 140 projects in more than 40 African countries. So far nearly 60 projects have been completed across a range of sectors;
20. Both sides recognize that technology provides solutions to many of our common challenges, and therefore, there is an imperative need to enhance effective collaboration in appropriate cost-effective technologies as well as in emerging and high technology areas;
21. Energy and infrastructure form substantial part of the ongoing cooperation between Africa and India. The forms of our ongoing cooperation include training, capacity building, consultancy and project implementation through concessional credit in areas

including water supply management, power generation and transmission, road and railway construction and upgradation, hydrocarbon exploration among others;

22. While underlying the importance of private investment in achieving sustainable and inclusive economic growth, the two sides decide to share experience and knowledge in this regard, and to:

    - Embark on sensitization efforts to create greater awareness of India's DFTP Scheme among businesses in Africa and appeal for the extension of this Duty Free Preference Scheme to all African states;
    - Accelerate trade between Africa and India through a coordination mechanism composed of representatives of the Government of India and the African diplomatic Missions represented in India to promote investment from Africa into India and facilitate the setting up of African-owned businesses in India;
    - Enhance collaboration in technology transfer and demonstration, training and joint research and development for specific applications;
    - Explore possibilities of collaboration and training in utilizing space technology for remote sensing and natural resource mapping including for water, agriculture, forest cover, mineral and marine resources, weather forecasting and disaster management and disaster risk reduction including early warning of natural disasters; and of nuclear technology for areas such as medicine, agriculture and hydrology in large installations that will have direct benefit for our peoples.

Cooperation in Trade and Industry

23. The Africa-India partnership is grounded in the core recognition that our peoples are our fundamental resource and that capable and skilled human resources are a foundation for building prosperity for all;
24. Both sides recognize the importance of developing technological capacities of the peoples towards an enhanced beneficiation and value addition to resources;

25. Africa and India take note of the importance of the capacity building institutions, which India is in the process of establishing in Africa's diverse sectors, and recognize that such efforts would greatly assist African industries and service sectors, and in the long run contribute to the growth of the continent;
26. Both sides underscore the importance of capacity building that supports industrialization and the need for establishing relevant institutions in that regard;
27. In this regard, Africa and India agreed to:

    - Support establishment of small and medium enterprises (SMEs) and Medium and Small Industries (MSIs) in order to promote employment creation and income generation for people of both sides;
    - Promote public–private partnership (PPP) by encouraging Indian businesses to set up skills development units in African industrial zones with the aim to train African engineers, technicians, managers and workers as well as by encouraging other experts in areas such as food security and solar energy;
    - Review the functional mechanisms of the already established institutions with a view to ensuring that the processes for their establishment, provision of material, human and financial resources and management are clearly understood and supported;
    - Create a mechanism to enable women groups to access credit for productive activities and markets for their products;
    - Enhance cooperation through training and collective negotiations on global trade issues, including at the WTO to protect and promote the legitimate interests of developing countries, especially the LDCs.

Cooperation in Agriculture

28. Large sections of populations in both Africa and India sustain their livelihoods from agriculture. Improving the productivity of agriculture including crop farming; animal husbandry and water management through sustainable and judicious use of inputs is vital to ensure food and nutritional security and represents a significant challenge and opportunity;

29. There has been extensive cooperation between the two sides including through sharing of experience, training, capacity building through setting up of institutions, and concessional credit in farming techniques, irrigation, soil quality assessment improvement as well as provision of farm equipment, among others;
30. Africa and India fully realize that sectors such as tourism, agriculture, fisheries, forestry and energy production are all sensitive to the adverse impacts of climate change;
31. In this regard, both sides agree to:

    - Further increase cooperation in improving farming techniques through appropriate and affordable technology, organic farming, improving crop varieties, seeds, efficient use of fertilizers and other measures;
    - Enhance joint efforts for more effective and efficient management of water resources and improve irrigation techniques through transfer of technology and know-how;
    - Support Africa's commitment to consign the hand-held hoes to the museum, as it has become a symbol of agricultural backwardness in Africa and oppression of women, who constitute the majority of agricultural workers. India will endeavour to provide tillers, cultivators, harrowers and harvesters at concessional rates and the transfer of such technologies for their production in Africa, in order to empower the African farmers;
    - Promote investment in agribusinesses and food processing industry to generate employment and greater revenue;
    - Continue to collaborate to ensure that public investment, services and policies for agriculture give due priority to enabling, supporting and complementing smallholders' owned investment, with particular attention to women and youth food producers;
    - Ensure that Indian agricultural cooperation with African countries gives priority to food production and improving levels of nutrition in order to increase the resilience of local and traditional food systems and biodiversity;
    - Encourage all initiatives to diversify their economies to expand climate-sensitive sectors and to promote adaptation

measures that are capable of increasing resilience within the sector;

- Enhance cooperation and coordination in finalizing an ambitious and comprehensive climate change agreement during the forthcoming COP 21 negotiations, which will be held in Paris, France.

Cooperation in Renewable Energy

32. Intensify our ongoing cooperation in developing renewable energy generation including solar, wind, hydro, geo-thermal and bio-mass along with building power transmission systems.

Cooperation in Blue/Ocean Economy

33. Livelihoods of large sections of our peoples are dependent on Oceans which have emerged as the new frontier for the development of the peoples of Africa and India. The significance of Oceans for global or regional trade and its marine resources as a contributor to the economic prosperity of our people is evident.
34. In this regard, the two sides decide to: Put special emphasis on exploring closer collaboration through training, capacity building and joint projects in developing sustainable fisheries, maritime connectivity, managing marine resources, exploring non-marine resources, promoting eco-tourism, developing renewable energy and disaster risk reduction through modern early warning tools, pollution control and other coastal and ocean studies; Pursue cooperation in port operations and marine transport, addressing illegal and unregulated fishing and hydrography surveys.

Cooperation in Infrastructure

35. Intensify ongoing cooperation in training, capacity building, consultancy and project implementation through concessional credit in infrastructure areas, including water supply management, maritime connectivity, road and railway construction and upgradation.

Cooperation in Education and Skills Development

36. Since the Second Africa-India Forum Summit (2011), over 24,000 scholarships across 300 training courses conducted at 60 training institutions have been utilized by African nationals in areas such as IT, renewable energy, agriculture, marine and aeronautical engineering, marine hydrography, SME entrepreneurship, rural development, parliamentary affairs, logistics and management, climate change adaptation, disaster management, cyber security, forensic sciences and defence and security, among others;
37. Both sides recognize the fundamental importance of educational cooperation and skills transfer in enhancing opportunities available to their youth in contributing to economic, scientific, technical and social development and the need to build further through expansion of training slots in existing and newer areas in line with the opportunities and challenges arising in the African continent in key areas outlined in Agenda 2063;
38. Both sides understand that the development of science, technology, research and innovation is a crucial element and an integral part of the process of development;
39. Both sides emphasize the importance of the early introduction of ICT in educational institutions as a key enabler for capacity building, education, health, industry, poverty eradication and delivery of public services;
40. Acknowledge the importance of successful implementation of the Pan-African E- Network Project aimed at providing an efficient tool to bridge the digital divide and also offer affordable and easy access to quality education and health care to the peoples of Africa;
41. In this regard, Africa and India agree to:

    - Continue cooperation in the areas of scientific and technological development as well as in Information and Communication Technology;
    - Explore possible joint investments to establish a robust, reliable and accessible fibre optic infrastructure in Africa, with a view to setting an enabled African information society, and integrated digital economy whereby all actors have access to reliable and affordable ICT networks and services;
    - Promote greater interaction, exchange and partnership between the tertiary institutions of Africa and India;

- Renew, expand and upgrade the existing Pan-African E-Network Project infrastructure so as to permit an innovative utilization of the E-Network Project with the view to cover newer areas of mutual interest;
- Intensify cooperation through sharing of experiences, gender-specific training courses and capacity building measures including through skill development;
- Provide and facilitate the access and enrolment of African students and academicians to India's premier institutions of higher learning in an effort to boost Africa's capacity in areas such as engineering, medical, technology, agriculture as well as emerging areas;
- Fast-track the implementation of those capacity building institutions that have been found to be feasible for continuation under IAFS-III;
- Intensify cooperation in capacity building, joint research and development and implementation of projects in renewable energy sources including solar, wind and hydropower along with building efficient power transmission systems.

Cooperation in Health

42. Africa and India recognize that the promotion of health is critical in the development of human capital, which drives socio-economic growth;
43. They reaffirm their commitment to enhance collaboration and share experience in the application of advancement in science, technology, research and development to training in the area of HIV, TB, Malaria, Ebola and Polio;
44. Both sides recognize the need to improve nutritional and food securities of their peoples and acknowledge the right for adequate food for all and the availability and accessibility of food in quantity and quality sufficient to satisfy the dietary needs of individuals;
45. In this regard, both sides agree to:

    - Collaborate in the provision of universal access to primary and public health care, to build resilience to fight and prevent deadly epidemics and disease control through implementing

educational programme in this field, recommendation of policies, administering services and conducting research;

- Support Africa's campaign on Accelerated Reduction of Maternal Mortality in Africa (CARMMA) and facilitate its implementation through cooperation in training and education for health professionals;
- Ensure access to affordable and quality medicines and treatment, particularly generic medicines;
- In this regard, both sides acknowledge the importance of full use of the flexibilities provided by the agreement on trade-related aspects of Intellectual Property Rights (TRIPS) administered by the World Trade Organization (WTO);
- Train doctors and healthcare personnel, including through the deployment of telecoms and ICTs in support of telemedicine and e-health applications;
- Strengthen public–private sector collaboration in the areas of pharmaceutical and procurement in Africa and India in the framework of the Pharmaceutical Manufacturing Plan for Africa and the fight against counterfeit medicines;
- Continue their dialogue on intellectual property rights, regulatory procedures and access to medicines and research and development in traditional medicine;
- Sharing of experiences, specialized expertise and best practices in healthcare systems development and community health programmes;
- Exchanges regarding food production to always meet dietary need and quality standards.

Cooperation in Peace and Security

46. Africa and India recognize the importance of peace, security and stability as a precondition for development;
47. Africa appreciates commitment of India towards supporting various African Union Missions such as those in Mali and in Somalia;
48. In this regard, Africa and India decide to:

- Support AU Peace and Security initiative within the African Peace and Security Architecture;

- Support programmes on conflict prevention, management and resolution;
- Pursue cooperation on Maritime security issues through training, capacity building, sharing of information, surveillance and other measures in securing sea lines of communication, preventing transnational crimes of piracy, combating terrorism, illegal and unregulated fishing, trafficking of drugs, arms and humans through surveillance and hydrography surveys;
- Enhance cooperation and coordination between Africa and India to combat terrorism in all its forms and manifestations, including countering violent extremism and, in this regard, make concerted efforts for the early adoption of the Comprehensive Convention on International Terrorism;
- Share best practices and experiences in cyber security especially in combating cyber crime and use of Internet for terrorist purposes.

Regional and Other Forms of Cooperation

49. Appreciate the ongoing fruitful cooperation between the AU/RECs and India;
50. Take note with appreciation of the third meeting between India and the eight Regional Economic Communities (RECs) of Africa held in New Delhi in August 2014. The RECs have worked towards harmonization of standards and rules as well as towards creation of common markets and this has an important bearing on the development of India's trade and investment with African countries.
51. In this regard:

    - India, the African Union and RECs will enhance the ongoing cooperation in the areas of capacity building, human resource development, food and agriculture processing and soft loans for regional projects among others.

Monitoring Mechanism

52. Agree to establish a regular formal monitoring mechanism to review the implementation of the agreed areas of cooperation and identified projects by the competent bodies of the partnership. Modalities of the monitoring mechanism and the detailed Plan of Action will be jointly developed within three months.

Source India Africa Forum Summit. (2015). Third India-Africa Forum Summit 2015: India-Africa Framework for Strategic Cooperation. *GoI*. http://iafs.gov.in/documents-detail.php?archive_id=323. Accessed 5 October 2019.

Glossary of Foreign Words

***Agence Française de Développement (AfD)*:** French Development Agency.

***Anubandh*:** Word/concept used in the Bhagwat Gita (Chapter 15; shloka 25), referring to the 'bond' between humankind. Mahatma Gandhi used the word with reference to education. Ela Bhatt, the founder of SEWA, expanded the concept to link self, society and nature as one.

***Anthropos*:** Greek word for human.

***Azadirachataindica*:** Neem.

***Bal Seva Kendra*:** Child Malnutrition Treatment Centre.

***Bambara groundnut*:** A grain legume grown mainly by subsistence farmers in sub-Saharan Africa.

***Belg*:** Short rains from February to June.

***Cene*:** Standard Greek suffix for epoch in geologic time.

***Chana chunni*:** Finely ground chickpea used as fodder for cattle.

***Chana dal*:** Yellow grams.

***Dal*:** Lentils or pulses.

***Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ)*:** German Society for International Cooperation.

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***Femmes en Action*:** French for 'Women in Action'—It is an organization built on the idea of defence of women's interests and socio-economic empowerment, headquartered in Bamako, Mali.

***Institut National des Recherches Agricoles du Bénin (INRAB)*:** National Institute of Agricultural Research of Benin.

***Khaya senegalensis*:** Commonly known as African mahogany, it is a species of tree native to Africa.

***Kilimo Kwanza*:** Swahili for 'Agriculture First'—It is an initiative launched by the Tanzanian government in 2006 to spearhead the transformation from subsistence to commercial agriculture and curb poverty.

***Lantana camara*:** A species of flowering plant native to the American tropics.

***Lepidoptera*:** A sub-type of insects that include butterflies and moths.

***Mandis*:** Market place.

***Masoor*:** Red lentil.

***Meher*:** Long rains from June to October.

***Metarhizium anisopliae*:** A fungus that grows naturally in soils and causes disease in various insects by acting as a parasitoid.

***Mitreeki*:** A portmanteau of the words 'Maitreyi' (meaning friendship in Hindi) and 'Urafiki' (meaning friendship in Swahili). It symbolizes Indo-Africa friendship beyond boundaries.

***Moringa oleifera*:** Commonly known as drumstick tree, it is a fast-growing, drought-resistant tree native to the tropical and subtropical regions of South Asia.

***Mung*:** Green lentil.

***NaneNane*:** Swahili for 'Eight Eight'—*NaneNane* day is celebrated on the 8th of August (08/08) to recognize the important contribution of farmers to the Tanzanian economy.

***Ololilis*:** A traditional Maasai forage conservation system used by families to feed cows during dry periods in Tanzania.

***Peste des Petits Ruminants (PPR)*:** Also known as sheep and goat plague, it is a highly contagious animal disease affecting small ruminants.

***Pisum Sativum*:** Peas.

***RUDI Sandesha Vyavhar*:** An affordable, simple-to-use and easily accessible mobile application launched by SEWA to assist and enable the Rudi sisters.

***SEWA Manager ni School (SMS)*:** A SEWA resource organization for building managerial capacities among women at the grass-roots level.

***Teff*:** Also known as Williams lovegrass, it is a grass species native to the Horn of Africa, cultivated for its edible seeds.

***Tur / Arhar dal*:** Pigeonpea.

***Urad*:** Black gram.

***Vihenge or Vihenge vyaudongo*:** A traditional silos made for storing shelled maize.

***Zuia Njaa*:** Swahili for 'Prevent Hunger'—A campaign slogan aimed at boosting the adoption of PICS bags.

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