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Stakeholder Surveys in Selected African Countries on the Perception of Initiatives to Promote Capacity Development (CD) for Agricultural Innovation[1]

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Abstract

The United Nations Sustainable Development Goal Number 2 (UN SDG 2) aims to eliminate hunger through the promotion of more resilient and productive food systems. In this context, the provision of effective Capacity Development (CD) for agricultural innovation is implicitly and explicitly emphasized in several targets (SDG 2.3, 2.4, 2A). Our stakeholder surveys carried out in four African countries on CD for agricultural innovation reveal different perception patterns toward the role of the domestic public sector and foreign aid initiatives in the provision of effective CD for agricultural innovation. Overall, the respondents of the survey tend to agree that inclusive, productive and sustainable food systems can only be achieved through more private sector involvement in efforts to integrate small-scale farmers into formal agricultural value chains. As such, the empirical findings are very much in line with Africa-owned agricultural initiatives as well as the call of the UN Food Systems Summit in fall 2021 for a global partnership designed to enable a profound change of the international food and agriculture system.

[1] The research project was funded by the Swiss Agency for Development and Cooperation (SDC)

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Abbreviations

AfDB	African Development Bank
AfCFTA	African Continental Free Trade Agreement
AGRA	Alliance for a Green Revolution in Africa
AIS	Agricultural Innovation Systems
AR4D	Agricultural Research for Development
AU	African Union
AUC	African Union Commission
CAADP	Comprehensive African Agricultural Development Programme
CAP-F	Country Agribusiness Partnership Framework
CD	Capacity Development
CD4AI	Capacity Development for Agricultural Innovation
CDAIS-	Capacity Development for Agricultural Innovation Systems
CCF	Country Cooperation Framework
CFS	Committee on Food Security (UN FAO)
CJE	Calestous Juma Executive Dialogue on Innovation & Emerging Technologies
CSM	Civil Society and Indigenous People Mechanism
DeSIRA	Development Smart Innovation through Research in Agriculture (EU)
DEVE	Committee on Development (European Parliament)
EU	European Union
EBA	Enabling Business in Agriculture
EC	European Commission
EP	European Parliament
FAO	Food and Agriculture Organisation of the United Nations
F2F Strategy	Farm to Fork Strategy of the European Union
FARA	Forum for Agricultural Research in Africa
FOLU	Food and Land Use Coalition (FOLU)
FSN	Food Security Network

FSS	Food Systems Summit
GFAR	Forum on Agricultural Research and Innovation
HLPE	High Level Panel of Experts
IAASTD	Internat'l Assessment of Agricultural Knowledge, Sci. & Techn. for Dev.
MAP	Agence Maroccaine du Presse
MOA	Ministry of Agriculture, Zambia
MOFA	Ministry of Food and Agriculture, Ghana
MoSTI	Ministry of Science and Technology, Uganda
MEP	Member of the Parliament
NAFSN	New Alliance for Food Security in Africa
NEPAD	New Economic Partnership for African Development
NAIP	National Agricultural Investment Plan
NAFSIP	National Agricultural and Food Security Investment Plans
NGO	Non-Governmental Organisation
NRDC	Natural Resource Development College, Zambia
PAEPARD	Platform for an Africa-Europe Partnership for Ag. Research for Development
PAZ	Poultry Association of Zambia
PCA	Principal Component Analysis
RAF	FAO Regional Office for Africa
ReSAKSS	Regional Strategic Analysis and Knowledge Support System
RREO	Regional Research and Extension Organization
SAM	Scientific Advice Mechanism of the European Commission
SCARDA	Strengthening Capacity in Agricultural Research and Development in Africa
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goals
SNV	Stichting Nederlandse Vrijwilligers (Dutch Volunteers Foundation)
STISA	Science, Technology and Innovation Strategy for Africa
UNECA	United Nations Economic Commission for Africa
TAP	Tropical Agriculture Plattform

1. Introduction

In its report on agricultural innovation published in 2018, FAO points at the importance of investing in capacity development (CD) for agricultural innovation in order to enable a transformation of tropical agriculture that is able to respond to the challenges of an increasingly urbanized population and the impact of climate change on agriculture. Simultaneously, CD for agricultural innovation plays a crucial role in fighting rural poverty, creating off-farming employment in the agricultural value chain, enhancing food security and access to healthy and nutritious food as well as improving resilience to external shocks.

A such, CD for agricultural innovation plays a major role in addressing especially the social dimension of the UN SDGs, the Sustainable Development Goals of the United Nations, directly or indirectly (Aerni et al. 2015, FAO 2018: 7). For example, SDG 2 on ending hunger by 2030 through investment in inclusive agricultural development makes explicit reference to CD for agricultural innovation. Moreover, in its Target 2.a, SDG 2 refers to the need to develop the capacities in agriculture necessary in efforts to make agriculture more inclusive, productive, sustainable, and resilient.

Apart from the general insight that capacity development should be demand-driven and that the capacity to innovate must be promoted on the organizational and the policy level as much as on the individual level, there is little common ground on what type of 'capacity development' in agriculture should be promoted. This applies in particular to the many North-South and South-South initiatives designed to promote efforts to strengthen capacity development for agricultural innovation in Africa in general and Sub-Saharan Africa in particular. Despite the official commitment to support demand-driven CD for agricultural innovation, foreign-aid sponsored initiatives often tend to reflect the interests and the opinions on sustainable agriculture of domestic stakeholders in the respective donor countries (Aerni 2006).

The introduction of this report provides an overview of the current Africa-owned initiatives and the numerous international initiatives to promote capacities that are meant to be supportive of the respective goals to make agriculture more innovative, resilient and inclusive on the African continent. It starts with the description of several recent initiatives launched by the African Union to improve food security, enable inclusive growth through agricultural innovation and fight poverty and unemployment in rural and urban areas. It then describes several international initiatives launched by the G8 (New Alliance for Food Security and Nutrition, NAFSN) and the G20 (Tropical Agriculture Platform, TAP/FAO) as well as bilateral South-South initiatives such as the China-Africa Cooperation Vision 2035 with its poverty reduction and agricultural development program. Finally, it discusses current efforts of the European Union to promote Capacity Development for Agricultural Innovation Systems (CDAIS) and the US-supported Alliance for a Green Revolution in Africa (AGRA), based in Kenya.

All these international initiatives, as well as the international opposition to them claim to speak on behalf of the interests of smallholder farmers. Yet, this report also highlights that there is often a big gap between such claims and the effective needs of African smallholders, as articulated in needs assessment surveys conducted by the Tropical Agricultural Platform in 2013 on capacity development priorities in African agriculture (Oijio et al. 2013) as well as Africa-owned initiatives designed to promote capacity development that include upstream and downstream skills in the agricultural value chain (e.g. CAADP).

The introduction ends with a discussion of the Food Systems Summit (FSS) of the United Nations, which was organized in September 2021 after extensive preparatory work. The greater emphasis of the FSS on capacity development designed, among other things, to promote sustainable intensification, agricultural value chain integration and job creation in rural areas in Africa must also be understood in the context of the COVID-19 Pandemic and its impact on rural poverty, food security and nutrition in Africa in general and growing African cities in particular.

This overview of current initiatives is important for the interpretation of the findings of the stakeholders surveys on 'lnstitutional Framework Conditions for the Promotion of Private Sector Capacity Development for Agricultural lnnovation' carried out from April 2021 to October 2021 in Ghana, Uganda, Zambia and Morocco in collaboration with local research partners in Ghana and Morocco. The research was funded by the Global Programme Food Security of the Swiss Agency for Development and Cooperation (SDC). The Global Programme is a thematic division that helps to find solutions to global challenges linked to food security. In this context, favorable institutional framework conditions that may lead to a crowd-in rather than a crowd-out of private sector investment in agriculture in general and capacity development for agricultural innovation in particular very much contribute to this goal by enabling inclusive and sustainable change in agriculture, which also helps to create new jobs through value chain integration.

Institutional framework conditions in agriculture are very much related to the set up of national Agricultural Innovation Systems (AIS) and the extent to which they encourage private sector capacity development for agricultural innovation. After all, innovations that prove to be sustainable and scalable are linked to capacities developed in the private sector rather than academia. In this context, AIS that encourage long-term public-private partnerships contribute to achieve the UN Sustainable Development Goals 2 (zero hunger), 8 (inclusive growth and decent work) and 10 (reducing inequality) through an increase in domestic agricultural productivity combined with job creation, resilience and sustainability.

Following the overall introduction to the research project, Chapter 2 describes the methodological approach and the challenges and opportunities during the implementation of the project. Chapter 3 describes the survey results and chapter 4 presents the conclusions, political implications and policy recommendations.

1.1 African-owned initiatives to promote CD for Agricultural Innovation

1. 1. 1 Agenda 2063 'the Africa we want'

Agenda 2063 is an Africa-owned initiative launched by the African Union (AU) in 2013 that is mainly focused on enhancing the ability of Africa to feed itself over the coming 50 years. It builds upon the so-called Comprehensive African Agricultural Development Programme (CAADP) launched in 2003 with the support of the New Partnership for Africa's Development (NEPAD), which is the strategic economic development framework of the African Union (AU). CAADP is a continent-wide agriculture initiative designed to support agricultural transformation in Africa.

1. 1. 2 CAADP and the Maputo Declaration

The so-called Maputo Declaration in support of CAADP was approved by the General Assembly of the AU in 2003. It is based on the shared view that enhanced agricultural performance is key to growth and poverty reduction through its direct impact on job creation and economic opportunities, especially for women and youth, food security and improved

nutrition, and for strengthening resilience in rural areas. In this context, CAADP contains measurable targets for governments such as minimum public investment in agriculture of 10 per cent of the national budget and a raise of the agricultural productivity by at least 6 per cent per annum. The CAADP Framework identifies four key pillars for food security improvement and agricultural investment:

1) Sustainable Land and Water Management;
2) Market Access;
3) Food Supply and Hunger; and
4) Capacity Development with a priority on the comprehensive skills development in sustainable agricultural value chains.

The commitment to CAADP was reaffirmed by in the so-called Malabo Declaration in 2014 with an additional commitment to end hunger and reduce poverty by half in 2025 through inclusive agricultural growth and transformation, and the creation of job opportunities for at least 30% of the youth in agricultural value chains.

In the first phase of the implementation of CAADP (2003-2013) based on the Maputo Declaration, the focus was primarily on public sector investment in agriculture. Based on the highly variable and often disappointing implementation results, the Malabo Declaration emphasized the importance of stimulating private investments in agribusiness by enabling the policy environments and recombining the resources and capabilities of public and private stakeholders along the priority commodity chains.

The Biennal Review Report of CAADP (2015-2018) acknowledges some progress in many countries but also notes that only four African countries fully met the ambitious CAADP targets. The report encourages African governments to undertake bolder and deeper initiatives to accelerate the rate of progress, and to ensure that agriculture contributes to the goals and targets set by Heads of State and Government by 2025 (AUC 2020). One important step to improve livelihoods and make the continent more resilient is to improve its capacity to feed its own people and thus decrease its dependence on food imports. At the outset of COVID-19, Africa's food import bill still amounted to US$ 43 billion (World Bank 2019). (Thomas, 2022).

1. 1. 3 The Science, Technology and Innovation Strategy for Africa (STISA-2024)

The STISA-2024 was formulated in line with the AU Agenda 2063 and represents the first of the ten-year incremental phasing strategies to enhance the impact of science, technology and innovation in critical sectors such as agriculture, energy, environment, health, infrastructure development, mining, security and water among others. One of the six distinct priority of STISA-2024 areas is to achieve 'Eradication of Hunger and Achieving Food Security'. There are four main pillars designed to contribute to this goal:

1) building and/or upgrading research infrastructures;
2) enhancing professional and technical competencies;
3) promoting entrepreneurship and innovation; and
4) providing an enabling environment for STI development in the African continent.

Continental, regional and national programmes are to be designed, implemented and synchronized to ensure that their strategic orientations and pillars are mutually reinforcing, and achieve the envisaged developmental impact as effectively as possible.

1. 1. 4 The Calestous Juma Executive Dialogue on Innovation and Emerging Technologies (CJED)

AUDA-NEPAD and African Union High-Level Panel on Emerging Technologies (APET) in collaboration with the African Union Commission, established the Calestous Juma Executive

Dialogue on Innovation and Emerging Technologies (CJED) in 2018 with the purpose of building a cadre of policy and decision-makers who would champion the promotion of the sustainable and inclusive use of emerging technologies in agriculture and several other economic sectors. CJED consists of a regional based 3-day and national in-country capacity strengthening programme designed to strengthen the knowledge and capacity of African executives, senior officials, decision and policymakers to enable them to provide technical advice to governments concerning innovation and emerging technologies appropriate for their respective countries.

In a recent blog[2], CJED and APET argue that the COVID-19 pandemic has presented unique opportunities for African countries to develop and strengthen inclusive agro-value chains across the continent using smart technologies. They have the potential to address the serious negative impact of the COVID-19 pandemic lockdowns on food supply and demand in Africa. In this context, CJED aims to encourage African governments and the business sector to formulate public-private sector partnerships to strengthen and develop resilient agri-business infrastructure through smart technologies. By digitising the various agro-value chain activities, African countries can ensure more effective interactions between farmers, input suppliers, transport and logistics service providers, financiers, and other value chain, partners.

1. 1. 5 The Feed Africa Strategy of the African Development Bank (AfDB)

The AfDB's Feed Africa strategy (2015-2025) was launched with the aim of improving agricultural policies, markets, infrastructure and institutions to ensure that agricultural value chains (AVCs) are well developed and that improved technologies are made available to reach millions of farmers. It targets to invest $24 billion into African agriculture over a ten-year period.

The AfDB report on the Feed Africa Strategy (AfDB 2018) aims to address the following common barriers to investment in value addition across most priority crops:

- insufficient or inconsistent quantities of feedstock (raw crops),
- lack of access to electricity for value addition processes,
- lack of skilled labor, and lack of affordable and appropriately structured working capital and other financing for storage, aggregation, and processing.
- high logistics costs arising from poor transport and other infrastructure
- high taxes for processed products
- lack of feedback from buyers to processors and from processors to farmers on the necessary quality of products
- insufficient or unenforced health and other food standards; and insufficient investment in marketing and branding to increase local demand for processed products

AVC integration is primarily designed to offer the growing African urban population access to affordable and nutritious food from domestic agriculture. In addition, the strategy aims at diversifying and add value to agricultural exports. Such a comprehensive food systems approach to development would also raise rural incomes and create the highly needed off-farm employment for the millions of young and increasingly educated African men and women that enter the job market every year.

1. 1. 6 The African Continental Free Trade Agreement (AfCFTA)

[2] See https://www.nepad.org/blog/strengthening-competitiveness-africas-agricultural-value-chain-using-smart-technologies

The African Continental Free Trade Agreement signed in March 2018 by 44 out of 55 African states (as of September 2021 ratified by 38 states of the so far 54 signatories) will be an important step in enabling African countries to increasingly meet the region's growing demand for food. Trading under the agreement commenced on 1 January 2021, after a six-months delay as a result of the impact of Covid-19. However, negotiations on many issues need to be resolved before the agreement is fully functional promoting sustainable food Systems and food security in Africa. The creation of a continental free trade agreement is seen as a crucial condition for achieving the Agenda 2063 aspiration for "A prosperous Africa based on inclusive growth and sustainable development" and to attract the necessary investments to make African agriculture more inclusive, resilient and innovative.

One of the major reasons for the widespread agreement among African governments to create a continental free trade agreement was also the awareness that African countries need to become more productive and wean itself off from food imports from outside Africa. A few lower-middle income African countries, such as Kenya, Ghana and Ivory Coast may have become agricultural net-exporters. But their exports mainly consist of tropical agricultural commodities such as cocoa, flowers, coffee, tea, and cotton, while they largely remain dependent food imports such as wheat, rice, soybeans, other oilseeds, and frozen meat products. Moreover, the proportion of food imports from other African countries continues to be very low (averaging about 20 per cent over the past several decades), with one country—South Africa—accounting for over a third of this intra-African food trade (Fox & Jayne 2021).

1.2 Foreign Initiatives to promote capacity development for agricultural innovation

1.2.1 The New Alliance for Food Security and Nutrition (NAFSN)

The New Alliance for Food Security and Nutrition in Africa (NAFSN), adopted 2012 at the G8 summit in Camp David, was in line the professed commitment of African governments to the principles of alignment, inclusivity and mutual accountability outlined in CAADP. The initiative was also strongly linked to 'Grow Africa', a platform jointly created by the AU, NEPAD and the World Economic Forum (WEF) comprising over 200 companies and 12 countries, 10 of which are part of the NAFSN. The Grow Africa partnership was designed to strengthen commitments between African countries and private sector investors in agribusiness, being fully funded by USAID.
Commitments by individual development partners were designed to be aligned with country priorities as spelled out in the respective National Agricultural Investment Plans (NAIPs).

NAFSN was based on Cooperation Frameworks in which governments commit to policy reforms that help enabling business development in agriculture, while companies and donor agencies commit to their announced investments and matching grants.

The implementation of Cooperation Frameworks are supported by a package of 'enabling actions' aimed at mobilizing capital, improving access to new technologies, managing risk, and focusing on smallholder farmers. Parties involved in the creation of Cooperation Frameworks were to be held mutually accountable for their commitments and participate in an annual review process. These commitments were already outlined to a great extent by the annual CAADP country reviews of progress against national agricultural and food security investment plans

(NAFSIPs). Progress on policy reforms was measured by a metrics called 'Enabling the Business of Agriculture' (EBA) in analogy to the Doing Business report of the World Bank[3].

In 2018, the Regional Strategic Analysis and Knowledge Support System (ReSAKSS) published on behalf of the African Union Commission (AUC) an Assessment of NAFSN presenting empirically-based findings of four separate country case studies carried out in Benin, Burkina Faso, Ghana, and Nigeria (Badiane et al. 2018). The report concludes that while many commitments outlined in the frameworks were not fully realized, the involved governments were nevertheless able to implement some of them. The financial commitments were met at different degrees according to donors and countries. Even though the authors of the report recognize additionality in terms of new investments (that did not go at the expense of existing public investment), they also observed a gap between commitment and real investment mainly related to lack of alignment of interest and lack of leadership in the implementation of NAFSN.

In regard to the lack of alignment of interests, the report indirectly alludes to the different agendas pursued by international civil society organisations involved in development cooperation, especially the growing social movements devoted to the promotion of organic farming and food sovereignty. Many of them voiced their opposition to the mobilization of private sector capacity development and investment for agricultural development in Sub-saharan Africa, as envisioned by NAFSN.

Opposition to NAFSN

The social movements that protested against NAFSN pointed at well-documented cases of private sector agricultural investment in poor countries that have failed to impact local society and economy in a positive way; Yet, by advocating the 'agro-ecologcial' approach, as the sustainable alternative to 'industrial agriculture', they revealed an increasingly ideological mindset. It excludes any sort of collaboration with agribusiness that is primarily blamed for environmental destruction, farm indebtedness and land grabbing in agriculture (Aerni 2018a). This generalized negative view of agro-industry tends to ignore the fact that embedded foreign direct investment (FDI) in agriculture may actually greatly contribute to better access to human rights, improved environmental management, the creation of more decent jobs and more inclusive growth. Many of these cases are well documented but largely ignored because they cannot be integrated into the overall popular narrative of people versus profits (Aerni 2021). At any rate, NAFSN became the target of many advocacy groups and university departments that oppose a 'neoliberal' agenda associated with the sale of agricultural land on a large scale in Africa to foreign investors that would then use it to feed people elsewhere (Curtis 2015).

In the case of the NAFSN, a large share of the content of the country cooperation frameworks (CCF) actually address concerns related land grabbing and potentially negative social and environmental side effects resulting from agricultural investments. They also contain strategies on how to mitigate potential negative impacts (Badiane et al. 2018).

But since the NAFSN was all about enhancing investment in the African agricultural sector and its infrastructure, enabling structural change in rural areas as well as making it easier for business to operate in agriculture through conducive policy reforms, it was impossible for the initiative to strictly follow the popular defensive understanding of sustainable development that tends to frame economic and technological change primarily as a risk to society and the

[3] In response to criticism about the implicit normative baseline assumptions of the Doing Business report, the Enabling Business in Africulture 'EBA' was reformed shifting its focus more on the regulatory burden that affects farmers. Its eight core indicators are: supplying seed, registering fertilizer, securing water, registering machinery, sustaining livestock, protecting plant health, trading food and accessing finance (see https://eba.worldbank.org/en/methodology).

environment. After all, enabling change also implies a process of trial and error. Some mistakes happen, yet learning from mistakes is also crucial for the improvement of future outcomes.

The end of NAFSN as a result of opposition from Europe

The view that investment in agriculture may be more than just exploiting rural labor and destroying the environment has been largely disregarded in the Report on the New Alliance for Food Security and Nutrition in Africa published in 2015 by Olivier De Schutter (2015), the then UN Special Rapporteur on the Human Right to Food. The report was commissioned by the European Parliament. It fully embraces the popular narrative embraced by the organic farming and food sovereignty movements by portraying private sector investment in agriculture primarily as a way for multinational companies to enhance profits at the expense of the local farmers and their environment. It does however not contain any empirical field research. Even though the report acknowledges that NAFSN is aligned with the priorities of Africa-owned initiatives such as CAADP, De Schutter suggests that CAADP and its National Agricultural Investment Plans (NAIP) had to rather be aligned to the needs of private investors, presuming that African governments have no real agency in NASFN. The same condescending view toward the ability of Africans to make their own choices can also be found in the so-called 'food regime' research literature which applies Marxist theory to 'critically' analyse the strategic role of agriculture in the construction and development of the world capitalist economy (McMichael 2009). The outcome of this 'critical' research seems to be always clear in advance: Western capitalist views and interests are imposed on non-Western societies who then ask 'critically-minded' civil society groups, academics and foundations in Western societies for help. Local stakeholders are merely passive victims in such stories because the 'critically-minded' stakeholders in Western countries must primarily please donors and taxpayers back home. And their expectation is that 'we' do something for 'them', rather respecting their priorities in addressing local concerns. After all local stakeholders may still be in need of 'further education' prior to be able to decide by themselves. This paternalist mentality in the foreign aid business is however beyond the self defined scope of 'critical' analysis, for obvious reasons (Rangan 2000, Aerni 2011).

The 'right to food' literature that De Schutter relies on in his publications has a lot in common with the food regime literature in the sense that it is not based on empirical field research. Instead it mostly relies on a set of carefully selected interviews, official documents and academic literature that is then weaved into a convincing storyline about the 'neoliberal' or 'neocolonial' agenda pursued in agricultural development in low income countries (Aerni 2011). Many anthropologists and political ecologists that still do their field research have raised concerns about the missionary zeal behind these university-trained activists who embrace these theories as well as the resulting, intended or unintended, de-valuation of local agency as well as local knowledge (Rangan 2000, Aerni 2018, Galvin 2021).

The influential role of the Committee on Development (DEVE) of the European Parliament (EP) in the opposition to private sector capacity development (CD) for agricultural innovation in tropical countries

Yet, in highly polarized affluent societies that instinctively associate 'agro-industry' with 'bad' and 'organic farming' with 'good', these rather simplistic and reductionist views of sustainable agriculture tend to be popular in food politics in Europe in general and the European Parliament (EP) in particular (Aerni 2018b). Since the Lisbon Treaty of the European Union has entered into force, the EP enjoys important legislative rights in international trade and international agreements, and laws related to common commercial and development policies have to be adopted by a co-decision procedure (Raunio and Wagner 2021). Furthermore, the Parliament

issues its own initiative resolution especially in the field of business and human rights as well as development policy (Delputte and Verschaeve 2015, Cardwell and Jančić 2019).

The EP's Committee on Development (DEVE) serves well as an example to illustrate the policy ambitions of Members of the European Parliament (MEP) who aim to raise their profile with their constituencies of their respective country of origin.

MEPs in the DEVE tend to be in favour of increasing aid and support a stronger role of the EU in development policy as long as it does not affect the domestic political agenda of their constituency (rather passive members) back home or is actually in line with its views (rather active members) (Raunio and Wagner 2021). The more active members who are happy to take the lead in shaping development policies often represent parties that do not support private sector CD for agricultural innovation in development cooperation (Aerni 2018b). Moreover, they are currently strong supporters of the European Green Deal in general and its farm-to-fork strategy, in particular, and would like to export it to low-income countries (Raunio and Wagner 2021).

In this context, NAFSN clearly did not fit the political agenda of DEVE, and since it was well-known that Olivier de Schutter shares the critical view toward private sector CD for agricultural innovation, he was invited by the European Parliament to prepare a report which then became the basis for the political opposition against NAFSN published by the DEVE in the form of the report on the New Alliance for Food Security and Nutrition in 2016[4]. Apart from repeating the arguments of the position paper of De Schutter, the report also asks to link European foreign aid for agricultural development to strict conditionalities for recipient countries, such as embracing costly EU-style regulations on doing business in agriculture and on restricting the adoption of new technologies that may promote agricultural modernization.

EU Consensus Document on Development: Exporting regulations rather than technologies

These demands of DEVE eventually found their way into the European Consensus Document on Development published in 2017[5]. The consensus is portrayed as a sort of European effort to help meet the UN Sustainable Development Goals on a global scale. It claims that its primary objective is the eradication of poverty, but leaves an impression that business is not part of the solution but actually the problem in capacity development in agriculture and poverty alleviation. As a result of the growing opposition in Europe, NAFSN lost momentum, and in 2016, the G7 group decided to cede the NAFSN to the African Union (Prášková and Novotný 2021. Finally, France announced its official withdrawal from the NAFSN in 2018 (MEAE 2018).

1.2.2 After NAFSN: Country Agribusiness Partnership Framework (CAP-F)

In 2018, the AU and the NEPAD launched the Country Agribusiness Partnership Framework (CAP-F)[6]. It builds upon an evaluation of the strengths and weaknesses of the NAFSN and proposes a way forward to promote a more embedded type of agribusiness with a more committed sort of leadership to bring ventures to fruition. As such it is well-integrated in the

[4] The Report of the Committee on Development of the European Parliament on the New Alliance for Food Security and Nutrition (A8-0169/2016) is available online: https://www.europarl.europa.eu/doceo/document/A-8-2016-0169_EN.html (accessed on February 10, 2022). It is also named 'Heubuch Report' paying reference to its Rapporteur in the Committee on Development, MEP Maria Heubuch, Member of the Green Party/Bündnis die Grünen in Germany.

[5] The Consensus Document on Development is available online: https://ec.europa.eu/international-partnerships/european-consensus-development_en (accessed on February 10, 2022)

[6] See NEPAD communication on CAP-F: https://www.nepad.org/publication/country-agribusiness-partnerships-framework-cap-f-concept-note (accessed on February 10, 2022)

CAADP 2013-2023 results framework and its respective National Agricultural Investment Plans (NAIP). The CAP-F concept emphasizes the need to "stimulate private investments in agribusiness through an enabling environment that encourages the combination of public and private resources and capabilities along the priority agricultural value chains (AVC). By calling for the mobilization of agribusiness to enable inclusive and productive growth in agriculture, job creation to combat youth un- and underemployment as well as enhanced resilience of rural economies, CAP-F reiterates to a large extent the original ambitions of NAFSN while also addressing its weaknesses. It is also very much in line with the 'Feed Africa: 2016-2025 Strategy' of the African Development Bank (AfDB 2018) with its focus on building resilient and sustainable food systems in Africa that eventually enable the African continent to be less dependent on food imports. As such CAP-F must be understood as a follow-up of African institutions to NAFSN with additional emphasis on transparency, inclusiveness, African ownership and the importance of institutional leadership.

1.2.3 Alliance for a Green Revolution in Africa (AGRA)

AGRA was launched in 2006 with funding from the Bill and Melissa Gates Foundation and the Rockefeller Foundation with the purpose of transforming African agriculture from a subsistence model to a strong and inclusive business designed to increase farm incomes and improve food security. In this context, AGRA emphasizes the importance of effective private sector CD for agricultural innovation through embedded corporate investments in agriculture as well as public-private partnerships for agricultural development. Ever since its inception, AGRA is based in Nairobi, Kenya, and led by African leaders. Kofi Annan was initial founder of AGRA and its first chair. He stepped down in 2013 as chairman, but pointed out that he will continue to support AGRA's mission through the Kofi Annan Foundation encouraging African governments and their foreign partners in AGRA to transform the agricultural sector, tackle climate change, and encourage private sector engagement on the continent[7]. Since 2019, AGRA's board chair has been the former Ethiopian Prime Minister Hailemariam Desalegn. President of AGRA is Agnes Kalibata, former Minister of Agriculture and Animal Resources of Rwanda. Dr. Kalibata served as the Special Envoy of the UN Secretary-General for the 2021 Food Systems Summit, which was designed to accelerate action to transform food systems around the world and contribute to achieving the UN SDGs. A reason for Kalibata's UN appointment may be AGRA's results-oriented food systems approach to inclusive and sustainable agricultural transformation in Africa, which is supported by a diverse set of stakeholders in Africa, Europe and the United States. including numerous international foundations and NGOs, UN Organisations as well as many official donors from the US, the UK and Europe.

AGRA was able to raise US$ 500 million from 2017-2021 to support a three-pronged strategy of agricultural capacity development consisting of (a) policy engagement and state capacity building for delivery, (b) strengthening systems for scaling technologies, (c) partnerships for agricultural transformation.

In order to achieve the objectives set out in its strategy 2017-21[8], AGRA created the Partnership for Inclusive Agricultural Transformation in Africa (PIATA) in 2017 designed to enable integrated delivery within agro-economic zones and across AVCs, to enhance in-country coordination, to strengthen engagements with the private sector and to continuously

[7] See https://www.kofiannanfoundation.org/foundation-news/kofi-annan-steps-down-as-chair-of-agra-but-reaffirms-commitment-to-food-and-nutrition-security-in-africa/ (accessed on February 12, 2022)

[8] See https://agra.org/ar-2019/overview-of-our-strategy/

improve the performance of coordinated collaboration through an effective monitoring and evaluation system.

For that purpose, PIATA has leveraged a wide range of complementary tools, systems, knowledge, and resources with partners to catalyse an inclusive agricultural transformation in Africa designed to increase incomes, improve food security and strengthen resilience in natural resource management.

Capacity Development is an important part of the strategy on all levels. It includes capacity development on the level 'enabling environment' designed to establish institutional framework conditions that enable inclusive and sustainable change in agriculture, organizational capacities on the institutional level designed to ensure the effective implementation of enabling policies, and farm household capacity development designed to upgrade farming from a subsistence model to strong and innovative businesses that improve the livelihoods of the continent's farming households.

Moreover, AGRA developed and implemented several initiatives to enhance the opportunities for the large youth population at various points along the value chain (provision of sufficient sustainable input, application of sustainable practices, support for the effective processing and marketing of output). It includes, above all, the ability to understand and successfully run an agribusiness through vocational training programs, the support for youth-owned companies through appropriate funding, mentoring and ways to improve market access[9].

Its overall focus is on improving farm productivity, value chain integration, access to markets and on boosting resilience at systems and farmer-level. Investments in these areas seek to strengthen agricultural systems by improving access to inputs and markets for farm households. They also build-up a country's capability to scale systems and technology through targeted investments in an innovation-driven local private sector[10].

AGRA's Status Report on Agriculture in Africa 'A Decade of Action: Building Sustainable and Resilient Food Systems in Africa' (AGRA 2021) is largely dedicated to making African agricultural systems more resilient in the face of the COVID-19 pandemic, to promote inclusive growth through economic empowerment, especially of African youth and women, and to support intra-African agricultural trade through the support of the African Continental Free Trade Area (AfCFTA) agreement. These efforts are very much in line and coordinated with the Africa-owned initiatives (Africa's Agenda 2063, Malabo Declaration, CAADP)[11], have been endorsed by the UN Food Systems Summit (UNFSS) in September 2021 (Queiroz et al. 2022).

The China-Africa Future Cooperation Vision on Agriculture

AGRA's focus on private sector CD for agricultural innovation is also very much in line with the nine programs of joint action articulated in the China-Africa Future Cooperation Vision revealed after the Eighth Ministerial Conference of the Forum on China-Africa Cooperation (FOCAC) held on November 30, 2021[12]. One of the nine programs of joint action has an exclusive focus on CD for agricultural innovation: it aims to set up a number of China-Africa joint centers for modern agrotechnology exchange combined with demonstration and training in China. It also promotes the set-up of demonstration villages for China-Africa cooperation on agricultural development and poverty reduction in cooperation with Chinese institutions and

[9] See https://agra.org/youth-strategy/ (accessed on February 12, 2022)

[10] See https://agra.org/ar-2019/overview-of-our-strategy/ (accessed on February 12, 2022)

[11] See https://au.int/en/pressreleases/20171009/auc-signs-mou-agra-malabo-declaration-implementation

[12] See Dakar Action Plan (2022-24) (accessed on February 12, 2022)https://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/202112/t20211202_10461183.html (accessed on February 12, 2022)

companies. Finally, it includes the support of the Alliance of Chinese Companies in Africa in its efforts to launch the initiative of "100 Companies in 1,000 Villages"[13].

1.2.4 Improving African food systems in view of urban growth and shrinking farm sizes

AGRA's status report (AGRA 2021) outlines a holistic understanding of food systems as a fundamental part of our lives 'on which the sustenance of mankind depends'. The functioning of food systems affect the health of people and the natural environment, as well cultural identities. In addition, food systems are also very important for the generation of employment and increasing the incomes of the poorest, especially in low income countries in Africa.

According to AGRA, food systems are more than sustainable farming practices. They include upstream agri-food stages involving pre-farm value addition activities, e.g., farm input distribution, irrigation equipment, crop and animal science and technology generation, and farmer extension services as well as downstream agrifood stages involving post-farm value addition such as crops aggregation, transportation, wholesaling, storage, processing, retailing, restaurants, and beverage manufacturing (AGRA 2021).

This holistic view takes into account the importance of rural-urban linkages in the context of food production and consumption. In this context major demographic shifts in the coming decades have to be taken into account: while Africa's rural population is projected to grow by an additional 305 million people by 2050 (Jayne and Headey 2014), its urban population is experiencing average growth rates higher than 3 per cent, regardless of the city size, leading to a projected additional 2.25 billion people living urban areas by 2050 in Africa (UN DESA 2018). It would enhance Africa's share of people living in urban areas from 10.3% in 2021 to 20.1% in 2050. While Northern Africa has already one of the highest urban population shares, Sub-Sub-Saharan Africa has at 4.1% the highest rate of urban population growth with the consequence that its population will more than double by 2050 (Saghir and Santoro 2018).

The projected increase in rural population combined with lack of off-farm opportunities will lead to further pressure on cropland and increasing land fragmentation. Diminishing farm average sizes in Sub-Saharan Africa are already having a big impact on deforestation and degradation of land and soils (AGRA 2021, Jayne and Headey 2014). Average farm sizes in many of the marginal regions in Eastern Africa have fallen below 0.3 hectares with the result that a further division of the land will not allow the offspring of such farm households to feed themselves and their families, not to speak of feeding the growing African urban population of whom 80 % do not grow their own food (Aerni 2014, Rapsomanikis 2015). In view of lack of off-farm employment in rural areas and stricter laws to halt deforestation, shrinking farm sizes have also become one of the major drivers of rural-urban migration (Aerni 2015).

In return, the expected rapid increase in the share of urban dwellers in Sub-Saharan Africa greatly contributes to an increase in demand for basic staple foods at a rate of 4.8% per year, which opens great opportunities to domestic agriculture and to the African youth to become employed in the production and marketing of processed food in urban retail stores or becoming active as entrepreneurs themselves.

Mobilizing entrepreneurship and innovation in African agriculture

Thanks to the increasingly educated young population, Africa has countless youth-led agricultural start-ups leveraging digital technologies to improve efficiencies in production, processing, and service delivery across agricultural value chains. However, often they operate in a very difficult environment that constrains their growth severely. Moreover, the basic domestic AVCs are largely underdeveloped in Sub-Saharan Africa (AGRA 2019). Whereas

[13] See https://allafrica.com/stories/202112100145.html

improved post-harvest value addition in Asia enabled the share of household food expenditures for processed food to increase to 60 per cent even in rural areas, only 30 per cent of food consumed in eastern and southern Africa is estimated to be processed (Tschirley et al.2015). Development of off-farm value addition sectors therefore offers a great potential to create new and better jobs for Africa's growing young labor force. Simultaneously, the development of formal agricultural value chains could produce the nutritious food demanded by African consumers at affordable prices and enhancing rural household food security and resilience thanks to increasing revenues from cash crops (AGRA 2021).

Taking into account the growing rural population, land pressures resulting in more rural-urban migration, increasing youth un- and underemployment and an annual food import bill of US$ 43 billion, AGRA argues that agricultural development will have to embark on sustainable intensification, crop diversification and integration into formal AVCs. This need has become more urgent in view of growing climate variation, infestation of locus and fall armyworm (FAW), civil conflicts, and the COVID-19 pandemic, which had a devastating impact on integrating precarious African subsistence farming systems into more formal agricultural value chain systems, putting.

1.2.5 The UN Food Systems Summit and the narrative of its opponents

AGRA's understanding of food systems and how to render them more sustainable, inclusive and productive played an important role in the preparatory work for the first Food Systems Summit of the United Nations held during the UN General Assembly in New York on September 23, 2021. It was designed to set the stage for global food systems transformation to achieve the Sustainable Development Goals by 2030. In his introductory remarks, Antonio Guterres, the Secretary General of the United Nations, praised the preparatory work of the summit, which included stakeholders representing businesses, communities and civil society. They were invited to chart pathways for the future of food systems that respect the human rights of all people through National Dialogues across 148 countries. These Dialogues revealed key building blocks for action by governments, together with different stakeholders, to further strengthen food systems by 2030. In this context, a focus emerged that is increasingly centered on feeding a growing population in ways that contribute to people's nutrition, health and well-being, restore and protect nature, support the goal of climate neutrality, are adapted to local circumstances, and provide decent jobs and inclusive economies. In this context, Guterres also pointed out that governments, the business community — from Small and Medium Enterprises to Multinational Corporations — has an important role to play through responsible business practices and innovative solutions[14].

Africa's Common Position to the UNFSS

COVID-19 and climate change had a significant negative impact on African agriculture and overall efforts to reduce poverty on the African continent. It also represented a serious setback of the ambitious targets of Africa's Agenda 2063. For that purpose, Africa's Common Position to the UNFSS has very much embraced the dynamic Food Systems Approach proposed by AGRA. It calls for the urgent need for a food systems transformation with its emphasis on improved resilience, productivity and inclusiveness. The Common Position paper proposes among other things the rapid adoption of biotechnology ranging from drought-tolerant seed varieties to biofortification of staple and other widely consumed foods, in addition to the promotion of digital technologies to advance affordable precision agriculture techniques

[14] See the Secretary General Chair's Summary and Statement of Action on the UN Food Systems Summit (https://www.un.org/en/food-systems-summit/news/making-food-systems-work-people-planet-and-prosperity (accessed on 24 February, 2022)

enabling a more sustainable use of water and land resources. These new technologies have become affordable and relatively user-friendly, and, according to the Position Paper, they could be easily combined with improved sustainable agronomic practices to promote soil conservation, and the preservation of the environment.

The Common Position Paper also asks for the establishment of an enabling regulatory and policy environment that creates more space for local entrepreneurship and innovation while also ensuring that improved standards in domestic business promote human and animal health (AU 2021). This demand is also compatible with four UN resolutions over the past decade that emphasis the importance of entrepreneurship and innovation for sustainable development[15] contributing essentially to the spirit of the UN SDGS with its emphasis on the promotion of inclusive and sustainable business (Aerni 2021). Such efforts go beyond business as usual, They require substantial capacity upgrades at all levels to achieve an African food systems transformation, according to the United Nations Economic Commission for Africa (UNECA). In this context, official development assistance and private foreign aid organisations must also acknowledge that the challenges that more inclusive and sustainable food systems in Africa are confronted with also include the rise of an African middle class, rapid urbanization, which is causing a shift in food demand as well as rising competition over African farmland, and mobilizing investment in climate change adaptation [16].

Opposition to AGRA and the Food Systems Summit

In view of the prior opposition to NAFSN, it was quite predictable that AGRA would face an increasing amount of opposition from international NGOs engaged in diverse social movements related to food sovereignty, organic farming, and 'right to food'[17]. The criticism relies so far on one single working paper that claims that AGRA had failed to address the problem of undernourishment, which would have gone up 30 per cent since the set up of AGRA in 2006 (Wise 2021)[18]. The paper also states that the potential income increases from larger yields were largely canceled out by higher cost of fertilizer and industrial seeds, and that projects would lack input from communities they are meant to help (Wise 2019). The paper then weaves these claims into a larger storyline that includes the negative outcomes of the

[15] See UN Resolutions UN RES 67/202, 69/210, 71/221, 73/225 in the period of 2012-18.

[16] See Africa's common position on food systems (https://www.uneca.org/?q=stories/african-countries-to-speak-in-one-voice-at-un-food-summit)

[17] See a publication (falsche Versprechen: the Allianz für eine Grüne Revolution in Afrika) funded by the Rosa Luxenburg Stiftung: https://www.rosalux.de/publikation/id/42635/falsche-versprechen (accessed on February 13, 2022) as well as an article in scidev.org called 'AGRA fails to deliver on promise to double yields' (https://www.scidev.net/global/news/agra-fails-to-deliver-on-promise-to-double-yields/ (accessed on February 13, 2022) citing several activists opposed to AGRA.

[18] The academic paper lacks scientific rigor insofar that it only discusses data and literature that fits the overall storyline. For example, the paper simply relies on some aggregated government data on agricultural production and poverty reduction in the 11 African countries in which AGRA is active. Deducing from a decline of agricultural production and an increase in poverty in recent years that AGRA has failed is a bit of a stretch in view of all the exogenous and endogenous shocks that affect African agriculture more than the rest of the World (climate change, COVID.19, civil war, ever-shrinking farm sizes due to population growth etc). A similar correlation may have been found between FAO's reform of the Committee on Food Security (CFS) and the formation of the High Level Panel on of Experts on Food Security and Nutrition (HLPE) that embraced the concept of 'right to food' (HLPE 2020) and declining yields in certain low income countries in Africa in which FAO is active over the subsequent decade. Moreover, attributing an increase in cash crop production at the expense of staple crops to the growing influence of AGRA is misleading in view that this primarily represents a shift in food preferences by the growing urban population in direction of convenience food and meat products). Moreover the stagnant or declining productivity of staple crops may also be due to European NGOs and donor agencies that believe that improved agro-ecological practices alone can solve the productivity problem of small-scale farmers (Paarlberg 2022).

Green Revolution during the Cold War period (a green revolution that actually never reached Africa) and the subsequent alleged corporate influence on the global food security debate and how civil society was able to push back and protect small-scale farmers from being exploited by commercial interests while promoting ecological practices.

When the UN Secretary General Antonio Guterres appointed Dr. Agnes Kalibata, the President of the Alliance for a Green Revolution in Africa (AGRA) as Special Envoy of the FSS, it created outrage in the civil society community. The Civil Society and Indigenous People Mechanism (CSM) wrote a letter to Antonio Guterres to revoke AGRA's Agnes Kalibata's appointment since it was "a deliberate attempt to silence the farmers of the world". In addition, they called her "a puppet of agro-industrial corporations and their shareholders"[19]. Since they did not receive an answer from Mr. Guterres, they announced that they would boycott the Summit (Vidal 2021).

The decision of Mr. Guterres to not cede to such demands may be related to the view that the interpretative sovereignty of the term 'food systems' should not be left to food sovereignty advocacy groups and food regime theorists alone but open for debate and to new insights from science. Kalibata made this clear in her response when she argued that "Debate and dialogue is the only way we will make progress and we must lean into courageous conversations rather than avoid them. Those choosing not to engage are self-excluding (Vidal 2021).

Struggle for discursive power over the term 'food systems'

Many aspects in the current public discourse on food systems tend to reveal some vested interests in keeping interpretive sovereignty (Deutungshoheit) over the term and with it securing discursive power despite changing global circumstances due to the COVID-19 pandemic. Analysing the line of argumentation of the incumbents, meaning those who have so far shaped the term of food systems and the global narrative associated with it, there is a striking gap between claims and effective reality: For example, calling any policy effort to promote public-private partnerships in agriculture as 'neoliberal' and any sort of private sector investment in African agriculture as 'land grabbing' and 'corporate take-over' may be motivated by the desire to keep up the moral highground. After all, who would not agree that those who struggle against land grabbing corporations in Africa act on behalf of the public interest and therefore deserve to be trusted (Aerni and Bernauer 2006)? However, such a simplistic view is hardly in line with the view of Africa's Common Position Paper to the FSS discussed earlier and therefore may disrespect the principle of ownership as expressed in the OECD Paris Declaration of Aid Effectiveness[20]. Moreover, it completely ignores the four UN resolutions calling for enabling policies designed to promote entrepreneurship and innovation for sustainable development and the aim of the UN SDGs to enable business to become part of the solution (Aerni 2021).

The struggle to keep the interpretive sovereignty of the term 'food systems' is apparent in a paper published in Frontiers in Sustainable Food Systems in January 2022 (Canfield et al. 2022) in protest of the set up and the outcome of the FSS. It argues among other things that the Summit has hijacked the term food systems transformation to serve AGRA's agenda and the

[19] The letter of the NGO coalition is available on the website of the Oakland Institute in the United States (https://www.oaklandinstitute.org/revoke-agra-agnes-kalibata-special-envoy-2021-un-food-systems-summit?utm_source=land_rights&utm_medium=email&utm_campaign=advocacy&utm_content=lower_callout (accessed on February 14, 2022). In reality, Kalibata, a native from Rwanda spent her childhood as a refugee in Uganda. Her parents were smallholders. She eventually made a career as a researchers concerned with improving African agriculture through science-based approaches and was then appointed as Rwanda's minister of agriculture and animal resources. According, to the signatories of the letter to Guterres, she is not entitled to talk on behalf of smallholders or Africans.

[20] See https://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm

promotion of new technologies. It concludes that "each of these outcomes is dangerous for its potential to overturn hard-won achievements of civil society" (p13). The authors argue from a position of supreme discursive power since they implicitly admit that they have shaped prior narratives, norms and values of what makes up a food system sustainable[21]. It remains however unclear what these hard won achievements were and why the private sector should be kept out of food systems by all means to the meet the UN SDGs[22].

It is also far from clear, if the praised multifunctional approach in agriculture, as it is promoted over the past three decades in Europe, has actually delivered effective results in terms of social and environmental improvements in rural areas. A recent paper makes a comparison of green farming in Europe and the United States based on World Bank and FAOSTAT data up to the year 2018 (Paarlberg 2022). It turns out that, apart from being slightly ahead in the field of animal welfare, European farmers continue to use roughly one third more chemical input and fertilizer per hectare than US farmers, who are also less affected by decreasing farm household incomes that drives many of them into poverty. Moreover, thanks to the widespread adoption of new technologies in the fields of precision farming and biotechnology, the increase in total factor productivity in agriculture in the United States did not go at the expense of the environment, land use change and the use of natural resources (Lin et al. 2019). In corn production, for example, advances in predictive breeding and digital farming enabled farmers to reduce irrigation water use by 46 per cent, energy use by 41 per cent and greenhouse gas emissions by 31 (Field to Market 2016). The EU did not particularly encourage the use of farm precision technologies because it is associated with larger farms. Moreover it completely discouraged the use of advanced biotechnology in breeding through preventive regulation due to organized public resistance (Aerni 2019). The implicit view that new technologies are more of a problem than a solution in agriculture is reflected in the agricultural component of the EU's 'Green Deal' agenda called the Farm to Fork (F2F) Strategy. It builds upon the recommendations of a report that was prepared by the Scientific Advice Mechanism (SAM), the Group of Chief Scientific Advisors of the European Commission. However, none of the members of this group had real expertise in agriculture. The report called "Towards a sustainable food system" (SAM Report 2020), largely reflects the 'food systems' perspective of food regime theorists who see market forces and new technologies as the main obstacle to sustainable agriculture.

Europe's Farm to Fork (F2F) Strategy as an alternative to AGRA?

The F2F strategy pursues ambitious environmental goals. It aims at reducing chemical pesticide use on farms by 50 per cent by 2030, and fertilizer use by 20 per cent in the same period, but not through sustainable intensification, as it took place in the United States, but extensification. In this context, the farmland area under organic production in Europe is envisioned to increase by "at least" 25 per cent by 2030 (EU, 2020). Moreover, a list of agricultural practices is presented that would have the potential to promote high-diversity farming landscape and build semi-natural wildlife habitat on farms. The two main agricultural practices to be promoted are organic farming and integrated pest management (EC 2021).

[21] The rhetoric of the claim to have norm-setting power can be situated in a struggle between doxa and episteme. Whereas Doxa is understood as a unreflected belief or opinion, episteme is implied as being true knowledge (Borchers and Hundely 2018,

[22] The recently published IAASTD+ report (Herren at el. 2019) defines the concept of food systems as the integration of previously segregated sectors of production, processing, trade, consumption, environmental assessment and health, as well as knowledge systems. The concept would represent a shift from a productivity to a sufficiency mode of thinking (from "more food is needed – production must increase!" to "only produce or take what is needed".

When it was presented to the public, the F2F strategy of the EU was hailed as an attempt to create a "new and better balance of nature, food systems and biodiversity; to protect people's health and well-being, and at the same time, to increase the EU's competitiveness and resilience" [23]. Many food sovereignty advocates, agro-ecology experts and food regime theorists welcomed it, but felt that it would stop short of a systems change[24].

However, European scientists concerned with sustainable agriculture voiced their skepticism in regard to potential negative side effects of the F2F strategy considering that the yields in organic farming reach on average only 60-70 per cent of the yield in conventional farming and that making use of modern biotechnology to reduce the use of pesticides, fertilizer and greenhouse gas emissions in agriculture is not foreseen as an option (Punhagen et al. 2021). The unintended side effect will be offshoring environmental pollution (Fuchs et al. 2020), because the surface required to produce the same amount of food will have to increase significantly elsewhere and thereby induce massive land use change outside Europe (through more food imports) to produce the same amount of food for European consumers. In view of the fact that land use change is already the biggest source of greenhouse gas emissions from agriculture (IPCC, 2019), the F2F strategy is expected to have a negative impact on climate change mitigation (Punhagen et al. 2021). These warnings did not prevent the European Parliament (EP) from approving the F2F Strategy in October 2021 with great approval from food sovereignty advocates who praised the EP for its strong commitment to the transition to sustainable food systems and for withstanding corporate attempts to water it down.[25]

The situation could take an unexpected turn with the invasion of Russia in Ukraine in February 2022. Since the onset of the Ukrainian crisis, the cost of energy, fertilizer, animal feed and food increased to levels not seen since the World Food Crisis in 2008. This has induced the European Commission to postpone two new proposals related to binding targets to restore nature as well as a sustainable pesticides law that is meant to be part of the F2F implementation strategy[26].

1.2.6 EU support for the Tropical Agricultural Platform (TAP), a G20 initiative

At the first G20-led Meeting of Agriculture Chief Scientists in September 2012, there was a widespread consensus that capacity development (CD) for agricultural innovation is key to prevent future food crises and promote sustainable change in agriculture, especially in low-income tropical countries that have so far lagged behind in terms of agricultural innovation and productivity. In this context, it was acknowledged that many emerging economies in Asia were able to overcome the dual economy in rural areas with its large informal sector dominated by semi-subsistence small-scale agriculture and its small formal agricultural sector dominated by large estates run by agribusiness companies. They were able to overcome the problems of a dual economy thanks to investment in inclusive CD for agricultural innovation (FAO 2013). As such they achieved convergence in the agricultural sector and, with it, improved domestic food security, reduced rural poverty and enabled sustainable change (Juma 2011). The Interagency Report of the Mexican G20 Presidency thus concluded that governments should move from merely regulating agricultural change through protective trade policies toward facilitating policies that enable sustainable change and increased private sector investment in

[23] See EC communication: https://ec.europa.eu/commission/presscorner/detail/en/IP_20_884

[24] See comments: https://www.theparliamentmagazine.eu/news/article/commissions-unveiling-of-farm-to-fork-strategy-receives-mixed-response (accessed on February 14, 2022)

[25] See https://www.slowfood.com/eu-parliament-gives-the-green-light-to-the-farm-to-fork-strategy/

[26] See Reuters article on 'Ukraine war set to delay EU sustainable farming plans': https://www.reuters.com/world/europe/ukraine-war-could-delay-eu-sustainable-farming-plans-2022-03-21/ (accessed on March 29, 2022).

agriculture (Interagency Report to the Mexican G20 Presidency 2012). In order to improve coherence and coordination of CD for agricultural innovation in the tropics, it was proposed to make national Agricultural Innovation Systems (AIS) more productive, inclusive and sustainable, as well as a driving force of economic empowerment and sustainable change in rural areas through the creation of a Tropical Agriculture Platform (TAP). The Food and Agriculture Organization of the United Nations (FAO) was subsequently requested to lead the development of TAP designed to create a multi-partner dynamic facilitation mechanism on capacity development for tropical agricultural innovation and to improve the coherence and effectiveness of CD interventions.

TAP needs assessment in tropical countries reveals need for more private sector CD for agricultural innovation

The activities of TAP started in 2012 with a needs assessments based on stakeholder surveys carried out in three tropical regions: Southeast Asia, Sub-Saharan Africa and Central America (FAO 2013). The stakeholder groups involved represented institutions involved in policy, research, higher education, extension as well as farmer organisations and civil society organizations.

Participants in the survey across all three regions felt that, due to their dependence on foreign funding, the agricultural research and extension initiatives tend to reflect a particular external agenda and, therefore, are often ill-coordinated with national and regional policies to promote and sustain CD in agricultural innovation. Moreover, priorities set in agricultural research, education and training are perceived to be often misaligned with local priorities expressed by farmers, farmer cooperatives and local agribusiness.

For the participants in the survey in Subsaharan Africa, lack of private sector investment, distrust of public-private partnerships and lack of responsiveness to smallholder needs were felt to be the main challenges that national AIS systems are facing in efforts to promote effective CD for agricultural innovation. This view is in line with the fact that Africa's National Agricultural Investment Plans (NAIP) aim at attracting more and not less private sector investment in agriculture. After all, many national AIS especially in Least Developed Countries (LDCs) have only weak links to the local private sector (Ojijo et al. 2013).

The survey participants further acknowledged that market forces tend to neglect the needs of small-scale farmers unless governments and foundations assist private investors in managing investment risks. However, they also agree that markets constitute an important pull effect that encourage farmers to acquire capacities in agricultural innovation that they would otherwise not have access to. In this context, it is suggested that academic and civil society actors involved in the promotion of AIS could potentially play an important complementary role by focusing on the integration of the more informal and less productive semi-subsistence farming sector into formal AVCs. Finally, the surveyed stakeholders in all three regions felt that there is a lack of coordination between North-South and South-South funded projects (FAO 2013).

Based on the survey results, the synthesis report proposed a common framework for CD for Agricultural Innovation that enables less developed countries to learn more efficiently from southern innovation champions and to conduct effective reforms at the policy and the organizational level to facilitate sustainable change.

TAP Common Framework and the EU-funded CDAIS project (2015-1019)

Instead of using the synthesis as a basis for a framework designed to implement the TAP Action Plan in accordance with the findings of the Needs Assessments, another participatory process was launched to develop a Common Framework for Capacity Development for Agricultural Innovation Systems (CDAIS), incorporating inputs from a wide range of experts chosen from

donors, research, extension and education institutions as well as international organizations involved in the field of agricultural innovation. The Synthesis document was published in 2016 (FAO 2016) and largely reaffirms the commitment to a non-linear approach in the promotion of Agricultural Innovation Systems (AIS) with its three levels of intervention (individual, organizational and enabling environment). Referring to numerous prior work, it defines 'Capacity Development' as 'the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time' (FAO 2016: 4). The report largely remains descriptive and theoretical by outlining different sorts of capacities to navigate complexity, collaborate, reflect and learn, and to engage in strategic and political processes. They would then eventually all contribute to an enabling environment in which bridge-building institutions such as TAP would assume the role of a facilitator designed to enhance interaction and relationships of individuals, organizations, and their social, cultural and political structures (FAO 2016: 7). The report then introduces the idea of creating innovation niches as the 'locus of learning, experimentation and micro-level transformation'. In such innovation niches 'alternative socio-technical practices can be experimented and developed so that they can subsequently inform and influence mainstream processes' (FAO 2016: 9). Based on these deliberations, the Common Framework proposes a CD for AIS Cycle of 5 stages: "Galvanizing Commitment", "Visioning", "Capacity Needs Assessment", "CD Strategy Development" and "Implementation".

TAP Common Framework for CDAIS: European funding not in line with local priorities

However, despite its inclusive language, the Synthesis document (FAO 2016) widely ignores the views of local stakeholders in tropical countries as expressed in the three prior needs assessment (FAO 2013). For example, the Synthesis document remains silent about

- the demand by stakeholders in tropical countries for more private sector capacity development
- support for agricultural value chain integration of small-scale farmers,
- investment in agricultural productivity growth,
- more capacity development across the whole food system including service/input-delivery to farmers and food processing capacities, and
- learning from successful leadership demonstrated by southern innovation champions.

These demands were expressed in the prior needs assessment and can also be found in many national agricultural development and investment plans in Africa. Yet, they are widely by-passed in foreign-funded capacity development projects sponsored by Europe.

The reason for this neglect may be related to the fact that the European Commission (EC) became the main financial supporter of TAP and that the Synthesis report is largely a product of the European agricultural research alliance AGRINATURA that is supported by the EC.

It may also explain why there is no private sector partner listed among the 41 partners of TAP, even though this was an implicit demand from local stakeholders that participated in the prior needs assessments (FAO 2013, Oijio et al 2013). This demand is even taken into account in the first of the basic CD for AIS principles promoted by the TAP Common Framework: "CD for AIS interventions must respond to expressed needs of actors. It cannot be designed and implemented by external actors with a well-defined and standardized set of products and services" (FAO 2016: 7).

TAP Activities and the

The aim of the TAP Common Framework was to

1) consolidate the diversity of approaches to CD for AIS,
2) to promote a shift of mind set and attitudes using an AIS perspective,

3) to provide concepts, principles, approaches and tools to better understand the AIS architecture, and based on that, assess CD needs, and plan, implement, and evaluate CD interventions
4) to emphasize the role of facilitation, learning, documentation and knowledge.

Since then, the Framework has been applied in eight pilot countries with four of them being located in Sub-Saharan Africa (Angola, Burkina Faso, Ethiopia and Rwanda)[27]. Since August 2019 the EU supports the new TAP Action Plan through the project "Developing capacities in agricultural innovation systems: scaling up the TAP Framework" (in short, TAP AIS), to be implemented over 5 years (2019-2024).

Joint Appraisal of AIS by FARA using AGRINATURA methodology and funding from TAP

In 2021, a joint rapid appraisal on strengthening agricultural innovation systems in Africa, Asia and Latin America by Regional Research and Extension Organizations (RREO) has been published (EU 2021) adopting the methodology developed by AGRINATURA, which mainly consists of guidelines for desk research, stakeholder surveys, case studies and individual interviews. It is portrayed as “an initial step in the process of strengthening their capacities and facilitating collaboration”. In Africa, the focus of the appraisal was on the target countries of a European Union-funded TAP project on CDAIS. These countries are Cameroon, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Nigeria, South Africa and Uganda. The RREO in the appraisal was the Forum for Agricultural Research in Africa (FARA) based on Ghana. Its focus was on exploring ways in which RREO could support and integrate functional capacity development and integrate them with technical capacities.

FARA developed and tested the Strengthening Capacity for Agricultural Research for Development (SCARDA) approach based on a stepwise participatory needs assessment conducted in the target national agricultural research institutes and universities in ten countries in Africa. Subsequently, capacities identified in demand-led multi-actor partnerships were applied to address problems in specific value chains or agricultural systems. The initiative was supported by the Platform for an Africa-Europe Partnership for Agricultural Research for Development (PAEPARD) including FARA and AGRINATURA with the aim to encourage policy decision makers in Sub-Saharan Africa to also adopt the approach in the design of national AIS.

However, the impact of SCARDA on the ground remains unclear. There is also no guidance in regard to priorities that need to be addressed in order to generate real impact and scale of projects that would then contribute to the UN SDGs that are related to food security and sustainable agriculture. In this regard, one is tempted to call it an exercise of consultation and participation on AIS approaches, especially in view of its focus on design and subsequent descriptive analyses of workshops with local stakeholders.

1.2.7 EU-funded CDAIS and the real challenges in African agriculture

The impatience with the TAP/CDAIS approach was expressed in an online discussion organized by Food Security Network (FSN) Forum in cooperation with the FAO Regional Office for Africa (RAF) on “Sustaining the impact of capacity development initiatives for African youth in agriculture”. It took place from 25.10. - 25.11.2017 and involved participants from 25 countries who shared 98 contributions[28]. The contributors listed numerous challenges

[27] See TAP Action Plan: https://www.fao.org/in-action/tropical-agriculture-platform/commonframework/ru/ (accessed on February 15, 2022

[28] A summary report of the discussion is available on the following website: https://www.fao.org/publications/card/en/c/I8410EN/

that youth are facing after capacity development (CD) initiatives have been completed. The challenges are related to the way the initiatives were set up, organized and promoted, and to the lack of consideration of the general institutional and socioeconomic context of agriculture in the respective region. The criticism referred in particular to:

1) the lack of motivation to enable agricultural entrepreneurs to succeed in the business,
2) the lack of interest in upgrading business skills,
3) the short duration of CD initiatives combined with a general lack of follow-up (in terms of mentoring and supervision) and
4) the failure to address real challenges of youth in agriculture such as lack of access to finance, land and business services that would enable the integration into agricultural value chains.

Yet, despite the exponential growth of literature on Agricultural Innovation Systems (AIS) and Agricultural Research for Development (AR4D) and the emphasis on participatory approaches that would include all actors, such grievances are hardly ever addressed (Wang et al. 2018). This also applies to the most recent TAP report on the lessons learned from the case studies on Capacities Development for Agricultural Innovation Systems (Toillier et al. 2020). It does not contain any reference to research on private sector CD for agricultural innovation, the role of local innovative entrepreneurs that make use of new knowledge to create new markets through innovation or ways to improve institutional framework conditions to incentivize agribusiness to invest in the development and scale up of inclusive innovation. Even though the report contains a vision of 'scaling' the niche innovations that were investigated in the case studies, it remains rather vague following the ex-post theory of change approach and describing potential improvements on different levels (individual, organizational, enabling environment) that may have enabled the scale-up of some successful niche innovations in a particular context. Yet, whether the scale-up was due to the particular foreign-sponsored CDAIS interventions or whether it would have taken place anyway remains far from clear. The authors also seem to be unfamiliar of the literature on scaling up sustainable business, which is strongly linked to the ability to make a business grow through innovation (Matthews 2020).

The report admits that there was a frustration expressed by the 'beneficiaires' of the local workshops organized (Toillier et al. 2020: xi), even though they would have acquired 'capacities to innovate'. Yet, it remains not clear if such capacities proved to be of real practical value.

What all the EU-funded reports on CDAIS under TAP have revealed so far is that the academic community involved in AR4D and AIS under the EU-funded umbrella organization AGRINATURA[29] does not involve any researchers in the field of business development. It mainly involves like-minded scholars in the field of transdisciplinarity concerned with popular terms such as vulnerability and resilience (Ford et al. 2018). The transdisciplinary research community has also developed its own evaluation criteria of quality research that creates a sort of self-immunization toward criticism. As such it tends to be largely self-referential. Nevertheless, the field of education for sustainable development largely relies on this field of research (Aerni 2021).

The AGRINATURA network comprises a wide range of partners[30], yet none from the private-sector, which may not have been necessary since all the funding came the public sector agencies

[29] Agrinatura is a European Alliance on Agricultural Knowledge for Development, an entity established jointly by European Research and Education organisations.

[30] See https://agrinatura-eu.eu/about-us/partners/ (accessed on February 19, 2022)

in the European Union and its member states[31]. This may also explain why its reports do not contain any critical assessments of the agricultural, environment and development policies promoted by the EU and its potential conflict with the ownership principle which is meant to guide development cooperation according to the Paris Declaration on Aid Effectiveness.

A recent book chapter on research and innovation (Wang et al. 2019) in the FAO publication on Sustainable Food and Agriculture: An Integrated Approach (Campanola and Pandey 2019) points at the weakness of current research on AIS. The model would fail to consider societal priorities, values and concerns of the users in the local agricultural value chain. Even though innovation is the outcome of Agricultural Innovation Systems (AIS) that include researchers, farmers, enterprises, and bridging institutions, it fails to jump start an inclusive and sustainable transformation of agriculture unless there is predictable public funding and dialogue with the increasing private investment sector (Wang et al. 2019: 505). In this context, they challenge the new focus of the Consultative Group for International Agricultural Research (CGIAR) from 'science-driven' toward 'development oriented' because the CGIAR system with its strong science-based approach to sustainable intensification in agriculture should leave the 'development' component of agricultural development to national agricultural research systems (NARS) to ensure ownership (Wang et al. 2018: 498).

The authors therefore propose a new contract between science and society designed to ensure that the new knowledge produced in research is 'socially robust' in the sense that it generates impact through practical application and scalable innovation. In this context, agricultural innovation is a process that can only thrive in an economic ecosystem (Wang et al. 2019: 493).

The 'One CIGAR' strategy and its link to CDAIS

Formed in 1971, CGIAR was tasked with extending the agricultural transformation associated with the Green Revolution to new countries and new crops. The purpose was to hire international experts and develop and deliver research-based interventions in different subtropical and tropical countries across the Global South. Its agenda has been shaped by an unusual partnership: an ad-hoc consortium of national governments, foreign aid agencies, philanthropies, UN agencies, and international financial institutions. The agenda changed substantially after the end of the Cold War: Terms such as food security, gender equity, and sustainability replaced the security concerns. Although research priorities, mechanisms of funding, and decision-making may have changed in the subsequent decades, CGIAR and this network of research centres remain powerful actors in shaping international development and, with it, global agriculture[32].

The new strategy called 'One CGIAR'[33] aims for greater integration of knowledge and more impact in the face of the interdependent challenges facing today's food systems addressing from the interconnected food, land, water and climate crises in effective ways. In this context, it has identified five key impact areas:

- climate adaptation and mitigation
- environmental health and biodiversity
- gender, youth and social inclusion
- nutritional health and food security
- poverty reduction, livelihood and jobs

[31] See https://knowledge4food.net/partners/platform-african-european-partnership-agricultural-research-development-paepard/ (accessed on February 19, 2022)

[32] See https://www.cultivation.hps.cam.ac.uk/CGIAR-histories (accessed on March 31, 2022)

[33] See https://www.cgiar.org/how-we-work/strategy/ (accessed on March 31, 2022)

The strategy is driven through three impact pathways – science-based innovation, targeted capacity development and advice on policy with three action areas: three Action Areas: systems transformation, resilient agrifood systems and genetic innovation.

In this context, CGIAR capacity development largely builds upon capacity building initiatives across the CGIAR Research Programs (CRPs) and Platforms. These encompassed training programs for a range of stakeholders; the production and dissemination of tools and manuals; guidance on, and support for institutional and organizational changes and improvements; and support for improved practices and methods [34]. Yet, it also praises the CDAIS approach promoted by the EU for the "capacity development for offering an inclusive approach to problem-solving because it focuses on understanding a developmental problem from the perspective of the individuals impacted by problem [35].

The funders of the 'One CGIAR' strategy include mostly donors from Europe and the United States with highly diverse agendas. Whereas the donors of the EU tend to pursue an agenda that reflect the CDAIS approach, US donors such as USAID but also private foundations such as the Bill and Melissa Gates Foundation have largely embraced the AGRA approach. In this context, the EU seeks to align the goals of its DeSIRA Strategy (Development Smart Innovation through Research in Agriculture) designed to contribute to climate-relevant, productive and sustainable transformation of agriculture and food systems in low and middle-incomes countries, with the agenda of 'One CGIAR'.

The EU's DeSIRA strategy: Development Smart Innovation through Research in Agriculture

The Tropical Agriculture Platform (TAP) as well as numerous other above-mentioned projects to promote initiatives related to Agricultural Research for Development (AR4D) and Agricultural Innovation Systems (AIS) are supported by Development Smart Innovation through Research in Agriculture (DeSIRA). DeSIRA was launched as one of the 'One Planet Actions' at the One Planet Summit in 2017 in Paris convened by the French government. Subsequently, it became a European Commission Initiative with initial funding of US$ 300 Million for the first phase of implementation (2019-2025) [36]. It aims to promote the adaptation of agricultural practices to climate change, the promotion of agro-ecology and the support of small farmers and to strengthen agricultural research organizations in Europe and in the South, as well as their partnership networks in order to promote innovation trajectories [37].

In its farm-to-fork strategy, the European Commission refers to DeSIRA as a way to export its philosophy of sustainable food systems to low income countries [38]. It aims to do so mostly through ongoing initiatives and the integration of policy coherence for sustainable development in all its policies. development projects designed to promote n food research and innovation (EC 2020: 18). One of the great beneficiaries are the Forum for Agricultural Research in Africa

[34] See https://www.cgiar.org/capacity-development/ (accessed on March 31, 2022)

[35] See https://pim.cgiar.org/2020/07/09/a-systems-approach-for-supporting-inclusive-agricultural-research-and-innovation-systems/ (accessed on March 31, 2022)

[36] In 2018, 20 projects in 20 countries have been supported (including 6 multi-country projects) with €100M (including co-financing). In addition, support for research governance to GFAR, TAP/FAO and the CAADP organization: €40M (EU) and €12.5M (IFAD). In 2019, 22 projects in 31 countries have been supported with 112M€ (including co-financing).

[37] See https://www.oneplanetsummit.fr/en/coalitions-82/desira-development-smart-innovation-through-research-agriculture-206 (accessed on February 19, 2022)

[38] In its communication of the farm-to-fork strategy in 2020 the EU made it very clear that it will pursue the development of Green Alliances on sustainable food systems on all levels of regional and global governance through its external policies, including international cooperation and trade policy emphasizing that 'this will include cooperation with Africa, neighbours and other partners' (EU 2020: 17).

(FARA) in Ghana and AGRINATURA. These two research institutions are supported by the EU through TAP and the Food Security Thematic Programme to coordinate the Platform for African-European Partnership on Agricultural Research for Development (PEAPARD).[39]

1.3 Food Systems Summit Commitments

The culmination of two years' preparatory work and worldwide mobilisation events, the United Nations Food Systems Summit took place on 23 September 2021 after extensive preparatory work and mobilization events worldwide. More than 150 countries took part in the event, which was held entirely online.

A follow-up mechanism has been designed to advance the national and global transformative actions announced at the summit and in subsequent biannual stock-taking meetings to measure progress.

Five tracks of action were identified:

1) enabling access to safe and nutritious food,

2) shifting consumption patterns,

3) boosting nature positive[40] production,

4) advancing equitable livelihoods and value distribution to achieve inclusive growth and the creation of decent work for all,

5) Building resilience to external shocks.

The Scientific Group tasked by the UN Food Systems Summit 2021 proposed three concrete follow-up implementation actions: 1) increase funding for food research and the fight against poverty, 2) enhance scientific capacity and information sharing in food systems, 3) working toward an international treaty or convention on food systems (von Braun et al. 2021).

In a follow-up briefing to the UN FSS for the European Parliament (Caprile 2021), a statement published by the EU Council (Council of the European Union 2021) claims that the EU is well-placed to contribute to the proposed UN FSS through its European Green Deal and the farm-to-fork strategy, which it considers a blueprint for sustainable food system. Through its international cooperation strategy it would engage in this joint the vision of a sustainable, climate-neutral and resource-efficient future, driven by the overarching human rights principles and the right to food approach.

As for the promotion of private sector investment and capacity development, the Council choses a highly precautious wording: it would like to encourage the uptake and application of international instruments to promote responsible investment aimed at food security and nutrition which respects human rights, ensures fairness and transparency in the governance of land tenure, and is aligned with climate and environmental objectives. This wording does not refer to the need of business to generate a return on investment and how the public sector could enhance incentives to invest in high-risk low income countries.

The high-level panel appointed by the European Commission to prepare a report in preparation of the UN FSS

[39] https://knowledge4food.net/partners/platform-african-european-partnership-agricultural-research-development-paepard/

[40] 'nature positive' means enhancing the resilience of our planet and societies to halt and reverse nature loss. It includes acting on climate change, reducing emissions and increasing carbon capture, regenerating and protecting critical ecosystems and reducing food loss and energy usage, without undermining health or nutritious diets

However, the high-level panel appointed by the European Commission to prepare a report in preparation of the UN FSS tends to challenge this official strategy by arguing in favor of more collaboration with the private sector and innovation that goes beyond what is already there (Webb and Sonnino 2021). Apart from the work of a few NGOs and public networks such as the Food and Land Use Coalition (FOLU) and the Forum on Agricultural Research and Innovation (GFAR), the high-level panel also cites examples such as GrowAsia Forum, the Sustainable Agriculture Initiative Platform, India's Agricultural Value System Partnership Platform and the Food Action Alliance (supported by the World Economic Forum) which all include business as one of the major stakeholders. In this context, they also question whether another framework convention would really be solution-oriented. Instead the authors suggest more innovative pathways of institutional collaboration designed to enable solution-oriented networking, enhanced access to data, and cross-constituency discussion on lessons from local experimentation. These could be trust funds supporting multi-stakeholder secretariat funding, new online platforms and open databases.

The Nutrition for Growth Summit and the pledges made by the EU and the USA

At the Nutrition for Growth Summit taking place in Tokyo (N4G Tokyo, 7-8 December, 2021) the EC Commission announced a new pledge of €2.5 billion for 2021-2024 to reduce all forms of malnutrition mainly through humanitarian assistance to address urgent needs. In addition, it aims to support efforts to tackle the underlying causes of malnutrition. It claims to focus on a long-term food systems transformation in EU partner countries, as partially laid out in the F2F Strategy as well as the Action Plan on Nutrition[41]. In this context, the EU pledged €140 million to support research in sustainable food systems and to tackle hunger via CGIAR.

In return, the United States announced a pledge of US$10 billion over five years to promote food security and food systems transformation, of which US$5 billion will be channelled through the 'feed the future' initiative[42]. Finally the pledges by philanthropic organisations are led by the Bill & Melinda Gates Foundation, which announced a new US$922 million, five-year investment in nutritious food systems[43].

1.4 The COVID Impact and the Ukrainian Crisis as a trigger for joint action

The UN FSS as well as the N4G Toyko referred in their statements to a great extent to the lessons learned from the impact of the COVID-19 on global food security and nutrition. It was recognized that it created significant demand-side pressure that may worsen food insecurity on the continent owing to loss of incomes and potential food price increases caused by localized supply shocks and depreciating currencies[44]. The pre-COVID-19 pandemic food shortage expectations in West Africa were envisaged to impact approximately 22 million people negatively. However, the COVID-19 pandemic amplified the food shortages and need for food assistance to approximately 28 million people [AGRA 2021). This demonstrates the challenges of food insecurity in Africa, among other things, caused by inefficient value chains. It led to

[41] see https://op.europa.eu/en/publication-detail/-/publication/0abb4a4c-e8e2-11e9-9c4e-01aa75ed71a1 ((accessed on 22 February, 2022)

[42] See FACT SHEET: Biden-Harris Administration Commit to End Hunger and Malnutrition and Build Sustainable Resilient Food Systems | The White House with its reference to the 'feed the future initiative' (https://www.feedthefuture.gov/ (accessed on 22 February, 2022)

[43] See https://www.gatesfoundation.org/ideas/media-center/press-releases/2021/09/922m-commitment-to-global-nutrition-and-food-systems (accessed on 22 February, 2022)

[44] See https://www.fao.org/partnerships/resource-partners/covid-19/en/ (access on 22 February, 2022)

global disruptions in agricultural value chains that have also caused a food supply crisis in many African countries that are substantially dependent on importing agricultural products such as seeds, fertilisers, veterinary inputs, fish fingerlings, and feeds exposing the weaknesses in the agriculture value chains in Africa in terms of food supply and demand. Supply disruptions were estimated to have led to losses between $1 billion and $5 billion of export value in 2020 and to have affected the livelihoods of 10 million farmers through job loss or price reductions—and up to 40 million people could be affected if dependents are factored in[45]. The impact may have created a new awareness, that sustainable food systems are not just about protecting the environment but also enabling inclusive growth, sustainable intensification and job creation, especially in rural areas.

This also applies to the impact of the Russian War on Ukraine, which started on February 23, 2022. It has caused global price peaks for energy, fertilizer and led to an increase in food prices unseen since the Food Crisis in 2008. The negative repercussions on access to imported farm input, animal feed and nutritious food products in Africa will be significant. For example, wheat imports account for roughly half of Africa's $4.5bn trade with Ukraine, and for about 90% of the continent's $4bn trade with Russia, according to figures from the African Development Bank (AfDB)[46]. The Ukraine crisis also raised food security concerns in Europe. Initially scheduled to be unveiled on 23 March, the legislative proposal of the F2F strategy to slash the use of chemical pesticides in half by 2030 and nature restoration targets have been put on hold. Prior to that, the French president Emmanuel Macron announced that he want to adjust the EU's Farm to Fork strategy, which is based on a world "before the war in Ukraine," as it could result in a "13% reduction in production", according to some recent studies[47]. "Europe cannot afford to produce less," he said, calling for a review of the Farm to Fork objectives.

[45] See https://www.nepad.org/blog/strengthening-competitiveness-africas-agricultural-value-chain-using-smart-technologies (accessed on 22 February, 2022)

[46] See https://african.business/2022/03/agribusiness-manufacturing/africa-braces-for-food-price-inflation-as-russia-ukraine-war-continues/ (accessed on March 31, 2022)

[47] See https://www.euractiv.com/section/agriculture-food/news/macron-wants-to-adapt-eu-farm-to-fork-to-the-post-ukraine-war-world/ (accessed on March 31, 2022).

2. Project Implementation and Methodology

The Global Program on Food Security of the Swiss Agency for the Development and Cooperation (SDC) approved the project 'lnstitutional Framework Conditions for the Promotion of Private Seetor Capacity Development {CD) for Agricultural Innovation in Selected African Countrie' on March 4, 2019, right after COVID-19 was finally declared to be a global pandemic by the World Health Organisation (WHO). This subsequent travel restrictions made it very difficult to carry out the empirical part of the project in the four selected African countries Ghana, Zambia, Uganda and Morocco. Instead, all meetings with the partners in Ghana and Morocco as well as the stakeholder surveys in Uganda, Zambia, Ghana and Morocco have been carried out online.

In the first phase (April-October 2020), online meetings were held with our African partners to define the content of the semi-standardized questionnaire (designed for the country stakeholder surveys on CD for agricultural innovation), as well as to select the stakeholders considered to be relevant in each country with the assistance of local key informants. In a second phase (November 2020-March 2021) the online version of the questionnaire was set up on 'Surveymonkey' and pre-tests were conducted with selected participants in each country. In the third phase (April 2021-October 2021), the invitations to complete the questionnaire were sent out to the selected stakeholder representatives in each country combined with selected qualitative online interviews with experts. Thanks to a persistent follow-up process, a total of 109 questionnaire were returned by October 2021, even though some of them were incomplete (missing affiliation). The final phase from November 2021-March 2022 consisted of the survey data analysis and the completion of the final report.

2.1 Project Implementation

In April 2020, CCRS reached out to the research partners in Africa. A joint online kick-off Meeting took place online on May 4, 2020 with the two implementation partners in Africa: the Forum for Agricultural Research in Africa (FARA) in Ghana and the Policy Center for the New South in Morocco (PCNS). Due to the outbreak of COVID-19, flights booked to visit the partners had to be cancelled.

Dr. Irene Frempong, Director of Capacity Strengthening at FARA confirmed the interest of her institution to co-develop a questionnaire on the topic designed to be used in stakeholder surveys in Uganda, Zambia and Ghana. On the part of PCNS, Dr. Karim El Aynaouni, President of PCNS reaffirmed his interest and commitment to jointly carry out the research project in Morocco. Subsequently, MoUs were prepared and eventually signed in which the two institutions committed themselves to assist CCRS in the design and implementation of the country surveys.

A project website was set up on the African Technology Development Forum platform (www.atdforum.org).

From May to September, FARA and PCNS assisted CCRS in the identification of relevant stakeholders in the public debates on agricultural innovation systems in Ghana, Uganda, Zambia and Morocco through key informants in each country. In addition, a questionnaire was designed that followed the structure of prior questionnaires used in stakeholder surveys on sustainable agriculture and agricultural biotechnology (Aerni et al. 2016, Aerni 2009, Aerni and Bernauer 2006).

By October 2020, we were able to jointly agree on the structure and content of the questionnaires in English (for Ghana, Zambia and Uganda) and French (for Morocco).

Subsequently, an online version of the questionnaire was drafted on surveymonkey (www.surveymonkey.com) and pretests started in December 2020.

Yet, during that period FARA dropped as implementation partner mainly due to the retirement of Dr. Frempong in December 2020. FARA did not respond to requests to find a replacement. Eventually, Konfidants, a consulting firm in Ghana, was identified as alternative implementation partner. It turned out to be well-placed to replace the gap. They were prepared to help us in identifying further stakeholders in the private and the public sector in collaboration with with their networks in Ghana, Zambia and Uganda.

The surveys in these three Sub-Saharan countries were launched in April 2021 and closed on August 31, 2021. In view of travel restrictions during the COVID-19 crisis in all four countries, no physical meetings took place with the partner institutions and physical interactions with the selected participants were also not possible. We were however able to get hold of most of the e-mail contact information of the selected institutions and, within them, contact at least one high level representative of each institution to complete the survey online. This also thanks to our partner institutions and their key informants in each country.

In Morocco, the launch of the survey was delayed due to the month of Ramadan. It eventually started in June and was closed in October 2021. The goal of at least 25 completed questionnaires was not met, so that the data analysis is limited to a descriptive analysis. However, Moroccon stakeholders were included in the aggregated perception pattnern analysis that comprised all four African countries.

The analysis of the questionnaire data took place from November 2021 to February 2022 at CCRS.

The choice of the four African countries was based on the ‘whole of Africa approach’ previously proposed by FARA. It requires a selection of countries that represent Eastern (Uganda), Southern (Zambia), Western (Ghana) and Northern (Morocco) Africa. Each country has developed its own approach to capacity development for agricultural innovation and, consequently, their respective framework conditions for private sector capacity development for agricultural innovation differ substantially.

As for the methodology, the surveys are based on the needs assessment on capacity development for agricultural innovation, as they were designed for an earlier project sponsored by the Tropical Agriculture Platform (TAP) (Aerni et al. 2015). Yet, the emphasis is on exploring private sector rather than public sector capacity development for agricultural innovation. The data collection is based on a semi-standardized questionnaire. Respondents had to pick an answer to questions and statements in a Likert scale from 1 to 4 (e.g. I do not agree at all/ I fully agree) or click on the box ‘I do not know’. These closed answers allowed for the quantitative analysis of the data obtained, identifying perception patterns that dominate in the national debates on institutional framework conditions, which encourage private sector capacity development for agricultural innovation.

The methodological approach is based on the design of stakeholder surveys in which the relevant political actors are identified by means of local key informants that are familiar with the respective national debates. These political actors are meant to represent a wide range of stakeholders that are either directly or indirectly involved in the public debate or are likely to get involved at a certain stage and are assumed to have a significant influence on public opinion and policy decision-making processes. The analysis of the data collected through the questionnaire-based surveys consists of a descriptive part, a cluster analysis to identify perception patterns and a rudimentary social network analysis to assess the relevance of the respective stakeholders (Aerni et al. 2016, Aerni, 2009, Aerni and Bernauer 2006; Laumann & Knoke, 1987).

In this context, perception patterns on an aggregated level (containing the stakeholder who participated in the survey in all four countries) and on the respective country level are visualized and identified by means of a Biplot graph. A Biplot is an exploratory graph to present both, the observations and the variables of the data, as points and vectors, respectively. It is based on a matrix that calculates the best approximation of the inner product of a row vector and a column vector in a plot to the corresponding value in the table.

The axes in the graph represent the latent principal dimensions in which the observations can be interpreted in relation to their position to the vectors. The length of a vector variable in the ordination plot reflects its contribution to the ordination indicating their importance in building the principal components.

2. 2. 1 Structure of the Questionnaire

The Questionnaire was designed primarily in collaboration with the partner institution FARA in Ghana (FARA) via online communication from June to September 2020. During this period we started to notice that FARA's CDAIS network consists almost exclusively of public sector, academic and civil society stakeholders. This may also be related to the fact that FARA plays a major role as implementation partner of DeSIRA-funded projects We also received support from our partners in Morocco, the Policy Center for the New South, that emphasized the importance of value chain integration in agriculture as a major channel of private sector capacity development.

The questionnaire consists of four parts: Part 1 was designed to capture general views on institutional framework conditions in domestic agriculture and whether they enable economic empowerment in rural areas. The first section consisted of an overall assessment of the strength and weaknesses of the concept of 'Agricultural Innovation System' (AIS) addressed to those participants that felt familiar with the term. The second section was about the relevant constraints for African entrepreneurs to succeed in agriculture and the institutions that are felt to be supportive in their endeavor to succeed, also as providers of capacity development for agricultural innovation.

In Part 2, 12 statements were drafted with an implicit message indicating skepticism or endorsement of more private sector involvement in capacity development for agricultural innovation.

Part 3 was about the stakeholders that were felt to be involved in the debate on capacity development for agricultural innovation in the respective national debates. For that purpose, a list of stakeholders representing academia, business, government, international organisations, media, legislative and nongovernment organisations were drafted and survey participants were asked to indicate whether they were familiar with the respective names of the organizations listed and considered them relevant.

Part 4 aimed to collect information about the respective respondent's name and education background and the position he or she helds in the organization.

The questionnaire in its print version is added in ANNEX I.

2. 2. 2 Survey participation

Thanks to a persistent follow up process, a total of 135 invited stakeholders responded of which 109 completed the questionnaires to an extent that could be used in the survey analysis. 16 respondents completed the different parts, but did not add any contact information. They were nevertheless used in the survey as respondents with no affiliation (n_a).

Table1 shows that out of these 109 survey participants 36 originated from Ghana, 24 from Uganda, 31 from Zambia and 18 from Morocco. 16 stakeholders did to provide any contact information (missing). The return rates of questionnaires (number of invited organisations/number of organisations that responded) was 53.66% in Ghana, 41.41% in Uganda, 46.51% in Zambia and 30% in Morocco respectively

Institutional affiliation on an aggregated level was relatively evenly divided between Academia (29), Business (20), Government (26) and Non-profit (28), a category that includes farmer organisations and NGOs (14), business associations, BA (4), foundations and international organisations, IO (10).

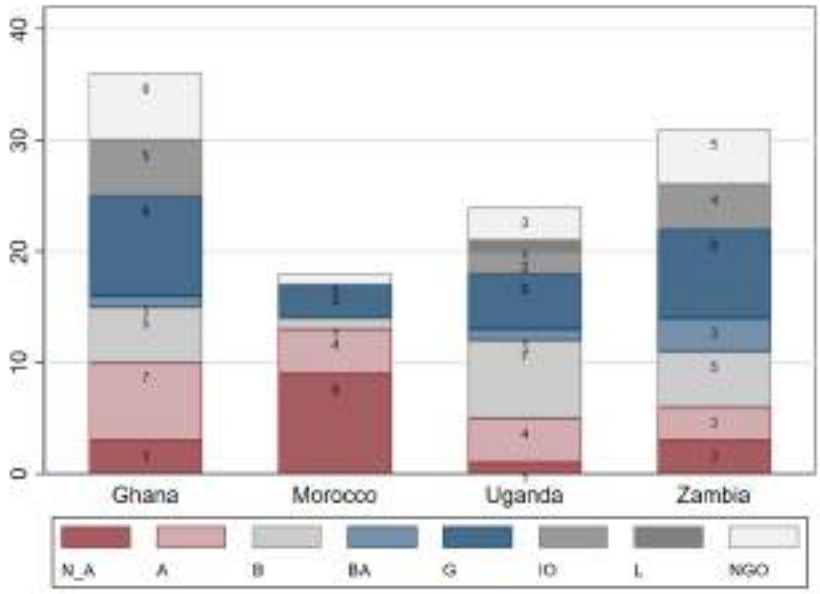
Institutional Affiliation

	N/A	academia	business	government	non-profit	Total
Ghana	3	7	7	9	10	36
Morocco	9	4	1	3	1	18
Uganda	1	4	7	6	6	24
Zambia	3	3	5	8	12	31
Total	16	18	20	26	29	109

Table 1: Survey Participants by country and institutional affiliation

Graph 1 visualizes the distribution of stakeholders across the different countries based on their more concrete association. Institutions related to academia, business, government and non-profit organisations (including NGOs, international organisations, international foundations and business associations) are well represented in Ghana, Uganda and Zambia. This however not the case in Morocco. Despite numerous rounds of reminders to complete the survey, we had a relatively low return rate of questionnaires in Morocco (30%) compared to Ghana, Uganda and Zambia (60%). Moreover, out of 18 participants in Morocco, 9 did not complete Part 4 (contact information) and, therefore, we were unable to identify their institutional affiliation. Those who completed the questionnaire in Morocco largely represented government officials, academia and a few international organisations. In view of the low return rate and the relatively high number of questionnaires that were incomplete, we decided to limit the data analysis in Morocco to a descriptive analysis. Of all the participants there was only one who represented the legislative (L) in Uganda.

The detailed list of participants in the survey and their respective institutional assignment can be found in ANNEX I.



Graph 1: Distribution of respondents by country and institutional affiliation

3. Survey Analysis

The survey analysis consists of

- a descriptive analysis, describing the country-based survey results on an aggregate level mainly using mean values and standard deviation,
- a perception pattern analysis that consists of cluster analyses and their visual portrayal,
- an analysis of the assessed familiarity and relevance of the different stakeholders.

3.1. Descriptive Analysis

The descriptive analysis of the survey data focuses largely on aggregate perceptions of participants on the country-level as well as the continental level (including all four country surveys). Participants assessed each question or statement in a likert-scale from one to four, whereas one stands for 'not important'/'completely disagree' and four for 'very important'/'completely agree'. The mean values in the assessments were in most cases above 2.5 on the likert scale and standard deviations above 0.8 were relatively rare, revealing a certain level of agreement.

Survey participants tended to consider problems referred to in the questions to be generally 'important' and to generally 'agree' with the statements listed. However the descriptive analysis of Part 1 of the questionnaire also revealed substantial differences in perception when it comes to the relevance of the problems related to capacity development for agricultural innovation and which institutions are deemed effective to address them. The descriptive analysis of Part 2 revealed that there is a general concern to make capacity development for agricultural innovation (CD4AI) more relevant for youth entrepreneurs and thus inclusive in Africa. Simultaneously, there was a general disagreement that CD4AI should be left to the public sector.

The share of participants that completed Part 3 of the questionnaire was lower (roughly 80 respondents in total) compared to Part 1 and 2 (roughly 100 respondents). Nevertheless, the results of the descriptive analysis in Part 3 reveal the institutions participants felt familiar with and considered relevant tended to diverge substantially.

Overall, the descriptive analysis reveals that each of the four countries faces its own challenges in making CD4AI more effective and inclusive. It also confirms that stakeholders involved in the national discourses on capacity development for agricultural innovation see a need to try out new models that include all parties involved, including the private sector.

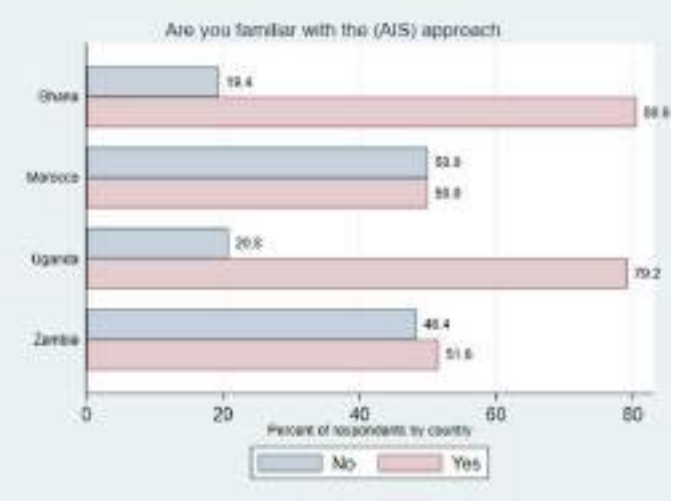
3.1.1 Descriptive Analysis of Part 1 of the Questionnaire

The content of Part 1 of the questionnaire mainly focused on the institutional framework conditions in agriculture and whether they are generally supportive of in enabling local entrepreneurship and innovation-

Familiarity with and effectiveness of Agricultural Innovation Systems (AIS)

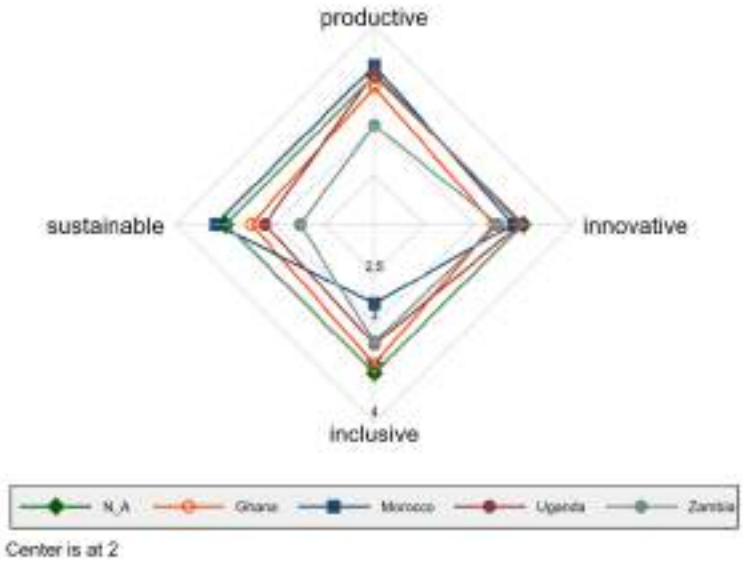
The first section referred to the familiarity and the perceived potential of the Agricultural Innovation Systems (AIS) approach.

Graph 2 shows that respondents in Ghana and Uganda proved to be most familiar with it (roughly 80%) while the term was less known in Zambia and Morocco (roughly 50% seem to be familiar with it).



Graph 2: Familiarity with the AIS approach (135 responded).

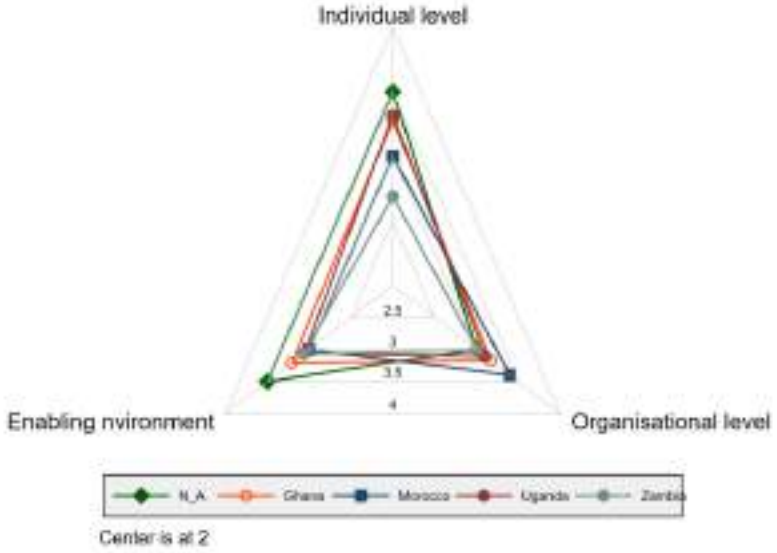
Overall, Graph 3 indicates that the survey participants who are familiar with AIS found the concept helpful to make domestic agriculture more productive, inclusive and sustainable. Since average scores were all above 2.5, the center of the spider graph starts with 2 rather than 1 in the likert scale (1-4) so that a differentiation of the positive perception in the different countries is possible[48]. The graph shows that stakeholders in Zambia seem to be a bit less enthusiastic compared to their peers in the other countries. Stakeholders in Morocco consider AIS to be less inclusive but more sustainable in comparison with the perception of the stakeholders in the other countries (see Graph 3).



Graph 3: AIS approach and its potential to make agriculture more inclusive, sustainable, productive and innovative (71 responded).

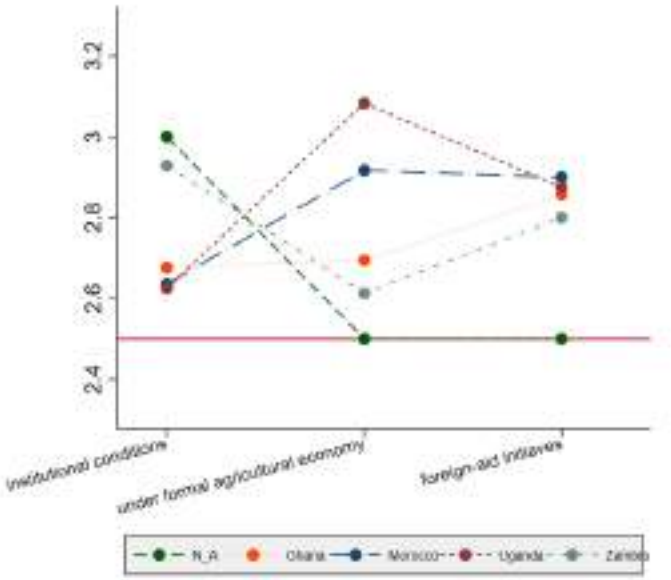
[48] Since the views expressed by survey participants tend to regard all aspects related to institutional framework conditions to promote public and private sector capacity development for agricultural innovation to be important, the center of all spider graphs in part 1 starts with 2 in the likert scale, rather than 1.

In terms of strengthening capacity development on the individual, the organizational and the 'enabling environment' level (Question 3), there seems to be an overall agreement that the contribution is more on the side of individual and organizational capacities (see Graph 4). Morocco and Zambia are generally more skeptical about the potential of the AIS approach while participants who did not reveal their affiliation felt that it has a great potential on the organizational level.



Graph 4: Strengthening Capacity Development on Different Levels (71 responded).

Do current institutional framework conditions encourage private sector capacity development for agricultural innovation? Has it become easier to operate as an entrepreneur in agriculture in recent years? And do foreign-sponsored initiatives designed to promote capacity development in agriculture make life easier for agricultural entrepreneurs? These three questions (4/5/6) have been generally approved by the participants in all four countries. However, as Graph 5 indicates, there are some differences. While survey participants in Zambia believe that institutional framework conditions have improved, this is not felt to be the case to the same extent in Ghana and Uganda. In return, it seems that the life of entrepreneurs in agriculture has not become easier in recent years in Zambia, while this is felt to be the case to a greater extent in the other three countries.

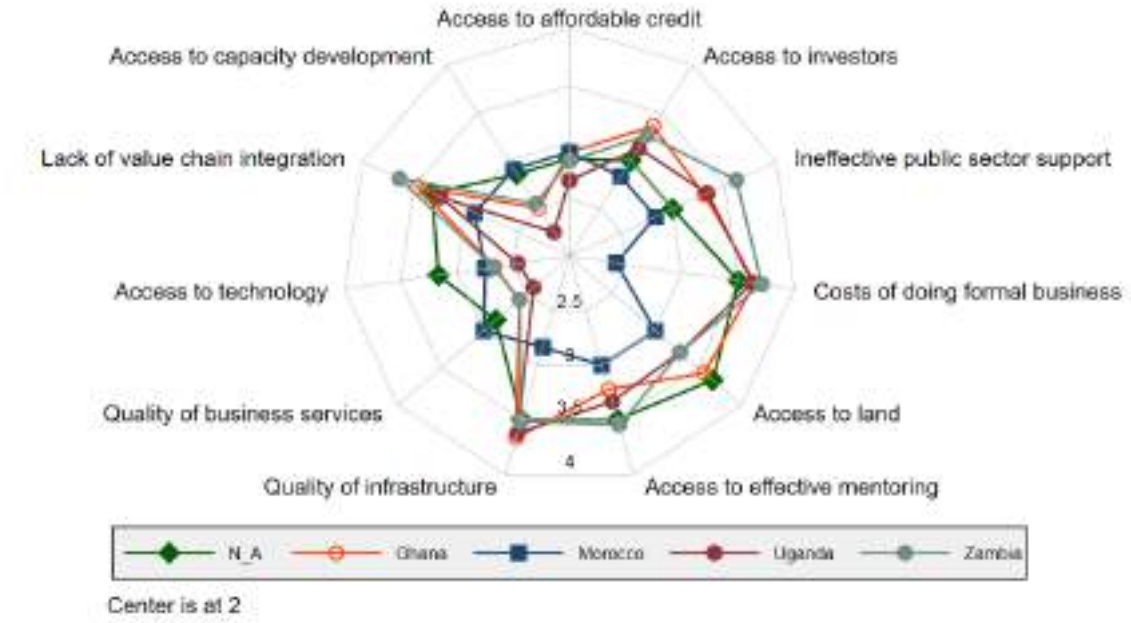


Graph 5: Challenges that agricultural entrepreneurs face and how they are addressed? (110 responded)

As for the effectiveness of foreign-aid initiatives, they are generally perceived as supportive of agricultural entrepreneurs. However, it is not clear, to which foreign-aid initiatives respondents are referring to. Interestingly, those participants who did not complete part 4 of the questionnaire and therefore remain unknown, are more pessimistic regarding the situation of agricultural entrepreneurs in Africa, and they do not think that foreign-aid initiatives proved to be very effective in supporting entrepreneurs.

Constraints faced by entrepreneurs

The view that entrepreneurs continue to face a lot of challenges in the four countries is confirmed by the assessment in the second set of questions in Part 1 about the constraints that entrepreneurs in agriculture (Question 7). Graph 6 highlights that almost all listed constraints are perceived to be serious in all four countries. Especially in Zambia, survey participants believe that public sector support is not effective at all in assisting local entrepreneurs. They also believe that the costs of doing business in the formal sector is exceedingly high and that there is a lack of value chain integration in agriculture. The other countries tend to assess these constraints in a similar way but less pronounced. Whereas respondents in Morocco and Uganda tend to be skeptical, but not entirely frustrated about public sector support, their counterparts in Ghana and Zambia seem to considered public sector support for entrepreneurs in their country to be largely ineffective. Generally, lack of access to effective mentoring as well as quality infrastructure is largely perceived to be a problem as well as lack of access to land, even though land is perceived to be less of a problem in Morocco.

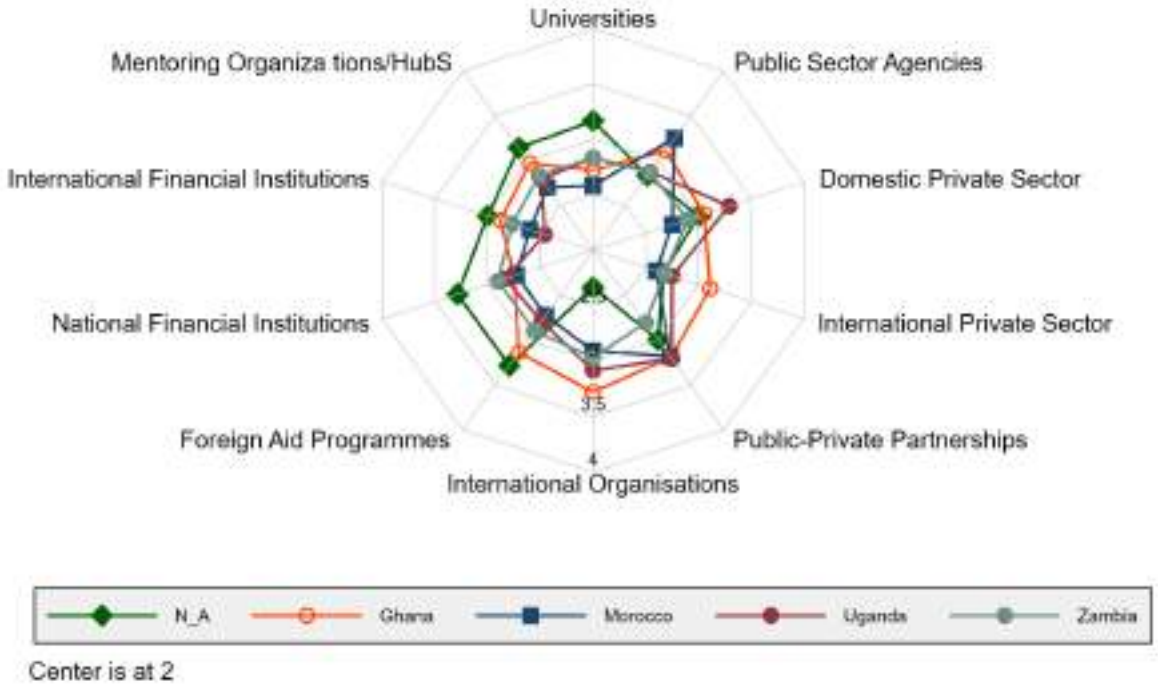


Graph 6: Assessment of the constraints entrepreneurs face in agriculture (110 responded).

Many survey participants added also comments to the question related to the constraints (see complete list of added comments and their assessment in terms of relevance in ANNEX I). Several participants mentioned that access to technology, especially digital technologies, would be highly relevant. However, it needs to be reliable, provided at affordable terms and with the required equipment to make effective use of them. In Morocco, a participant also added the need to assist entrepreneurs in their efforts to add value to their products, presumably in the area of quality improvement and marketing. In return, a major constraints in rising the entrepreneurial spirit in agriculture is seen in the problem that agriculture, as an economic sector, is often associated among young people with backwardness, hard work and low returns. In this context, more emphasis may have to be placed on the fact that agriculture is increasingly becoming part of a knowledge-based economy thanks to digital technologies and new breeding techniques. However, innovative entrepreneurs in agriculture need to obtain more legal protection (e.g. IP rights) and more possibilities to de-risk their business (affordable index-based insurance). A few participants also referred to the relevance of access to machinery and irrigation to make agriculture more productive and less labor intensive. Such capital-intensive input has the potential to be produced domestically, which would create valuable off-farm employment within the agricultural sector.

Question 8 in part 1 was about the extent to which the different institutions currently contribute to the success of local agricultural entrepreneurs. Graph 7 shows there is hardly an institution that is not considered to be important (ratings are all above the average value of 2.5 on the Lickert Scale). The perception in Morocco is different in so far that the survey participants believe that the public sector plays an important role whereas foreign aid initiatives are less important. Survey participants in Uganda perceive the domestic private sector to be the main contributor to the success of local entrepreneurs whereas they regard the role of international financial institutions as less relevant. In Ghana, survey participants regard the international community (international private sector, mentoring hubs, foreign-aid initiatives) to be highly relevant contributors to the success of local entrepreneurs. Zambian survey participants rate the

contributions of all the different stakeholders generally lower, with the exception also of the domestic private sector. Finally, those who did not reveal their affiliation have the interesting view that foreign-aid initiatives are very relevant while international organisations are quite irrelevant in contributing to the success of local entrepreneurs.



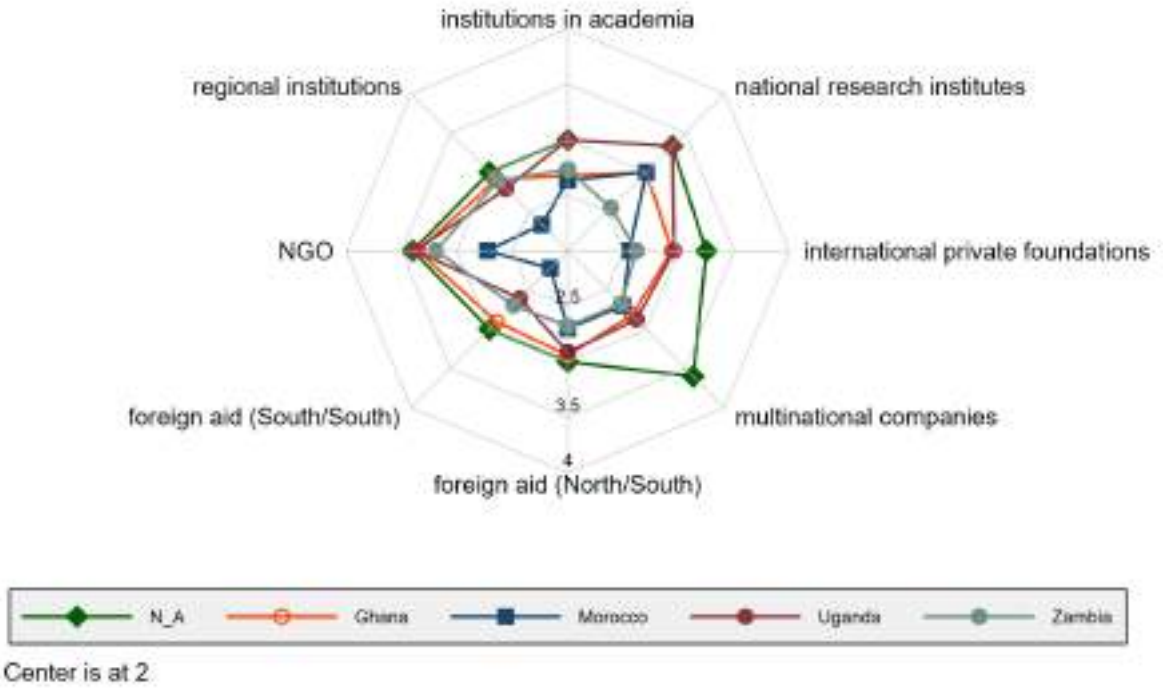
Graph 7: Assessment of the contribution by the different institutions to the success of local entrepreneurs (110 responded).

The fact that they also rate mentoring organisations and business hubs as well as public-private partnerships as being quite relevant could explain this difference since these are often foreign-aid initiatives that are not linked to particular international organizations but involve a network of multiple foreign and domestic stakeholders.

Effectiveness of Institutions in promoting CD4AI

Question 9 in Part 1 was about the question which institutions are providers of effective Capacity Development for Agricultural Innovation (CD4AI). Graph 8 shows all institutions listed received a relatively positive assessment (average above 2.5 on the Lickert Scale). However, NGOs seem to be considered important providers of CD4AI in all four countries. Looking at the NGOs listed as relevant in the different countries in the policy network table reveals that most of them are active in the field of enabling farmers to succeed in the market, improve their chances of successful value chain integration, and vocational training, rather than in the field of advocacy work. Overall, Uganda and Morocco consider national research institutes to be important provides of CD4AI whereas this is not the case in Zambia. Among those who did not reveal the names and the identity of their institution in the survey (missing information in part 4), multinational firms are regarded as the most important providers of effective capacity development for agriculture innovation, combined with international private foundations. Since this view is not shared with those who revealed their identity, it may be a view that is not meant for a public audience. The assessment of regional/continental institutions

and South-South cooperation is slightly positive, but with a relatively high standard deviation (above 0.8). This may be an indication that there is widespread disagreement about the effectiveness of these institutions among the participants.



Graph 8: Providers of effective capacity development for agricultural innovation (CD4AI) (109 responded).

3.1.2 Descriptive Analysis of Part 2 of the Questionnaire

Part 2 of the questionnaire consisted of 12 statements with implicit value judgements regarding the role of the private sector, entrepreneurship and innovation in the promotion of capacity development for agricultural innovation (CD4AI). The detailed formulations of the statements can be found in ANNEX 1.

Graph 9 reveals to what extent the survey participants agreed/disagreed with the different statements in a scale from one to four. The two statements that received most agreement were that "National agricultural innovation systems should focus on co-developing 'innovation niches' designed to render domestic agriculture more sustainable" (*niche innovation*) and that "Current agricultural policies should strengthen the capacities of small-scale farmers to ensure household food self-sufficiency" (*self-sufficient smallholders*). The strong approval of these two statements across all four countries may reveal the widespread concern that national agricultural innovation systems (AIS) are not just about enhancing business opportunities in rural areas but also ensuring food security through inclusive development. In this context, the term 'niche' in 'niche innovation' may be understood as innovations that are not primarily designed to be scaled-up in the export-oriented agricultural sector but to strengthen food security and food quality in the domestic agricultural sector. A quick check, whether the term 'niche innovation' is associated with the academic literature on Capacity Development for Agricultural Innovation Systems (CDAIS) revealed that this may not the case since those who were not familiar with the concept of Agricultural Innovation Systems approved the statement

as much as those who indicated their familiarity with the concept (see Link between Perception of Innovation Niches and Familiarity with the AIS Concept in ANNEX I).

The emphasis on ensuring household food self-sufficiency in rural areas may be related to the view that investing in enhanced productivity and quality of domestically produced cash crops designed to meet the growing demand in cities should not divert attention from the fact that small-scale farm households continue to be more at risk of becoming food insecure. Especially the COVID-19 pandemic has led to serious food access distruptions of rural households in Africa (Tabe-Ojong et al. 2022).

The third, fourth and fifth most approved statements refer to the importance of moving beyond ideological mindsets. They refer to the need to overcome the polarized the debate between small-scale farming versus large-scale farming (*scale neutral*), express a general *'trust in agribusiness'* to provide young agricultural entrepreneurs with capacity development that serves them to succeed in business on their own and approve of the statement that, 'ultimately, it is the private sector that has the capacity to create scalable agricultural markets through innovation in production, management and marketing' (*business-driven innovation*).

The need to move beyond traditional approaches to capacity development for agricultural innovation is also revealed in the very low approval of the statements that:

'Publicly funded agricultural services can be trusted to address to respond to the needs of the domestic private sector in agriculture' (*trust in public sector*),

'Current agricultural policies create the necessary capacities and infrastructure to integrate farmers into formal agricultural food value chains' (*policies promote AVC*) and

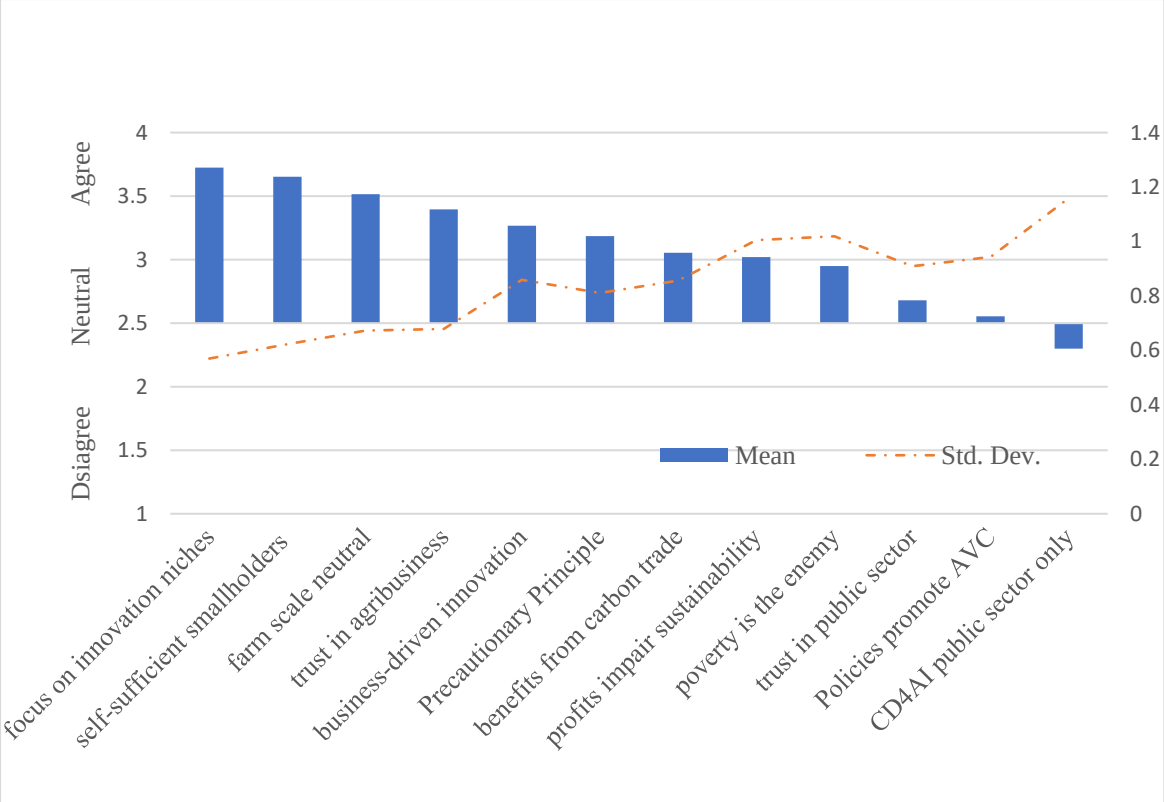
'Capacity Development for Agricultural Innovation (CD4AI) must be provided by the public sector only in order to ensure broad access' (*public sector only*).

Interestingly, the standard deviation is also highest with these three statements, indicating that there is substantial disagreement among the different stakeholder representatives that participated in the survey.

Generally, the simultaneous approval of the two concerns that the pursuit of profits may go at the expense of sustainability (*profits impair sustainability*) and that poverty rather than affluence may be the main enemy of sustainability (*poverty is the enemy*) is somewhat puzzling since reducing poverty is only possible by increasing prosperity, and prosperity is generally generated by a profitable private sector.

Concerns about the potential negative impact of new agricultural technologies, such as biotechnology, on sustainable agriculture are revealed in the approval of the statement that application of the Precautionary Principle ensures sustainable agriculture by preventing the spread of potentially risky new technologies (*Precautionary Principle*).

Finally, many survey participants see a potential in agro-ecological practices that improve yields and would enable farmers to benefit from carbon trade (*Benefits from Carbon Trade*).



Graph 9: Statements on CD in Agricultural Innovation (101 responded)

3.2 Perception Pattern Analysis

The perception pattern analysis serves the purpose of identifying groups of stakeholders that share a similar perception and, with it, a similar mindset toward appropriate institutional framework conditions to promote capacity development for agricultural innovation.

Perception patterns have been identified on a country level by means cluster analyses carried out in Ghana, Zambia and Uganda as well as on an aggregated Africa-wide level, including the respondents from Morocco. A cluster analysis for Morocco was not possible due to the fact that only 18 stakeholders participated in the survey of which only 9 provided contact information in Part 4 of the questionnaire. In total, 88 participants in Zambia, Ghana and Uganda completed the questionnaire to an extent that they could be included in the aggregate cluster analysis.

The Ward's minimum variance was used for the formation of clusters designed to minimize total within-cluster variance. Detailed information on the validation of clusters as well as the formation of variables can be found in ANNEX II.

The analysis of clusters required the formation of variables created out of answers in Part 1 and 2 of the questionnaire could be combined into meaningful groups.

Based on a best-fit assessment and a factor analysis (see also ANNEX II), the assessment of the answers to the questions in Part 1 and 2 of the questionnaire have been grouped into the following variables:

1. **BC**: the variable ‘business conditions’ (BC) is based on the assessment of answers in part 1.4 and 1.5 of the questionnaire (do institutional framework conditions encourage CD for agricultural innovation? / Has it become easier for entrepreneurs to succeed in the agricultural sector?)

2. **FA**: The variable 'foreign aid' (FA) is based on the assessment of the answer to question 1.6 (To what extent do foreign-aid sponsored initiatives address the concerns of local entrepreneurs)

3. **AB**: The variable refers to the 'administrative burden' (AB), it includes the rating of the follow obstacles for agricultural entrepreneurs: ineffective public sector support (1.7.c), the costs of doing formal business (1.7.d), access to land (1.7.e)

4. **FBC**: The variable refers to 'financial and business constraints' (FBC) faced by agricultural entrepreneurs. They include lack of access to credit (1.7.a), to investors (1.7.b), to mentoring (1.7.f) to quality infrastructure (1.7.g), to quality business services (1.7.h), to technology (1.7.i), value chain integration (1.7.j) and capacity development (1.7.k)

The assessment of the statements in Part 2 of the questionnaire have been grouped into the following variables[49]*:*

5. **ENV:** The variable refers to the degree of consent with statements related to promotion of agricultural sustainability through 'innovation niches' (2.5), the usefulness of the Precautionary Principle (2.7) and the potential to improve livelihoods through practices related to agro-ecology carbon sequestration (2.9).

6. **PROG:** The variable refers to statements that reveal a progressive attitude in the sense of an awareness that change is necessary to enable a sustainable future in African agriculture. It comprises the statements that express confidence in the value of CD of agribusiness for young entrepreneurs to succeed in business (2.6), that poverty continues to be the main enemy of sustainability in Africa (2.8) and that CD should be promoted in Africa independent of farm scale.

7. **CV**: The variable comprises statements that reveal a rather 'conservative' (CV) attitude in the sense that the public sector should be exclusively in charge in promoting CD in agriculture (2.1) and that publicly funded CD projects can be trusted to serve the needs of the local private sector (2.4).

8. **ICD**: The variable 'Inclusive capacity development' (ICD) comprises statements that mind the importance of 'inclusiveness' and 'business as part of the solution' as expressed in the UN SDGs. It includes Statement 2.2 that scalable innovation is taking place in business, 2.10 that value chain integration is important to improve rural livelihoods and 2.11 that CD should strengthen the ability of small-scale farmers to ensure household food security.

3.2.1 Cluster Analysis on an Aggregated Level

Perception Patterns on an aggregated level, including the four country-based surveys

Based on the Ward Minimum Variance Method, three perception clusters were identified on the aggregated level, representing perceptions in all four African countries (see Table 2). It corresponds to the 'whole of Africa approach' that comprises perceptions in Northern (Morocco), Southern (Zambia), Eastern (Uganda) and Western Africa (Ghana).

[49] Statement 2.3 'Local farmers who produce for international markets tend to pursue profits at the expense of sustainable practices' did not match any variable and was therefore not considered. However, the descriptive analysis reveals that the statement received on average moderate approval but was also controversial (relatively high standard deviation). See Graph 9.

	N_A	A	B	BA	G	IO	L	NGO	Total
Cluster 1	2	7	7	1	4	3	0	5	29
Cluster 2	4	7	4	3	12	2	0	5	37
Cluster 3	2	4	6	1	6	5	1	5	30
Total	8	18	17	5	22	10	1	15	96

Table 2: Perception Clusters by institutional affiliation on an aggregated level in Africa

The cluster analysis includes 96 observations comprising respondents from Academia (A), Business represented by selected companies (B), Business Associations (BA), Government Institutions (G), International Organisations (IO), Legislature (L) and Non-Government Organisations (NGO). The largest share of respondents represent government institutions (G: 22) and business (B/BA: 22) followed by academia (A: 18), NGO/Civil Society (NGO: 15), which also includes farmer organisations, and international organisations (IO: 15). Only one representative represented the legislature in Uganda and eight did not complete Part 4 of the questionnaire but completed Part 1 and 2 to the extent that they could be included in the cluster analysis.

Cluster 1 represents the smallest cluster with 29 survey respondents. It contains a significant number of respondents from academia (A:7), business (B/BA:8), government (G:4) and international organisations (IO: 3)

Cluster 2 is the largest cluster with 37 respondents. It contains most of the survey participants representing government institutions (G: 12) as well as significant number of respondents from academia (7)

Cluster 3 with 30 respondents contains the largest share of representatives from international organisations (IO: 5) as well as substantial shares from business (B/BA: 7) and government (G: 6) organisations. The only participant from a legislative institution (parliamentary committee on agriculture in Uganda) is also located in this cluster.

Interestingly, representatives from civil society institutions that comprise NGOs, farmer organizations and capacity building platforms (NGO) are equally distributed across the different clusters (five NGO representatives in each cluster), indicating that civil society in Africa is characterized by a multitude of views.

In order to interpret the perceptions of the different clusters, a biplot was used to portray the observations in a two-dimensional space (see Graph 10). The Biplot is based on a Principal Component Analysis (PCA). It visualizes the results by presenting observations (survey respondents) and variables (collection of similar responses and statements), as points and vectors, respectively. The length of a vector variable indicates the importance of the variable in building the principal components in a two dimensional space.

In the present analysis, the PCA also allows to interpret the results obtained in the cluster analysis. Observations of Cluster 1 are portrayed as orange dots, those of Cluster 2 as blue dots and those of Cluster 3 as crimson dots.

The positions of the three clusters in Graph 10 reveal that survey participants found in Cluster 1 have a clearly distinct view. They are more favorable to the view that foreign-aid initiatives provide capacity development that help address the concerns of young entrepreneurs in agriculture (FA) and that institutional framework conditions have become more favorable to do business in agriculture (BC). They also tend to endorse statements related to inclusive capacity development (LCD) believing that it is ultimately actors in the private sector who

create valuable new jobs in agriculture through scalable innovation and value chain integration and that CD in agriculture should also support small-scale farmers to ensure food self-sufficiency. However, they disagree with conservative statements (CV) implying that the public sector should be exclusively in charge of capacity development in agriculture. The negative attitude toward the conservative statements may also indicate that they tend to endorse those foreign aid initiatives (FA) in particular that support private-public partnerships, such as AGRA rather than public sector capacity development, such as TAP.

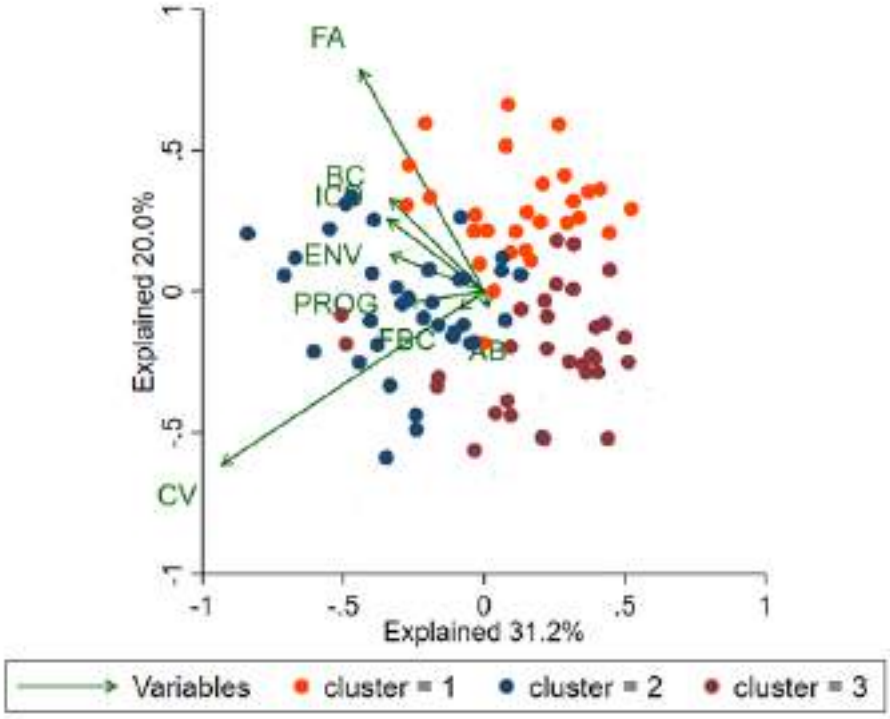
Representatives in Cluster 2 tend to endorse the conservative statements (CV) to a much greater extent. But they also approve of statements that acknowledge that poverty rather than affluence is still the main enemy of sustainability in Africa and that emphasize the importance of agribusiness as trusted providers of effective CD for agricultural innovation for young entrepreneurs (PROG). They also acknowledge the numerous constraints that entrepreneurs face in agriculture (FBC) to a greater extent[50]. Moreover, they tend to endorse the statements related to preventing risks (precautionary principle) and the capturing of opportunities (in regard to compensation for carbon sequestration) in the area of environmental management in agriculture and promoting innovation niches for sustainable agriculture (ENV). In short, Cluster 2 contains views that are rather heterogenous and are difficult to integrate into a meaningful narrative.

Representatives in Cluster 3 tend to see foreign-aid initiatives (FA) in a more skeptical way and can identify more with conservative (CV) than with progressive (PROG) statements meaning that they consider the public sector to be more reliable in the deliverable capacity development in agriculture that serves the needs of farmers. They are also less likely to that there is a need for inclusive development through value chain integration (ICD). Despite their view that the public sector can be trusted to deliver, they do not think that current institutional framework conditions are encouraging CD for agricultural innovation and that life has become easier for young entrepreneurs in agriculture (BC). This is in line with their endorsement of statements that are concerned about the administrative burden that entrepreneurs face in agriculture (AB). However, the lengths of the vectors of the variables ‘administrative burden’ (AB) and ‘financial and business constraints’ (FBC) are very short, indicating that most survey participants widely agreed in their assessments of the underlying questions and statements, independent of their cluster affiliation. In return, the vector variables comprising conservative statements (CV) and the role of foreign aid (FA) are very long, indicating that there is more widespread disagreement. Therefore, these two vector variables contributed most to the separation of the different clusters.

In short, Cluster 1, which mostly consists of representatives from not-for-profit organisations, international organisations, business and academia seem to be skeptical about the effectiveness of capacity development initiatives that are exclusively supported by the public sector (CV) and more confident that foreign-aid initiatives designed to encourage effective public-private partnerships are benefiting local entrepreneurs in agriculture. Cluster 2, which contains the largest share of government representatives, acknowledges the important role of the private sector (PROG), yet they also see an important role in the public sector in the promotion of inclusive agricultural development (CV) and environmental protection in agriculture (ENV).

[50] The FBC vector variable is however very short, indicating that there was a general agreement among the survey participants that such constraints must be taken seriously.

Finally, Cluster 3, which could be called the perception group dominated by international organisations. tends to be more in favor of conservative than of progressive views. Moreover, they express a much more skeptical view toward foreign aid initiatives, even though they themselves are not necessarily representing domestic stakeholders. This could be an indication that the polarized political debate at the UN Food Systems Summit in fall 2021 on the effectiveness of different approaches to the promotion of sustainable food systems is also reflected in the disagreement on the 'right' approach among foreign stakeholders involved in domestic debates in Africa.



Graph 10: Biplot visualizing perceptions patterns on an aggregated level

Another important question related to the Graph 10 is the extent to which the participants in the four surveyed countries share similar perceptions. Table 3 reveals that each country may have a particular preference for a particular perception. Cluster 1, which expresses skepticism about the conservative view and is more convinced of foreign aid initiatives, seems to be the preferred perception in Ghana. In return, Cluster 2, which still considers the public sector to be a major, important and effective player in CD for agricultural innovation but also acknowledges the importance of the private sector as the actual driver of innovation, contains most of the respondents in Morocco, which is not surprising in view of the high share of respondents from government. While the perception pattern in Uganda is similar to the one in Ghana, it looks very different in Zambia, where only four respondents are located in Cluster 1, indicating that they tend to be less happy with foreign aid initiatives and generally believe that the public sector must play an important role in stimulating more private sector investment in domestic agriculture.

	Ghana	Morocco	Uganda	Zambia	Total
1	14	1	10	4	29
2	10	5	8	14	37
3	10	2	6	12	30
Total	34	8	24	30	96

Table 3: Perception Patterns in the four surveyed countries

An indication that the skepticism toward foreign aid initiatives in Zambia is directed more toward the European-sponsored approaches promoting Capacity Development for Agricultural Innovation Systems (CDAIS) may be the fact that the progressive view (PROG) was most favored in Zambia (see Table 4). However, the fact that the conservative view (CV) also received a comparatively high endorsement indicates that there is widespread disagreement about the extent to which the public sector should play a role in promoting CD for agricultural innovation. Generally, the conservative view is also reflected in the fact that the precautionary principle, an indicator for risk aversiveness, is also highly endorsed in Zambia (ENV). Yet, there is a general agreement in Zambia that the administrative burden of doing business in agriculture (AB) is too high. Moreover, Capacity Development for Agricultural Innovation Systems (CDAIS/AIS[51]) is regarded as less a promising pathway to address rural concerns in Zambia than in the other countries; at least among those who felt familiar with the AIS concept.

Generally, Business Conditions (BC) for African entrepreneurs are rated lower in Ghana and Zambia compared to Morocco and Uganda. This seems to be in line with the fact that the administrative burden (AB) is considered to be high in Ghana as well. Only in Morocco, the administrative burden of doing business seems to be more or less bearable. In return, the conservative view receives the highest endorsement in Morocco revealing a high amount of trust in the public sector and its role in promoting capacity development for agricultural innovation. This trustworthiness in public sector activities may also be related to the fact that a third of the survey participants in Morocco represented government institutions. Yet, these representatives of the public sector seem to have a highly positive attitude toward the role of the private sector in CD for agricultural innovation and consider poverty rather than affluence as the main enemy of sustainability in their country (the variable PROG is rated as high as the variable CV in Table 4).

	CV	PROG	ENV	ICD	FA	AIS	BC	AB	FBC
Ghana	2.25	3.199	3.236	3.093	2.857	3.271	2.708	3.421	3.049
Morocco	3.3	3.3	3.350	3.333	2.9	3.257	2.833	2.778	2.884
Uganda	2.354	3.306	3.201	3.194	2.875	3.256	2.854	3.476	2.892
Zambia	2.597	3.376	3.495	3.151	2.8	2.994	2.742	3.505	3.075

Table 4: Endorsement of Variables by Country

[51] The variable AIS was not included in the cluster analysis and the biplot because of the fewer observations (of our 96 only 66 completed this part because they did feel familiar with the AIS approach.

3.2.2 Cluster Analysis on a country-based level

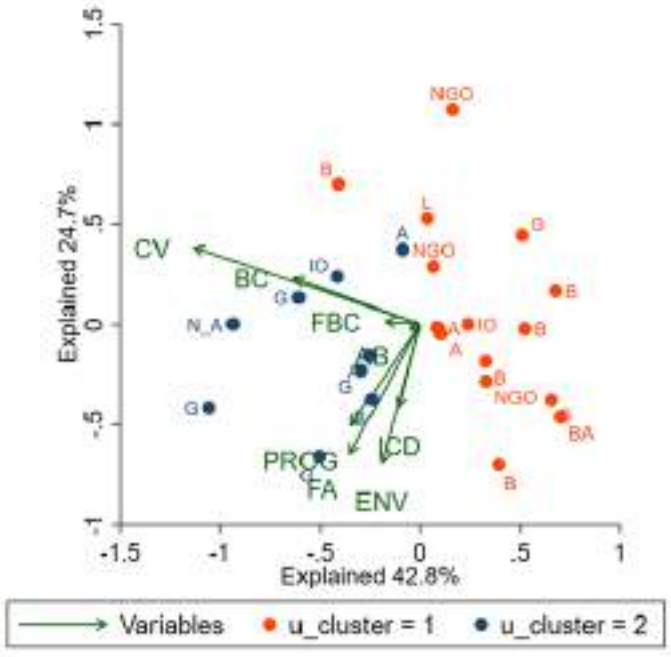
Perception Patterns in Uganda

24 stakeholder representatives participated in the online survey in Uganda of which only one did not complete Part 4 and therefore remained without institutional affiliation. Representatives from business (B/BA: 8) are most prominent on the aggregated level followed by representatives from government (5) and academia (4). Table 3 reveals that there are two main perception clusters: Cluster 1 is dominated by respondents from business (B/BA) and civil society and farmer organisations (NGO).

	N_A	A	B	BA	G	IO	L	NGO	Total
Cluster 1	0	2	6	1	1	1	1	3	**15**
Cluster 2	1	2	1	0	4	1	0	0	**9**
Total	**1**	**4**	**7**	**1**	**5**	**2**	**1**	**3**	**24**

Table 5: Perception Clusters in Uganda

Thanks to the fewer observations in the Biplot for Uganda, it is possible to also visualize the institutional affiliation of each single observation in the two-dimensional space, in addition to the respective group of clusters (see Graph 11).



Graph 11: Biplot visualizing perceptions patterns in Uganda

Graph 11 reveals, once again, that the most relevant variable to distinguish the three perception groups is the conservative view (CV), namely that the public sector must be exclusively in charge of CD for agricultural innovation and that it can be trusted to do so effectively. Followed

by environmental concerns and opportunities in agriculture (ENV) and the supportiveness of foreign-aid initiatives (FA). Additional relevant variables were PROG, the progressive view that poverty is still the main enemy of sustainability and ICD emphasizing the need for more value chain integration of small-scale farmers.

Based on their position in relation to these variables, Cluster 2, dominated by respondents from government, seems to distinguish itself mainly by its trust in the public sector as provider of CD for agricultural innovation. Many respondents of its cluster also endorse statements related to progressive attitudes toward private sector involvement (PROG), environmental challenges and opportunities (ENV) and inclusive development (ICD). In addition, they tend to believe that foreign-aid initiatives are supportive of enhancing the capacities of African entrepreneurs in an effective way (FA). Even though these variables also received relatively high endorsement from some participants in Cluster 1, which is dominated by business and civil society, this cluster is generally skeptical and tends to challenge the claim that the public sector must be exclusively in charge of CD for agricultural innovation.

Interesting about the Ugandan perception is the fact that business and civil society are found in the same perception pattern, indicating that they are likely to collaborate in many different ways in the field of CD for agricultural innovation.

Perception Patterns in Ghana

The online questionnaire in Ghana was completed by 34 respondents relatively evenly distributed across the different stakeholder categories government (8), academia (7), civil society (6), business (B/BA) (6) and international organisations (4).

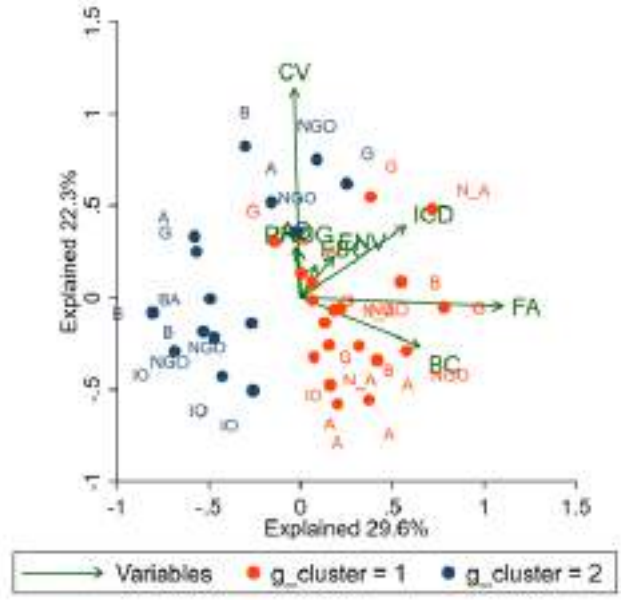
The perception clusters are once again dominated by particular stakeholder groups (see Table 4): Cluster 1 is dominated by government (6) and academia (5) whereas Cluster 2 contains most of the business respondents (B/BA), international organisations (IO) and civil society groups (NGO).

	N_A	**A**	**B**	**BA**	**G**	**IO**	**NGO**	**Total**
Cluster 1	3	5	2	0	6	1	2	19
Cluster 2	0	2	3	1	2	3	4	15
Total	**3**	**7**	**5**	**1**	**8**	**4**	**6**	**34**

Table 6: Perception Clusters in Ghana

The Biplot of the Ghana survey results (see Graph 12) reveals again the importance of the conservative view (CV), and, to some extent, the attitude toward foreign-aid initiatives (FA) in the creation of distinctive clusters. Unlike in Uganda, where government representatives are very much embracing the conservative view, this is not necessarily the case in Ghana with government officials and academics mostly found in Cluster 1, which tends to be relatively skeptical toward the domestic public sector. Many of them tend to look more favorably at foreign aid initiatives designed to improve the effectiveness of CD for agricultural innovation for African entrepreneurs because they seem to foster inclusive development (ICD) and improve business conditions (BC), two variables that are highly correlated with FA.

In return, representatives in business (B/BA), civil society (NGO) and to some extent international organisations (IO), found in Cluster 2, tend to doubt the effectiveness of foreign aid initiatives (FA) and believe that business conditions (BC) did not substantially improve. Interestingly, they tend to support progressive statements (PROG), which seem to be very much aligned with the conservative view (CV) but less controversial, to a much greater extent than statements related to inclusive development (ICD) meaning that the need to integrate small scale farmers in AVCs is less of a concern. As for the position of institutional categories within the clusters, it seems that representatives from government and civil society organisations are are more inclined to embrace the conservative view than representatives from international institutions, business and academia.



Graph 12: Biplot visualizing perceptions patterns in Ghana

Perception Patterns in Zambia

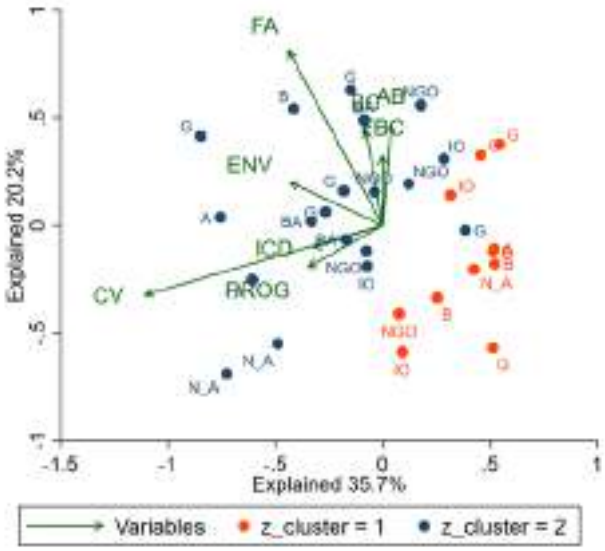
The two perception patterns in Zambia are less distinctive in terms of clear attribution to particular institutional categories.

	N_A	A	B	BA	G	IO	NGO	Total
Cluster 1	1	1	3	0	3	2	1	**11**
Cluster 2	2	2	1	3	5	2	4	**19**
Total	**3**	**3**	**4**	**3**	**8**	**4**	**5**	**30**

Table 7: Perception clusters in Zambia

The Biplot in Zambia reveals that the variables CV and FA once again help explain most of the variance in the plot. Similar to the perception patterns in Ghana, the conservative and the progressive view do not seem to mutually exclude each other, they are in fact highly correlated. This means that respondents that endorse both statements, are very much aware that poverty

continues to be the main enemy of sustainability and that agribusiness must play a major role effectiveness capacity development for young entrepreneurs that eventually help lift regions out of poverty. But there is just a major disagreement regarding the degree to which the private sector should be involvement in CD for agricultural innovation. Whereas the large Cluster 2 with most respondents from government and non-for profit organisations tends to favor the view that the public sector has to play a major role, respondents from business and, to some extent also government and international organisations, mostly found in Cluster 1, do not think so. They tend to be skeptical in regard to foreign aid initiatives (FA) as much as government initiatives (CV) and mainly point at ongoing business constraints (BC and the administrative burden (AB) as major obstacles to successful entrepreneurship in domestic agriculture. They also believe that the risk-averse focus on environmental concerns (EVN) may not be conducive to sustainable change.



Graph 13: Biplot visualizing perceptions patterns in Zambia

A Cluster and PCA Analysis for Morocco was not possible due to the low number of respondents in the country (18). However, based on the insights from the descriptive analysis, respondents generally expressed more trust in the delivery of public sector services, compared to the case of Zambia, for example.

3.3 Assessment of the Relevance of the Stakeholders

In Part 3 of the online questionnaire, we created a list of stakeholders for each country, selected with the support of key informants that were familiar with national debates on agricultural development and the organisations that represent the different institutional categories in this debate. We then asked respondents whether they are familiar with the names of the respective organisations and institutions listed in the different institutional categories (‘academia’, ‘business’, ‘government’, ‘international organisation’, ‘legislature’, ‘mass media’ and ‘civil society / NGO’) and if they consider them to be relevant.

Table 8 shows the three top-ranked organisations in Uganda that respondents felt most familiar with, compared to the three top ranked in terms of relevance considered in the national debate on CD for agricultural innovation. Since the respective ranks are often shared by two organizations, there are altogether seven organisations listed[52].

In terms of familiarity, a domestic maize agro-processing company called Maganjo Grain Millers, which also sells numerous processed food products is top-ranked among the survey respondents that completed part 3. Maganjo Grain Millers are also found among the five organisations considered most relevant in the national debate on CD for agricultural innovation. It is followed by an NGO (SNV), a not-for-profit international development organization that is active in eastern, southern and western Africa. It is committed to improve local incomes and enhance access to basic services through locally owned solutions. SNV Uganda is also ranked among the five most relevant institutions in the debate. In addition, business and civil society organization, the Ministry of Science, Technology and Innovation (MSTI) and the Committee on Agriculture of the Parliament are regarded as well-known institutions representating government and the legislature. Finally, respondents in Uganda seem to be very familiar with academic/research institutions such as Gulu University and the National Agricultural Research Organisation (NARO). Whereas NARO is also considered to be the most relevant institution in the national debate on CD for agricultural innovation, it is Makerere University rather than Gulu University that is considered to be most relevant.

Rank	Familiar	Count	Rank	Relevance	Count
1st (B)	Maganjo Grain Millers	22/23	1st (R)	National Agricultural Research Organisation (NARO)	23/23
1st (NGO)	SNV Uganda	22/23	1nd (A)	Makerere University	23/23
2nd (G)	Ministry of Science, Technology & Innovation (MoSTI)	21/23	2nd (G)	District Local Government	22/23
2nd (L)	Committee on	21/23	2nd (NGO)	Committee on Agriculture,	22/23

[52] The familiarity is reflected in the number of counts, the relevance could be rated as not relevant, relevant, and very relevant (see complete rankings of familiarity and relevance by country ANNEX I) relevance of the respective organization and their share in terms of percentage of those respondents who completed this part. Often the ranking turned out to be identical so that several organizations may rank on the same place.

	Agriculture, Parliament of Uganda			Parliament of Uganda	
3rd (A)	Gulu University	20/22	2nd(IN)	SNV Uganda	22/23
3rd(G)	Uganda Industrial Research Institute (UIRI)	20/22	3rd(B)	Uganda Industrial Research Institute (UIRI)	21/23
3rd(G)	National Council for Science and Technology	20/22	3rd(B)	Maganjo Grain Millers	21/23

Table 8: The most familiar and relevant organisations in Uganda

Respondents were also asked if there are any organizations not mentioned in the list (based on the feedback of local key informants), which they would nevertheless consider to be highly relevant in the national debate on CD for agricultural innovation. Altogether, 26 organizations were added to the list, however only 4 organizations were mentioned more than once. These were the Private Sector Foundation Uganda (mentioned three times), FAO (mentioned twice) and Horticultural Exporters Association Uganda, mentioned twice. The whole list of organizations mentioned can be found in ANNEX I.

In Ghana, University of Western Cape and its Faculty on Agriculture seem to be best known followed by an horticultural research institute and FAO. Finally, the Ministry of Environment, Science and Technology as well as the Ministry of Agriculture belong to the best known institutions in the country. In terms of relevance, it is AGRA, the Alliance for a Green Revolution and the University of Science and Technology in Kumasi, that are ranked as most relevant. Followed by the institutions that are also listed in the ranking of familiarity. The top ranking of AGRA is quite interesting in view of the fact that the organization also played a major role in the UN Food Systems Summit in fall 2021. Of equal interest is the fact that the Forum for Agricultural Research in Africa (FARA) does not appear among the top-ranked in terms of familiarity and relevance even though it receives the largest share of financial support from DeSIRA, the Initiative of the European Union to promote capacity development for agricultural innovation systems (CDAIS) and is one of the main partners of the FAO-based and mostly DeSIRA-funded Tropical Agriculture Platform (TAP) in Africa.

Twelve organisations were added to the list by the respondents in the survey, however, none was mentioned twice indicating that the list created in collaboration with local key informants was a relatively good selection of relevant stakeholders in the national debate on CD for agricultural innovation.

Rank	Familiarity	Count	Rank	Relevance	Count
1st (A)	University of Cape Coast	33/34	1st (I)	Alliance for a Green Revolution in Africa (AGRA)	32/32
1st (A)	Ghana Institute of Horticulturist Dept. Of Horticulture, KNUTST Kumasi.	33/34	2nd (A)	University of Science and Technology, Kumasi	32/33
1st (I)	FAO(Food and Agriculture Organization)	33/34	3rd (G)	MOFA	32/33
2nd (G)	Ministry for Environment, Science and Technology	32/33	4th (I)	FAO	32/34
2nd (G)	Ministry of Food and Agriculture MOFA	32/33	5th (A)	University of Cape Coast, Faculty of Agriculture	31/34

Table 9: The most familiar and relevant organisations in Ghana

In Zambia, the institution considered to be best known and most relevant is the Ministry of Agriculture and Livestock. In addition, a business association related to poultry production and an academic institution (Natural Resources Development College) are also found among the most familiar and the most relevant. In return, NGOs such as Catholic Relief Services and SNV are only found among the most familiar. International institutions do not appear to play a central role in the national debate on CD for agricultural innovation, even they foreign donor agencies are quite influential in co-setting the research and development agenda.

Of the 13 organizations listed that were not mentioned in the stakeholder list created in collaboration with local key informants, three were mentioned more than once: the Indaba Agricultural Policy Research Institute (mentioned three times) and the Zambia Development Agency (mentioned twice), Musika Development Initiatives (mentioned twice) and the Dairy Association of Zambia (mentioned twice).

Rank	Familiarity	Count	Rank	Relevance	Count
1st (G)	Ministry of Food Agriculture and Livestock (MOA)	28/29	1st (G)	Ministry of Agriculture and Livestock	29/29
1st (NGO)	Catholic Relief Services (CRS)	28/29	2nd (G)	Ministry of Food Agriculture and Livestock (MOA)	28/29
1st (BA)	Poultry Association of Zambia (PAZ)	28/29	2nd (A)	Natural Resource Development College	28/29
2nd (NGO)	SNV	27/28	4th (BA)	Zambia National Farmers Union	27/29
2nd (A)	Natural Resource Development College	27/28	5th (BA)	Poultry Association of Zambia (PAZ)	26/29

Table 10: The most familiar and relevant organisations in Zambia

In the case of Morocco, the ranking of familiarity and relevance in the national debate on CD for agricultural innovation may be less meaningful in view of the very small number of respondents that completed this part. However, there is one conspicuous difference compared to the other three countries in regard to the perceived importance of the media in the debate. The Press Agency of Morocco and a national news platform (Le Quid) are top ranked in terms of familiarity in the context of the CD for agricultural innovation. In return, the top ranking of domestic companies (OCP Group, COSUMAR) in terms of relevance in the national debate on CD for agricultural innovation is quite unique, considering the fact that domestic business associations rather than domestic companies were found in the top ranks of the other three surveyed countries. This is particularly surprising in view of the fact that most respondents from Morocco represented government officials.

Rank	Familiarity	Count		Relevance	Count
1st (M)	MAP (l'Agence Marocaine de Presse)	8/9	1st (G)	Agence Nationale pour le développement des zones oaziennes (ANDZOA)	9/9
1st (A)	Université Mohamed V	8/9	1st (B)	COSUMAR (Sugar processing)	9/9
1st(G)	Conseil Général du Développement Agricole	8/9	1st (R)	Institut National de la Recherche Agronomique	9/9
2nd (A)	Abdelmalek Essaâdi University	7/9	1st (R)	Institut Agronomique Vétérinaire Hassan II	9/9
2nd (M)	Le Quid	7/9	1st(B)	OCP Group (phosphate mining)	9/9

Table 11: The most familiar and relevant organisations in Morocco

4. Discussion and Concluding Remarks

The UN Food Systems Summit (UN FSS) organized in fall 2021 recognizes that entrepreneurs running small- and medium-sized enterprises (SMEs) companies in the agricultural value chain (AVC) are fundamental in efforts to transform the ways we produce and consume our food. In this context, three fundamental pathways in support of entrepreneurship and innovation to promote sustainable food systems were identified: (a) create a business ecosystem in which food SME can thrive, (b) incentivize business to provide "Good Food for All", (a) increase the power of food SME in sector planning (UN FSS 2021). Institutional framework conditions to promote private sector Capacity Development (CD) for agricultural innovation play a key role in each of these pathways.
However, such demands tend to be largely disregarded in the academic literature on Agricultural Innovation Systems (AIS) and Capacity Development for Agricultural Innovation Systems (CDAIS) in particular, because business in agriculture is hardly ever associated with sustainable food systems. Yet, as the UN FSS report highlights, inclusive and sustainable change in AVCs is ultimately driven innovative entrepreneurs, many of them women and youth. They will reshape our food systems for the better if support systems, market incentives, power dynamics, and cultural norms start to shift in their favour.

In this context, there is a fundamental need to improve institutional framework conditions for private sector capacity development for agricultural innovation, not only to assist the increasing numbers of passionate entrepreneurs in food and agriculture, but also to help build up capacities within the thriving business ecosystems in agriculture in low-income countries.

The present study reviewed the global discourse and the local action programs on capacity development for agricultural innovation and to what extent they address the needs of local entrepreneurs. In this context, relevant stakeholders involved in four different national debates on the topic in Africa were selected with the help of local key informants and invited to participate in an online survey. 109 respondents from Ghana, Uganda, Zambia and Morocco eventually completed the semi-standardized online questionnaire, which was drafted with our local partners in Ghana and Morocco.

The descriptive analysis of the four country surveys revealed on the aggregated level, that respondents widely agree that African entrepreneurs operating in agriculture continue to face numerous obstacles in their efforts to succeed in business. They include burdensome costs of doing business in the domestic formal agricultural economy, lack of integration into formal value chains, ineffective public sector support, as well as lack of access to infrastructure and technology. Many of these constraints may also be related to the lack of responsiveness of public sector capacity development programs in agriculture concerning the needs of entrepreneurs in agriculture. For example, respondents including representatives from government, academia, civil society, business and international organisations widely disagreed that the public sector should be in charge of CD for agricultural innovation and they tended to approve of the argument that agribusiness can be trusted to provide local entrepreneurs with capacities that help them succeed in business. In return, they very much favored an inclusive approach to agricultural development, recognizing that CD for agricultural innovation must also address the food security challenges of small-scale farmers. It is also very much in line with the high approval rate of the statement that poverty rather than affluence is still the main

enemy of sustainability in low income countries in Africa. In this context, efforts to integrate small local farms into formal value chains by addressing the aggregation problem[53] and promoting local entrepreneurship especially in the domestic food processing industry are expected to lead to more inclusive growth.

Generally, the respondents of the survey supported the application of the precautionary principle as a continuous and evidence-based approach that creates space for innovation guided by ethical values that reflect demand for inclusiveness. As a consequence, foreign aid initiatives that promote institutional framework conditions that help enable sustainable and inclusive economic and technological change in agriculture are generally approved by the domestic respondents of the survey. However, many respondents representing international and civil society organisations, also expressed a very skeptical view toward the performance of such foreign aid initiatives.

This may reflect the diverging views on the understanding of sustainable food systems, expressed in the aftermath of the UN Food Systems Summit held in fall 2021. In this context, foreign aid initiatives such as the New Alliance for Food Security and Nutrition (NAFSN) and Alliance for a Green Revolution in Africa (AGRA) have been confronted with criticism especially from international organisations and NGOs that are supported primarily by European donor agencies. They also approve of a strong version of the Precautionary Principle, which frames the numerous new plant breeding techniques exclusively as a risk that should be strictly regulated rather than an opportunity that contribute to addressing current productivity and climate change-related challenges in African agriculture by combining such agricultural biotechnology with effective agro-ecological practices.

Even though the survey participants seem to agree that NGOs are the most effective providers of CD for agricultural innovation, they do not refer to the advocacy-oriented type of civil society organization, but rather grassroots organizations working with local farmer organisations and vocational training institutions (e.g. SNV). Interestingly, participants in the four surveys who did not reveal their names and institutional affiliation in Part 4 of the questionnaire regarded multinational companies to be the most effective providers of CD for agricultural innovation. Those anonymous respondents also considered foreign aid initiatives and public-private partnerships to be much more effective than international organisations in providing useful assistance for local entrepreneurs. Since half of those who did not want to reveal their identity completed the French version of the survey, it can be implied that they are respondents from Morocco and do actually not represent international stakeholders themselves.

The survey also revealed some differences in perception between countries. Respondents in Morocco revealed a rather positive attitude toward the role of the public sector as an enabler of capacity development for agricultural innovation. This may be related to the fact that the formal cash crop-oriented agricultural sector in Morocco is dominated by large domestic companies and there is less dependence on foreign aid initiatives and investments. This stands in strong contrast to Ghana where even respondents from government had a rather skeptical attitude toward the role of the public sector in CD for agricultural innovation and where foreign aid

[53] Small-scale farming is characterized by Fragmented production and market interfaces give rise to high transaction costs and problems in matching supply with downstream or consumer requirements. See https://openknowledge.worldbank.org/handle/10986/31516

initiatives that promote domestic entrepreneurship and innovation in agricultural development are considered to be highly relevant. AGRA, the Alliance for a Green Revolution in Africa, was considered to be the most relevant stakeholder in the national debate on CD for agricultural innovation. By contrast, FARA, the Ghana-based Forum for Agricultural Research in Africa who is meant to promote CD for agricultural innovation on the continent, did not show up among the top-ranked institutions in terms of familiarity and relevance.

In Uganda, respondents considered the domestic private sector as the most effective provider of CD for agricultural innovation. This view is also reflected in the fact that two important private sector associations (representing the dairy and poultry industry) in the domestic agricultural value chain were ranked among the top five of the most relevant institutions in the country. Respondents in Zambia considered the administrative burden of doing business in the formal agricultural economy to be the most serious problem among, combined with the highest degree of skepticism toward the effectiveness of foreign aid initiatives. The role of universities as providers of effective support to local entrepreneurs is generally rated lower than the role of national research institutes, which have obtained particularly high ratings in Uganda and Morocco.

The cluster analysis that included the respondents from all four countries revealed three main perception patterns. The first perception group mostly consisted of representatives from not-for-profit organisations, international organisations, business and academia. They expressed a great deal of skepticism toward the effectiveness of capacity development initiatives that are exclusively supported by the public sector and showed more confidence in the effectiveness of foreign-aid initiatives to benefit local entrepreneurs in agriculture. The second perception group contained the largest share of government representatives. It acknowledges the important role of the private sector and that poverty rather than affluence is the main enemy of sustainability in Africa. However, the perception group also sees an important role in the public sector in the promotion of inclusive agricultural development. Finally, the third perception group, dominated to some extent by civil society and international organisations tended to be more in favor of conservative than progressive views in the sense that they regard CD for agricultural innovation to be the exclusive realm of public sector institutions while distrusting the role of the private sector. They also express a very skeptical view toward foreign aid initiatives, even though they themselves are not necessarily representing domestic stakeholders.

This could, once again, be an indication that the polarized political debate at the UN Food Systems Summit in fall 2021 on the effectiveness of different approaches to the promotion of sustainable food systems is also reflected in the disagreement on the ’right’ approach among foreign stakeholders involved in domestic debates in Africa. The country-based cluster analyses revealed some substantial differences in regard to the perception of respondents who represented government organisations in each country. Uganda and Morocco seem to be more convinced that the public sector is playing an important role in agricultural development, compared to Ghana and Zambia where stakeholders revealed a more skeptical view of public sector initiatives in the area of CD for agricultural development. Yet, government officials in all countries also expressed a very positive attitude toward statements that implicitly see business as part of the solution.

The perception pattern analysis of Zambia reveals a more polarized debate on CD for agricultural innovation with one perception group expressing a very critical view toward public sector CD for agricultural innovation as well as foreign aid initiatives. This group, which seems to advocate deregulation to a great extent so that entrepreneurs in agriculture face less administrative burden, also contains many government officials.

Overall perception patterns are validated by the outcome of the descriptive analysis. The differences in perception between the four countries can be well explained in the face of the different domestic institutional framework conditions and the stakeholders that play an influential role in the country.

Overall, the four surveys confirm the view that private sector capacity development for agricultural innovation plays a crucial role in making agricultural development more inclusive, sustainable and productive. Even though there are efforts in all four countries to improve institutional framework conditions to enable more local entrepreneurs to succeed in the domestic agribusiness, respondents of the four surveys still regard the obstacles local entrepreneurs face in doing business in the formal sector to be a serious threat to inclusive growth.

These insights largely confirm the findings of the needs assessment on capacity development for agricultural innovation in Africa, published by the Tropical Agriculture Platform (TAP) in 2013 (Oijio 2013).

The UN Food Systems Summit has taken these findings seriously by committing itself to promoting effective public-private partnerships to address the challenges related to youth unemployment, environmental degradation and food insecurity in farm households. The COVID-19 pandemic as well as the outbreak of the war in the Ukraine and its impact on prices for agricultural input, animal feed and food has made the international community aware of the fact that sustainable agriculture is still about producing more food with less resource use through investment in innovation.

In this context, the views in the United States, Africa and Europe may eventually align because the classic argument often heard in high schools that food insecurity is not a production problem but only a distribution problem' may no more hold. Countries want to invest again in a productive type of agriculture that makes them more resilient toward external shocks. Simultaneously they are committed to make a substantial contribution to improve biodiversity and prepare for the climate change impact on agriculture through climate change adaptation.

References:

AbouAssi, K., & Trent, D. L. 2016. NGO accountability from an NGO perspective: Perceptions, strategies, and practices. *Public Administration and Development*, 36(4), 283-296

Aerni, P. 2021."Business as Part of the Solution": SDG 8 Challenges Popular Views in the Global Sustainability Dis-course'. MPDI Book Series on Transitioning toward Sustainability. 67-101. https://www.mdpi.com/books/pdfview/edition/3919

Aerni, P. 2018a Global Business in Local Culture: The impact of embedded Multinational Enterprises'. *SpringerBriefs in Economics*, 1-122.

Aerni, P. 2018b. The Use and Abuse of the Term 'GMO' in the 'Common Weal Rhetoric' Against the Application of Modern Bio-technology in Agriculture. In: James Harvey (ed) Ethical Tensions from New Technology: The Case of Agricultural Biotechnology. CABI Publishing, pp 39-52.

Aerni, P. 2014. The great misunderstanding of the global food crisis. In Insights—Africa's Future: Can Biosciences Contribute?; Heap, B., Bennett, D., Eds.; Banson Publishers: Cambridge, UK.

Aerni, P., 2016. Coping with migration-induced urban growth: Addressing the blind spot of UN Habitat. *Sustainability*, *8*(8), p.800.

Aerni, P. 2011. Food Sovereignty and its Discontents. *ATDF Journal* 8(1/2), 23-40.

Aerni, P. and Bernauer, T. 2006. Stakeholder attitudes towards GMOs in the Philippines, Mexico and South Africa: The issue of public trust. *World Development* 34(3), 557-575.

African Union (AU). 2015. Agenda2063 report of the commission on the African Union Agenda 2063 The Africa we want in 2063. Available online: https://archives.au.int/handle/123456789/4631 (accessed on January 4, 2022)

African Union Commission on the Implementation of the Malabo Declaration (AUC). 2020. Comprehensive Agricultural Development Programme (CAADP): Biannual Review Report (2015-2018). Addis Abeba, Ethiopia. Available online: https://au.int/en/documents/20201209/biennial-review-report-comprehensive-africa-agriculture-development-programme (accessed on February 7, 2022).

African Union (AU). 2021. Africa Common Position to the UN Food Systems Summit. Draft, July 7, 2021. Available online: https://www.acbio.org.za/sites/default/files/documents/202109/draft-africa-common-position-un-food-systems-summit-revised-july-7-2021-003.pdf (Accessed on February 12, 2022)

African Development Bank (AfDB). 2018. Feed Africa: Strategy for Agricultural Transformation in Africa 2016-2025. Abidjan: African Development Bank Group (AFDB). Available online: https://www.afdb.org/en/the-high-5/feed-africa (accessed on February 5, 2022)

AGRA. 2021. Africa Agriculture Status Report. A Decade of Action: Building Sustainable and Resilient Food Systems in Africa (Issue 9). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA)

Ausubel, Jesse, 2015. "The Return of Nature," Breakthrough Institute, May 12. 2015. https://thebreakthrough.org/images/elements/Figure_1.png.

Badiane, O., J. Collins, B. Dimaranan, and J. Ulimwengu. 2018. An Assessment of the New Alliance for Food Security and Nutrition. African Union: Addis Ababa, Ethiopia.

Barrett, C.B., Bachke, M.E., Bellemare, M.F., Michelson, H.C., Narayanan, S., and Walker, T.F. 2012. Smallholder participation in contract farming: Comparative Evidence from five countries. *World Development*, 40(4), 715-730.

Bellemare, M.F. and Novak, L. 2017. Contract farming and food security, *American Journal of Agricultural Economics*, 99(2), 357–378

Bengtson, E. 2017. The Concept of Doxa in the European Reinvention of Rhetoric. Rhetoric in Europe: Philosophical Issues/Norbert Gutenberg and Richard Fiordo (eds.), 1, 79-87.
Borchers, T. and Hundley, H. 2018. Rhetorical theory: An introduction. Waveland Press.

Campanhola, C., & Pandey, S. (Eds.). 2018. Sustainable food and agriculture: An integrated approach. Academic Press.

Canfield, M., Anderson, M.D., and McMichael, P.2021. UN Food Systems Summit 2021: Dismantling Democracy and Resetting Corporate Control of Food Systems. *Front. Sustain. Food Syst.* 5:661552. doi: 10.3389/fsufs.2021.661552

Caprile, A. 2021. United Nations Food Systems Summit 2021: Process, challenges and the way forward. EPRS Briefing, European Parliamentary Research Service. Available online: https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)696208 (Accessed on February 19, 2022)

Cardwell, P.J. and Jančić, D. 2019. The European Parliament and Development Cooperation: Democratic Participation in the 'Low Politics' of EU External Relations'. *Journal of European Integration*, 41, 3, 365– 381.

Council of the European Union. 2021. Draft Council Conclusions on the EU's priorities for the 2021 United Nations Food Systems Summit. 8949/21, 20 May, 2022, Brussels: Available online: draft-council-conclusions-on-the-eu-s-priorities-for-the-2021-united.pdf (europa.eu) (accessed on 19 February, 2022)

Curtis, M. 2015. New Alliance, New Risks of Land Grabs: Evidence from Malawi, Nigeria, Senegal and Tanzania. Johannesburg: Action Aid International

De Schutter, O. 2015. The New Alliance for Food Security and Nutrition in Africa. European Parliament, Directorate-General for External Affairs Policy Department Study (EP/EXPO/B/DEVE/2015/01). Accessed 21 March 2019. https://www.europarl.europa.eu/RegData/etudes/STUD/2015/535010/EXPO_STU(2015)535010_EN.pdfv

Delputte, S. and Verschaeve, J. 2015. The Role of the European Parliament in EU Development Policy. In S. Stavridis and D. Irrera (eds) The European Parliament and its International Relations, Abingdon: Routledge, 35– 51.

European Commission, 2021. List of Potential Agricultural Practices That Euro-Schemes Could Support, January. Available online: https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/factsheet-agri-practices-under-ecoscheme_en.pdf (Accessed on February 13, 2022)

EU, 2020. Farm to Fork Strategy: For a fair, healthy, and environmentally-friendly food system. European Commission.

EU 2021. FAO + European Union. Investing in a sustainable and food secure future. FAO, Rome. Available online: https://eeas.europa.eu/headquarters/headquarters-homepage/97243/fao-european-union-investing-sustainable-and-food-secure-future_en (accessed on February 9, 2022)

FAO. 2021. Joint rapid appraisal on strengthening agricultural innovation systems in Africa, Asia and Latin America by regional research and extension organizations – Synthesis report 2021. Rome.

FAO. 2018. FAO's Work on Agricultural Innovation: Sowing the seeds of transformation to achieve the SDGs. FAO Rome, Italy. Available online: https://www.fao.org/documents/card/en/c/ca2460en/ (accessed on 28.12.2021)

FAO. 2016. Common Framework on Capacity Development for Agricultural Innovation. TAP/FAO, Rome. Available online: https://www.fao.org/in-action/tropical-agriculture-platform/resources/en/ (accessed on 15.02.2022)

FAO. 2013. Assessment of the current capacities and needs for institutional and individual capacity development in agricultural innovation systems in low income countries. Synthesis Report. TAP/FAO, Rome. Available online https://www.fao.org/in-action/tropical-agriculture-platform/resources/en/ (accessed on 15.02.2022)

Field to Market, 2016. Environmental and Socioeconomic Indicators for Measuring Outcomes of On-Farm Production in the United States, Table 1.6. Available online http://fieldtomarket.org/media/2016/12/Field-to-Market_2016-National-Indicators-Report.pdf (accessed on February 13, 2022)

Ford, J.D., Pearce, T., McDowell, G. et al. 2018. Vulnerability and its discontents: the past, present, and future of climate change vulnerability research. Climatic Change 151, 189–203. https://doi.org/10.1007/s10584-018-2304-1

Fox, L. and Jayne, T.S. 2020. Unpacking the misconceptions about Africa's food imports. Brookings. Available online: https://www.brookings.edu/blog/africa-in-focus/2020/12/14/unpacking-the-misconceptions-about-africas-food-imports/ (accessed on 07.02.2022)

Fuchs, R., Brown, C., & Rounsevell, M. 2020. Europe's Green Deal offshores environmental damage to other nations. Nature 586, 671-673 (2020)

Galvin, S.S., 2021. Becoming Organic: Nature and Agriculture in the Indian Himalaya. Yale University Press.

Hall, R., Scoones, I. & Tsikata, D. 2017. Plantations, outgrowers and commercial farming in Africa: agricultural commercialisation and implications for agrarian change. *The Journal of Peasant Studies*, 44, 3, 515-537, DOI: 10.1080/03066150.2016.1263187$

Hall, N., Schmitz, H. P., & Dedmon, J. M. 2020. Transnational advocacy and NGOs in the digital era: New forms of networked power. *International Studies Quarterly*, 64(1), 159-167.

Hamid, S., & Mir, M. Y. 2021. Global Agri-Food Sector: Challenges and Opportunities in COVID-19 Pandemic. *Frontiers in Sociology*, 142.

Headey, D. D., & Jayne, T. S. 2014. Adaptation to land constraints: Is Africa different? *Food Policy*, 48, 18-33.

Herren, H., Haerlin, B. and IAASTD+ Advisory Group. 2019. Transformation of our food systems: the making of a paradigm shift. Zukunftstiftung Landwirtschaft/Biovision. Available online: https://www.globalagriculture.org/transformation-of-our-food-systems.html (accessed on February 14, 2022).

Hichaambwa, M., and Matenga, C. 2016. Which large-scale agricultural commercialization models offer the best opportunities for improved local livelihoods in Zambia? Lusaka: Indaba Agricultural Policy Research Institute (IAPRI).

High Level Panel of Experts on Food Security and Nutrition (HLPE) .2020. Food security and nutrition: building a global narrative towards 2030. FAO, Rome. Available online: https://www.fao.org/cfs/cfs-hlpe/en/ (Accessed on February 2022)

Interagency Report to the Mexican G20 Presidency. 2012. Sustainable Agricultural Productivity Growth and Bridging the GAP for Small Family Farms. Co-ordinated by the FAO and the OECD in a collaborative undertaking with Bioversity, CGIAR Consortium, IFAD, IFPRI, IICA, UNCTAD, Coordination team of UN High Level Task Force on the Food Security Crisis, WFP, World Bank, and WTO. FAO, Rome

Holenstein, A., Kury, P. & Schulz, C. 2018. Migrationsgeschichte: Von den Anfängen bis zur Gegenwart. Hier und Jetzt Verlag.

Hutchins, S., 2021. Sustainable Agriculture in the U.S. vs. the EU. CSA News, February. https://acsess.onlinelibrary.wiley.com/doi/10.1002/csan.20373.

IPCC, 2019. Climate Change and Land. Intergovernmental Panel on Climate Change, Geneva. Available online: https://www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf. (Accessed on February 2022)

Kirui, O. 2020. Skills development for value chain actors in African agriculture. In: Resnick, D., Diao, X., and Tadesse, G. (Eds.) Sustaining Africa's Agrifood System Transformation: The Role of Public Policies. ReSAKSS 2020 Annual Trends and Outlook Report. Washington, DC, and Kigali: 102-111.

Kolavalli, S., Mensah-Bonsu, A., and Zaman, S. 2015. Agricultural Value Chain Development in Practice: Private Sector-Led Smallholder Development. Discussion Paper 01460 International Food Policy Research Institute, Washington, DC

Lambrecht, I., and Ragasa, C. 2016. Do Development Projects Crowd Out Private- Sector Development? A Survival Analysis of Contract Farming Participation in Northern Ghana, Discussion Paper 01575 International Food Policy Research Institute, Washington, DC.

Lin, M., & Huang, Q. 2019. Exploring the relationship between agricultural intensification and changes in cropland areas in the US. Agriculture, ecosystems & environment, 274, 33-40.

McMichael, P. 2009. A food regime genealogy. *The journal of peasant studies*, 36(1), 139-169.

Maertens, M., and Vande Velde, K. 2017. Contract-farming in Staple Food Chains: The Case of Rice in Benin. *World Development*, 95, 73–87.

Makombe, T., Tefera, W., and Ulimwengu, J. M. 2019. Tracking key CAADP indicators and implementation processes. In 2019: Quisumbing, Agnes R.; Meinzen-Dick, Ruth Suseela; and Njuki, Jemimah (ed) Annual trends and outlook report: Gender equality in rural Africa: From commitments to outcomes. Chapter 13, Pp. 190-206. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499.

Mathews, J. A. 2020. Schumpeterian economic dynamics of greening: propagation of green eco-platforms. *Journal of Evolutionary Economics*, 30(4), 929-948.

Ministère de l´Europe et des Affaires étrangères (MEAE). 2018. Développement – Sécurité alimentaire. Available online: https://www.diplomatie.gouv.fr/fr/politique-etrangere-de-la-france/developpement/autres-secteurs-d-importance/securite-alimentaire-nutrition-et-agriculture-durable/actualites-et-evenements-lies-a-la-securite-alimentaire-et-a-l-agriculture/article/developpement-securite-alimentaire-09-02-18 (Accessed on February 9, 2022)

Ojijo, N. K. O., Jakinda, D. O., and Annor-Frempong, I. 2013. Assessment of the current capacities and needs for institutional and individual capacity development in agricultural innovation systems. Regional Synthesis Report for Africa. TAP/FAO, Rome. Available

online: https://www.fao.org/in-action/tropical-agriculture-platform/resources/en/ (accessed on February 15, 2022).

Panotra N., Gupta. V., Sharma, V., and Kumar, A. 2018. Contract Farming System for Sustainable Agricultural Development, *International Journal of Agriculture Sciences*, 10(6), 5505-5508.

Paarlberg, R., 2022. The trans-Atlantic conflict over "green" farming. *Food Policy*, 108, p.102229.

Poku, A., Birner, R., and Gupta, S. 2018. Making Contract Farming Arrangements Work in Africa's Bio-economy: Evidence from Cassava Out-grower Schemes in Ghana. *Journal of Sustainability*, 10(5), 1-21.

Purnhagen, K. P., Clemens, S., Eriksson, D., Fresco, L. O., Tosun, J., Qaim, M., Richard, G.F., Visser, R. G. F, Weber, A. P. M., Wesseler, J. H. H. and Zilberman, D. 2021. Europe's farm to fork strategy and its commitment to biotechnology and organic farming: Conflicting or complementary goals? *Trends in plant science*, 26(6), 600-606.

Prášková, D.M. and Novotný, J., 2021. The rise and fall of the New Alliance for Food Security and Nutrition: a tale of two discourses. *Third World Quarterly*, 42(8), pp.1751-1769.

Queiroz, C., Norström, A.V., Downing, A., Harmáčková, Z.V., De Coning, C., Adams, V., Bakarr, M., Baedeker, T., Chitate, A., Gaffney, O. and Gordon, L., 2021. Investment in resilient food systems in the most vulnerable and fragile regions is critical. *Nature Food*, 2(8), pp.546-551.

Rangan, H., 2000. Of myths and movements: Rewriting Chipko into Himalayan history. Verso.

Rapsomanikis, G. 2015. The economic lives of smallholder farmers: An analysis based on household data from nine countries. Food and Agriculture Organization of the United Nations, Rome.

Raunio, T. and Wagner, W., 2021. Contestation over development policy in the European Parliament. JCMS: *Journal of Common Market Studies*, 59(1), pp.20-36.

Saghir, J. and Santoro, J. 2018. Urbanization in Sub-Saharan Africa Meeting Challenges by Bridging Stakeholders. Center for Strategic and International Studies (CSIS), Washington DC. Available online: https://www.csis.org/analysis/urbanization-sub-saharan-africa (accessed on February 13, 2022).

SAM Report (Group of Chief Scientific Advisors). 2020. Toward a Sustainable Food System: Moving from food as a commodity towards food as more of a common good. European Union, Brussels. Available online: https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/scientific-support-eu-policies/group-chief-scientific-advisors/towards-sustainable-food-system_en

Silungwe, S. 2020. Evaluating the Effectiveness of Out-Grower Projects in Reducing Poverty in Rural Zambia: a Case of the Eastern Province. Doctoral Thesis, University of Zambia, Lusaka.

Schüpbach, J. 2014. Foreign direct investment in agriculture: The impact of out-grower schemes and large-scale farm employment on economic well-being in Zambia. Zurich: vdf Hochschulverlag AG.

Tabe-Ojong, M. P. J., Gebrekidan, B. H., Nshakira-Rukundo, E., Börner, J., & Heckelei, T. (2022). COVID-19 in rural Africa: Food access disruptions, food insecurity and coping strategies in Kenya, Namibia, and Tanzania. Agricultural Economics.

Thomas, D. 2022. What you need to know about the African Continental Free Trade Area. African Business. Available online: https://african.business/2022/01/trade-investment/what-you-need-to-know-about-the-african-continental-free-trade-area/ (accessed on 07.02.2022)

Toillier, A., Guillonnet, R., Bucciarelli, M., & Hawkins, R. 2021. Developing capacities for agricultural innovation systems: lessons from implementing a common framework in eight countries. published by AGRINATURA and FAO. Available online: https://www.fao.org/policy-support/tools-and-publications/resources-details/fr/c/1333412/ (accessed on 30.03.2022)

Torvikey, G.D., Yaro, J.A., and Teye, J.K. 2017. Farm to Factory Gendered Employment: The Case of Blue Skies Out-grower Scheme in Ghana. Journal of Political Economy, 5(1), 77-97. https://doi.org/10.1177/2277976016669188

Tschirley, D. L., Snyder, J., Dolislager, M., Reardon, T., Haggblade, S., Goeb, J. & Meyer, F. 2015. Africa ' s unfolding diet transformation: implications for agrifood system employment, *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 5 No. 2, pp. 102-136

Vermeulen, S. 2010. Making the most of agricultural investment: A survey of business models that provide opportunities for smallholders," Technical Report, IIED, FAO, IFAD, SDC 2010.

United Nations, Department of Economic and Social Affairs (UN-DESA), Population Division. 2019. World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420). New York: United Nations.

United Nations Food Systems Summit (UN FSS). 2021. A Small Business Agenda. July 2021. Available online: https://www.un.org/en/food-systems-summit/news/un-announces-50-best-small-business-winners-providing-%E2%80%9Cgood-food-all%E2%80%9D (accessed on April 3, 2022)

Vidal, J. 2021. Farmers and rights groups boycott food summit over big business links. The Guardian, March 4, 2021. Available online: https://www.theguardian.com/global-development/2021/mar/04/farmers-and-rights-groups-boycott-food-summit-over-big-business-links (accessed on February 13, 2022)

von Braun, J., Afsana, K., Fresco, L. O., & Hassan, M. 2021. Food systems: Seven priorities to end hunger and protect the planet. *Nature 597*, 28-30.

Wang, R., Meybeck, A., & Sonnino, A. 2019. Research and Innovation. In Sustainable Food and Agriculture (pp. 491-507). Academic Press.

Webb, P. and Sonnino, R. 2021. Everyone at the Table: Co-creating Knowledge for Food Systems Transformation. European Commission, Brussels. Available online: https://op.europa.eu/en/publication-detail/-/publication/b3e25405-eb99-11eb-93a8-01aa75ed71a1/ (accessed on February 19, 2022)

Wise, T. A. 2020. Failing Africa's Farmers: An Impact Assessment of the Alliance for a Green Revolution in Africa. Medford, MA: Tufts University.

Institutional Framework Conditions for Private Sector Capacity Development (CD) in Agriculture

QUESTIONNAIRE

A joint research project by

The Forum for Agricultural Research in Africa (FARA) in Ghana

Center for Corporate Responsibility and Sustainability (CCRS) at the University of Zurich

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INTRODUCTION

In 2013, the Tropical Agriculture Platform (TAP) based at FAO in Rome asked the Forum for Agricultural Research in Africa (FARA) to conduct a needs assessment on capacity development (CD) for agricultural innovation in selected African countries. The survey results revealed that initiatives designed to promote CD for agricultural innovation are often not well-aligned with local priorities. Donor-funded CD projects usually focus on the strengthening of individual rather than organizational capacity development, and they hardly contribute to a more enabling environment for private sector development in agriculture. The TAP has also been promoting the concept of the Agricultural Innovation Systems (AIS)[54] as a mechanism for collaboration amongst actors at national level through the Capacity Development for Agricultural Innovation Systems (CDAIS) approach.

With this current survey, the Center for Corporate Responsibility and Sustainability (CCRS) at the University of Zurich and FARA would like to follow up these earlier findings and assess the perceptions of the effectiveness of the AIS-based approach in mobilizing private sector capacity development for agricultural innovation

The purpose of this stakeholder survey is to take stock of current concerns but also to have your assessment on the effectiveness of new policy approaches to address these concerns effectively.

The questionnaire consists mostly of closed questions in which the answers have to be rated in a scale from one to four. In the first part, we would like you to rate a list of challenges related to the current national agricultural innovation system and the potential gap between the supply and demand of assistance and capacity development in agriculture.

In return for participating in this survey, we will send you the final report with the results and invite you to a local workshop to obtain your feedback and discuss the interpretation of the results.

The study is funded by the Swiss Agency for Development and Cooperation (SDC).

DR. IRENE FREMPONG
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[54] The agricultural innovation system (AIS) approach is defined as a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic, social and/or environmental use, together with the institutions and policies that affect their behaviour and performance (http://www.fao.org/in-action/tropical-agriculture-platform/background/ais-a-new-take-on-innovation/en/)

INSTRUCTIONS: Please circle the number that corresponds to your answer.
Example: Overall, domestic agriculture has become more innovative.

I don't agree at all		I completely agree		don't know
1	(2)	3	4	☐

Part 1: General View on Institutional Framework Conditions in Domestic Agriculture

1.1. Are you familiar with the Agricultural Innovation System (AIS) approach

☐ Yes ☐ No

If your answer is no then please proceed to question 1.4

1.2. How effective do you consider the AIS approach in making domestic agriculture more…..

	not effective at all	very effective	don't know
productive	1--------2--------3-------4		☐
innovative	1--------2--------3-------4		☐
inclusive	1--------2--------3-------4		☐
sustainable	1--------2--------3-------4		☐

1.3. How effective do you consider the AIS approach in strengthening capacity development for agricultural innovation (CD4AI) with respect to…..

	not effective at all	very effective	don't know
CD on the individual level	1--------2--------3-------4		☐
CD on the organisational level	1--------2--------3-------4		☐
enabling environment supportive of CD	1--------2--------3-------4		☐

1.4. To what extent do you think the current institutional framework conditions encourage *private sector* investments in CD4AI?

Very discouraging		very encouraging	don't know
1--------2--------3-------4			☐

1.5. Over the past decade, has it become easier or more difficult to operate successfully as an entrepreneur in formal agricultural economy

Much more difficult much easier don't know

1--------2--------3-------4 □

1.6. To what extent do foreign-aid sponsored initiatives designed to create capacity development for agricultural innovation systems (CDAIS) address the concerns of local entrepreneurs?

Not at all to a great extent don't know

1--------2--------3-------4 □

1.7. What are the relevant constraints today to succeed as a young agricultural entrepreneur in Africa

	Not relevant highly relevant	don't know
Access to affordable credit	1--------2--------3-------4	□
Access to investors	1--------2--------3-------4	□
Ineffective public sector support	1--------2--------3-------4	□
The costs of doing formal business	1--------2--------3-------4	□
Access to land	1--------2--------3-------4	□
Access to effective mentoring	1--------2--------3-------4	□
Quality of infrastructure	1--------2--------3-------4	□
Quality of business services	1--------2--------3-------4	□
Access to technology	1--------2--------3-------4	□
Lack of value chain integration	1--------2--------3-------4	□
Access to capacity development	1--------2--------3-------4	□
Other:……..	1--------2--------3-------4	□

1.8 To what extent do the following institutions currently contribute to success of local agricultural entrepreneurs?

	would not contribute would greatly contribute	don't know
Universities	1--------2--------3-------4	□
Public Sector Agencies	1--------2--------3-------4	□
Domestic Private Sector	1--------2--------3-------4	□
International Private Sector	1--------2--------3-------4	□
International Organisations	1--------2--------3-------4	□
Foreign Aid Programmes	1--------2--------3-------4	□
National Financial Institutions	1--------2--------3-------4	□
International Financial Institutions	1--------2--------3-------4	□
Mentoring Organizations/Hubs	1--------2--------3-------4	□

Others:…… 1--------2--------3-------4 □

1.9 How effective do you judge the following providers of CD4AI?

	Not effective at all very effective	don't know
1. institutions in academia	1--------2--------3-------4	☐
2. national research institutes	1--------2--------3-------4	☐
3. interntl private foundations	1--------2--------3-------4	☐
4. multinational companies	1--------2--------3-------4	☐
5. foreign aid (North/South)	1--------2--------3-------4	☐
5. foreign aid (South/South)	1--------2--------3-------4	☐
6. NGOs	1--------2--------3-------4	☐
7. Regional/Contitl institutions	1--------2--------3-------4	☐
Others _____	1--------2--------3-------4	☐

Clarifications:_____
_____
_____
_____
_____

Part 2: Statements about the relation between agricultural modernization and sustainable agriculture

In this section, you find 14 statements that refer to particular views of on capacity development for sustainable agriculture. Please indicate to what extent you agree or disagree with each of these statements on a scale from 1 to 4.

2.1 Capacity Development for Agricultural Innovation (CD4AI) must be provided by the public sector only in order to ensure broad access.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.2 Ultimately, it is the private sector that has the capacity to create scalable agricultural markets through innovation in production, management and marketing.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.3 Local farmers who produce for international markets tend to pursue profits at the expense of sustainable practices.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.4 Publicly funded agricultural services can be trusted to address to respond to the needs of the domestic private sector in agriculture

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.5 National agricultural innovation systems (AIS) should focus on co-developing 'innovation niches' designed to render domestic agriculture more sustainable.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.6 Agribusiness can be trusted to provide young agricultural entrepreneurs with capacity development that serves them to succeed in business on their own.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.7 The application of the Precautionary Principle[55] ensures sustainable agriculture by preventing the spread of potentially risky new technologies, such as modern agricultural biotechnology.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.8 The popular concept of sustainable agriculture ignores that rural poverty is still the main enemy of sustainability in Africa.

I don't agree at all I completely agree don't know

1----------2----------3----------4 ☐

2.9 The promotion of agro-ecological carbon-sequestration practices in agriculture will boost yields while enabling small-scale farmers to benefit from carbon trade.

I don't agree at all I completely agree don't know

1-------2-------3-------4-------5 ☐

2.10 Current agricultural policies create the necessary capacities and infrastructure to integrate farmers into formal agricultural food value chains.

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[55] The Precautionary Principle (PP) is considered to be an essential tool in risk management in the face of scientific uncertainty. There are different definitions of the PP found in national and international law. All these definitions are related to a "better safe than sorry" attitude; the idea that, in the face of uncertainty, society should assume that potential problems are real and address them accordingly.

I don't agree at all I completely agree don't know

1----------2----------3----------4 □

2.11 Current agricultural policies should by strengthen the capacities of small-scale farmers to ensure household food self-sufficiency.

I don't agree at all I completely agree don't know

1----------2----------3----------4 □

2.12 National agricultural innovation systems should strengthen the capacities of farmers, independent of scale, to attract sufficient investment to produce cash crops for the growing domestic cities.

I don't agree at all I completely agree don't know

1----------2----------3----------4 □

Part 3: List of stakeholders (identified as relevant by key informants > assessment in terms of familiarity and relevance with the option to add further stakeholders/organizations that are considered to be relevant but not listed in the table

Part 4: General Questions

Name of the organisation: _____

4.1 What is the size of your organisation?

□ < 10 employees □ 10-99 employees □ 100-499 employees □ > 500 employees

4.2 What is your educational/professional background?

_____

4.3 What is the geographical scope of your organisation?

□ *Local*

□ *Regional*

□ *National*

□ *African Continent*

□ *Global*

4.4 Which of the following terms would best describe your organization?

□ *Non-profit organization (academic / international institution)*

- ☐ *Private company*
- ☐ *Government organisation*
- ☐ *Others*

4.5 Who filled in the questionnaire?

Respondent's Name: _____

Respondent's Title: _____

Respondent's Telephone: _____

Second respondent (if any): _____

Respondent's Title: _____

Respondent's Telephone: _____

Table with challenges added and rated in Part I on relevant constraints for entrepreneurs in agriculture in the four African countries:

Comments	Importance on the Likert Scale (1-4)				
	Not at all	Not so much	relevant	Highly relevant	Total
Access to information technology	0	0	0	1	1
Access to technology at the right time_- timeline, access to inputs of production	0	0	0	1	1
Accompagnement des agriculteurs et valorisation des produits.(Support for farmers and promotion of products)	0	1	0	0	1
AccÃ¨s aux dÃ©bouchÃ© (Access to outlets)	0	1	0	0	1
Availability of certified inputs	0	0	1	0	1
Availability of lucrative markets is main challenge	0	0	0	1	1
Avoir l'esprit d'entreprise(Have an entrepreneurial spirit)	0	0	0	1	1
Budgetary allocation to the sector	0	0	0	1	1
Coaching et accompagnement des jeunes entrepreneurs(Coaching and support for young entrepreneurs)	0	0	0	1	1
Entrepreneurship skills	0	0	0	1	1
Lack of Agriculture Insurance & Access to Agric inputs	0	1	0	0	1
Limited interest in Agriculture labelling it as dirty job	0	0	0	1	1
Low interest from youth	0	0	1	0	1
Market Access and Development	0	0	1	0	1
Markets for agricultural products	0	0	0	1	1
Mindset on quick returns	0	0	0	1	1
Networking and ICT integration into agriculture	0	0	1	0	1
None	0	0	0	1	1
Poecially or road infrastructure, lack of machinery (espcountry made machinery) access to long term credit with low interest rates. Interest rates on agricultural loans too high, access to land, poor and inadequate inrrigation schemes and access to market irrigation	0	0	0	1	1
Prolonged pandemics such as COVID - 19	0	0	1	0	1
Responsiveness of the market, narrow market base	0	0	0	1	1

Systems that aim at increasing innovation, research and technology development	0	0	0	1	1
Technology adoption and demonstrations. Appropriate Technology is essential	1	0	0	0	1
The country's political environment	0	0	0	1	1
access to funds from the banks	0	1	0	0	1
markets	0	0	0	1	1
policies to protect the entrepreneur (e.g lack of proper IP rights)	0	0	0	1	1
Total	1	4	5	17	27

Link between Perception of Innovation niches and familiarity with the AIS Concept

1.1. Are you familiar with the Agricultural Innovation System (AIS) approach	2.5 National agricultural innovation systems (AIS) should focus on co-developing 'innovation niches' designed to render domestic agriculture more sustainable.					
	Don't know	Completely agree	Agree	Somewhat agree	Not agree at all	Total
No	1	26	5	1	0	33
Yes	2	50	13	2	1	68
Total	3	76	18	3	1	101

Names of responding Stakeholders/Organisations per country

Academic and research institutions (19)	**Count**	**Country**
Center for Scientific and Industrial Research (CSIR) Ghana-Crops Research Institute	1	Ghana
CSIR Ghana -Science and Technology Policy Research Institute (STEPRI)	2	Ghana
Forum for Agricultural Research in Africa (FARA), Ghana	2	Ghana
Gulu University	1	Uganda
IAV Hassan II	1	Morocco
Institute National de la Rercherche Agronomique (INRA) Morocco	1	Morocco
Indaba Agricultural Policy Research Institute, Zambia	1	Zambia
National Agricultural Research Organisation (NARO), Uganda	2	Uganda
SD. Dombo University of Business and Integrated Development Studies	1	Ghana
Science Commn for Tech Adoption at University	1	Uganda
UM5R University Mohammed V Rabat	1	Morocco
University of Energy and Natural Resources, Ghana	1	Ghana
University of Zambia	2	Zambia

Universitat Abdelmalek Essaadi	1	Morocco
Business（18）		
3C Development Management & Entrepreneurship Ltd	1	Zambia
Agri-trust (U) Ltd	1	Uganda
Agrobasics (U) Ltd, Ghana	1	Ghana
Amevor Farms, Ghana	1	Ghana
Degas Ghana Limited	2	Ghana
Good Nature Agro, Ghana	2	Ghana
Home Harvest Uganda / Bakker Brothers	1	Uganda
Horticultural exporters association Uganda limited	2	Uganda
Independent	1	Uganda
Masindi Seed Company Limited, Uganda	1	Uganda
Mulenchi contractors ltd	1	Zambia
NESTLE	3	Ghana
Office Chérifien des Phosphates (OCP Group), Morocco	1	Morocco
Paradise Co-operative Credit Union Limited, Ghana	1	Ghana
PathMark Rural Development Consult	1	Zambia
Business Association	**5**	
African Women in Animal Resource Farming and Agribusiness Network	1	Ghana
AgriEn Network	1	Zambia
Agribusiness Impact Initiative Associates (AIIA)	1	Uganda
Dairy Association of Zambia	1	Zambia
Kalomo Poultry Association, Zambia	1	Zambia
Government	**24**	
Citizen Economic Empowerment Commission	1	Zambia
DEPARTMENT OF VETERINARY SERVICES	1	Zambia
Ghana government	1	Ghana
Golden Valley Agricultural Research Trust	1	Zambia
Harriet Shikoswe	1	Zambia
Haut Commissariat au plan (HCP).	1	Morocco
Ministry of Agriculture (MOA), Zambia	1	Zambia
Ministry of Science, Technology and Innovation (MSTI), Uganda	1	Uganda
Ministry of Food and Agriculture (MOFA), Ghana	1	Ghana
Ministry of Agriculture	2	Zambia
Ministry of Agriculture, Mpika	1	Zambia
Ministry of Fisheries and Livestock	1	Zambia
Ministry of Food and Agriculture	1	Ghana
Ministry of Food and Agriculture	1	Ghana
Ministry of Food and Agriculture - Extension Services	1	Ghana
Ministry of Food and Agriculture / GFAASS	1	Ghana
Ministry of Science, Technology and Innovation	1	Uganda
Ministry of food and agriculture	1	Ghana
MinistÃ¨re de l'Agriculture, de la pÃªche Maritime, de DÃ©développement rural, des eaux et forÃªts (Ministry of Agriculture, Maritime Fisheries, Rural Development, Waters and	1	Morocco

Forests)		
Mitooma District Local Government	2	Uganda
MoFA,ADENTAN MUNICIPAL	1	Ghana
Uganda National Council for Science and Technology	1	Uganda
International organizations	**10**	
Interinatonal Research Orgaisations (7)	***7***	
International Maize and Wheat Improvement Centre (CIMMYT)	1	Zambia
World Agroforestry/ICRAF	1	Zambia
International Food Policy Research Institute (IFPRI)	1	Uganda
International Institute of Tropical Agriculture (IITA)	1	Zambia
International Livestock Research Institute (ILRI)	1	Uganda
International Water Management Institute (IWMI)	1	Ghana
Alliance for a Green Revolution in Africa (AGRA)	1	Ghana
International Non-profit Orgaisations	**1**	
Natural Resource Defense Council (NRDC)		Zambia
Legislature	**1**	
Parliament of Uganda	1	Uganda
NGO and public interest groups	**14**	
Catholic Relief Services	1	Zambia
Development Action Association	1	Ghana
Farmers Organisation Network of Ghana (FONG)	1	Ghana
Impact Horizons, Ghana (taken over operations of Concern Universal)	1	Ghana
Kasisi Agricultural Training Centre	1	Zambia
Livestock Services Cooperative Society	1	Zambia
Peasant Farmers Association of Ghana (PFAG)	1	Ghana
Q-SQURE VENTURES	1	Ghana
Uganda Forum for Agricultural Advisory Services (UFAAS)	1	Uganda
Volunteer Efforts for Development Concerns (VEDCO), Uganda	2	Uganda
We Effect	2	Zambia
Young Professionals for Agricultural Development, Ghana	1	Ghana

*Rank of Stakeholders/Organisation to be considered **familiar** in PART 3 of the surveymonkey*

Uganda:

Affiliation	Organisation	Yes	No	Country
Business	Maganjo Grain Millers	22	1	Uganda
International NGOs	SNV((Dutch Volunteers Foundation)) Uganda	22	1	Uganda
Government	Ministry of Science, Technology & Innovation (MoSTI)	21	2	Uganda
Legislature	Committee on Agriculture, Parliament of Uganda	21	2	Uganda
Academic and Research Institutions	National Council for Science and Technology	20	2	Uganda
Academic and Research Institutions	Gulu University	20	2	Uganda
Academic and Research Institutions	Uganda Industrial Research Institute (UIRI)	20	2	Uganda
International stakeholders	Voulnteer Efforts for Development Concerns (VEDCO)	20	3	Uganda
Legislature	Committee on Agriculture, Animal Industry and Fisheries, Parliament of Uganda	20	3	Uganda
NGOs and Public Interest Groups	Uganda Forum for Agricultural Adivisory Servises (UFAAS)	20	3	Uganda
International stakeholders	HarvestPlus	19	4	Uganda
Legislature	Committee On Science and Technology, Parliament of Uganda	19	4	Uganda
NGOs and Public Interest Groups	Association of Uganda Professional Women in Agriculture and Environment (AUPWAE)	19	4	Uganda
Academic and Research Institutions	International Centre for Research in Agroforestry,(ICRAF)	17	5	Uganda
Legislature	Committee on National Economy, Parliament of Uganda	17	6	Uganda
Business	Agriterra	14	9	Uganda
Government	Masindi District Farmers Association	12	11	Uganda
International NGOs	TRIAS Uganda	9	13	Uganda
Business Associations	Uganda Farm Union	9	13	Uganda
International NGOs	Solidaridad	9	14	Uganda
Business Associations	Hoima District Farmers‟ Association	9	14	Uganda
Business Associations	Rukungiri Kanungu Dairy farmers‟ cooperative union	9	14	Uganda
Business Associations	Uganda Organic Certification Limited (Ugocert)	9	14	Uganda
Business	AgroWays (U) Ltd	8	15	Uganda
Academic and Research Institutions	National Agricultural Research Organisation (NARO)	0	23	Uganda
Academic and Research Institutions	Makerere University	0	22	Uganda
Academic and Research Institutions	The National Agriculture Advisory Services (NAADS)	0	22	Uganda
Business	Uganda Breweries Limited	0	22	Uganda
Government	District Local Government	0	23	Uganda

Mass Media	The Observer	0	23	Uganda
Ghana:				
Academic and Research Institutions	University of Cape Coast, Faculty of Agriculture	33	1	Ghana
Academic and Research Institutions	University of Science and Technology, Kumasi	33	1	Ghana
International Organisation	Food and Agriculture Organisation of the United Nations (FAO)	33	1	Ghana
Government	Ministry for Environment, Science and Technology	32	1	Ghana
Government	Ministry of Food and Agriculture, Ghana (MOFA/GFAASS)	32	1	Ghana
Academic and Research Institutions	CSIR-STEPRI Ghana	31	3	Ghana
Academic and Research Institutions	West Africa Centre for Crop Improvement,Kumasi	27	4	Ghana
Academic and Research Institutions	Ghana Institute of Horticulturist Dept. Of Horticulture, KNUTST Kumasi.	25	9	Ghana
Academic and Research Institutions	Young Professionals for Agricultural Development.(YPARD) --(ING)	21	13	Ghana
NGOs and Public Interest Groups	Ghana farmers Platform	17	17	Ghana
NGOs and Public Interest Groups	Development Action Association (DAA)	13	21	Ghana
NGOs and Public Interest Groups	Concern Universal Ghana	12	22	Ghana
Business	Legacy Crop Improvement Centre	8	25	Ghana
Business	Oikonomia Ltd	1	32	Ghana
International Organisations	Alliance for a Green Revolution in Africa (AGRA)	0	32	Ghana
Zambia:				
Government	Ministry of Food Agriculture and Livestock (MOA)	28	1	Zambia
NGOs and Public Interest Groups	Catholic Relief Services (CRS)	28	1	Zambia
Business Associations	Poultry Association of Zambia (PAZ)	28	1	Zambia
Academic and Research Institutions	Natural Resource Development College (NRDC)	27	1	Zambia
NGOs and Public Interest Groups	SNV	27	1	Zambia
International Organisations	International Centre for Research in Agroforestry, (ICRAF)	27	2	Zambia
Academic and Research Institutions	Zambia College of Agriculture (ZCA)	23	2	Zambia
NGOs and Public Interest Groups	SELF HELP AFRICA	26	3	Zambia
International stakeholders	International Institute of Tropical Agricultural (IITA), DG	25	4	Zambia
International NGOs	Good Nature	15	14	Zambia
Academic and Research Institutions	Zambia Agriculture Research Institute (ZARI/MOA)	0	28	Zambia

Academic and Research Institutions	Golden Valley Agricultural Research Trust (GART)	0	29	Zambia
Academic and Research Institutions	University of Zambia	0	26	Zambia
Government	Ministry of Lands, Natural Resources and Environmental Protection (MLNREP)	0	29	Zambia
Government	Ministry of Agriculture and Livestock	0	29	Zambia
Business Associations	Zambia National Farmers Union	0	29	Zambia
Morocco:				
Academic and Research Institutions	Université Mohamed V	8	1	Morocco
Mass Media	MAP	8	1	Morocco
Government	Conseil Général du Développement Agricole	8	1	Morocco
Academic and Research Institutions	Abdelmalek Essaâdi University	7	2	Morocco
Mass Media	EcoActu	7	2	Morocco
Academic and Research Institutions	Université Hassan II	6	2	Morocco
Business	Agroconcept	6	3	Morocco
Mass Media	Global Media Holding	2	6	Morocco
Mass Media	Le Quid	2	7	Morocco
Government	J-Pal	1	8	Morocco
Academic and Research Institutions	Institut National de la Recherche Agronomique	0	9	Morocco
Academic and Research Institutions	Institut Agronomique et Vétérinaire Hassan 2	0	9	Morocco
Academic and Research Institutions	Moroccan Foundation for Advanced Science, Innovation and Research (MASCIR)	0	9	Morocco
Academic and Research Institutions	Université Mohammed VI Polytechnique (UM6P)	0	9	Morocco
Mass Media	Panorapost	0	9	Morocco
Mass Media	Aujourd'hui le Maroc	0	9	Morocco
Business	OCP Group	0	9	Morocco
Business	InspireCorp	0	9	Morocco
Business	COSUMAR	0	9	Morocco
Business	Groupe Crédit Agricole du Maroc	0	9	Morocco
Government	Conseil Supérieur de l'Education, Formation et la Recherche Scientifiqu	0	9	Morocco
Government	Office National de Sécurité Sanitaire des produits Alimentaires (ONSSA)	0	9	Morocco
Government	Office National Interprofessionnel des Céréales et Légumineuses (ONICL)	0	9	Morocco
Government	Agence Nationale pour le développement des zones oaziennes (ANDZOA)	0	9	Morocco
Government	Office de la Formation Professionnelle et de la Promotion du Travail (OFPPT)	0	9	Morocco
Government	Haut Commissariat au Plan (HCP)	0	9	Morocco
International Organisation	World Bank Group	0	9	Morocco
International Organisation	Young Arab Voices British Council	0	9	Morocco

*Rank of Stakeholders/Organisation to be considered **relevant** in PART 3 of the surveymonkey*

Uganda					
Affiliation	**Organisation**	**Not Relevant**	**Relevant**	**Very Relevant**	**Don't know**
Academic and Research Institutions	National Agricultural Research Organisation (NARO)	NA	5	18	NA
Academic and Research Institutions	Makerere University	NA	9	14	NA
Business	Uganda Breweries Limited	1	17	5	NA
Government	District Local Government	1	10	12	NA
International NGOs	SNV Uganda	NA	13	9	1
Legislature	Committee on Agriculture, Parliament of Uganda	NA	12	10	1
Academic and Research Institutions	Uganda Industrial Research Institute (UIRI)	0	12	9	2
Business	Maganjo Grain Millers	1	17	4	1
Academic and Research Institutions	Gulu University	1	14	6	2
International stakeholders	HarvestPlus	NA	11	9	3
Legislature	Committee On Science and Technology, Parliament of Uganda	NA	7	13	3
NGOs and Public Interest Groups	Uganda Forum for Agricultural Adivisory Servises (UFAAS)	NA	7	13	3
Academic and Research Institutions	National Council for Science and Technology	2	13	6	2
Government	Ministry of Science, Technology & Innovation (MoSTI)	2	9	10	2
Legislature	Committee on Agriculture, Animal Industry and Fisheries, Parliament of Uganda	NA	8	11	4
NGOs and Public Interest Groups	Association of Uganda Professional Women in Agriculture and Environment (AUPWAE)	NA	8	11	4
NGOs and Public Interest Groups	Voulnteer Efforts for Development Concerns (VEDCO)	NA	7	11	4
Academic and Research Institutions	The National Agriculture Advisory Services (NAADS)	5	14	4	0
Legislature	Committee on National Economy, Parliament of Uganda	NA	14	4	5
Mass Media	The Observer	3	15	3	2

International stakeholders	International Centre for Research in Agroforestry, (ICRAF)	1	10	6	4
Government	Masindi District Farmers Association	NA	11	3	8
Business Associations	Hoima District Farmers‟ Association	NA	11	3	9
Business Associations	Rukungiri Kanungu Dairy farmers‟ cooperative union	NA	9	4	9
Business	AgroWays (U) Ltd	NA	9	3	10
Business	Agriterra	NA	5	7	10
Business Associations	Uganda Organic Certification Limited (Ugocert)	2	6	6	8
International NGOs	Solidaridad	NA	7	4	11
Business Associations	Uganda Farm Union	1	8	3	10
International NGOs	TRIAS Uganda(LN)	NA	6	2	12
Ghana					
Academic and Research Institutions	Alliance for a Green Revolution in Africa (AGRA)	0	15	17	0
Academic and Research Institutions	University of Science and Technology, Kumasi	NA	23	10	1
Government	MOFA/GFAASS	NA	16	16	1
International Organisation	FAO	1	15	17	1
Academic and Research Institutions	University of Cape Coast, Faculty of Agriculture	1	22	9	2
Academic and Research Institutions	West Africa Centre for Crop Improvement,Kumasi	1	18	10	2
Academic and Research Institutions	CSIR-STEPRI Ghana	1	18	12	3
Government	Ministry for Environment, Science and Technology	3	16	13	1
Academic and Research Institutions	Ghana Institute of Horticulturist Dept. Of Horticulture, KNUTST Kumasi.	1	19	3	10
Academic and Research Institutions	Young Professionals for Agricultural Development.(YPARD)	2	15	6	11
NGOs and Public Interest Groups	Ghana farmers Platform	NA	12	8	14
Business	Legacy Crop Improvement Centre	2	8	11	22
NGOs and Public Interest Groups	Development Action Association (DAA)	1	11	3	18
NGOs and Public Interest Groups	Concern Universal Ghana	2	9	3	19
Business	Oikonomia Ltd	0	3	0	30

Zambia					
Government	Ministry of Agriculture and Livestock	NA	7	22	NA
Business Associations	Poultry Association of Zambia (PAZ)	1	5	21	1
Government	Ministry of Food Agriculture and Livestock (MOA)	NA	8	20	1
Academic and Research Institutions	Natural Resource Development College (NRDC)	1	9	19	NA
Business Associations	Zambia National Farmers Union	2	8	19	NA
Government	Ministry of Lands, Natural Resources and Environmental Protection (MLNREP)	3	9	17	NA
Academic and Research Institutions	Zambia College of Agriculture (ZCA)	1	9	16	2
Academic and Research Institutions	Zambia Agriculture Research Institute (ZARI/MOA)	NA	14	15	NA
Academic and Research Institutions	Golden Valley Agricultural Research Trust (GART)	1	13	15	NA
Academic and Research Institutions	University of Zambia	NA	14	12	NA
NGOs and Public Interest Groups	SNV	NA	17	9	2
International NGOs	Good Nature	NA	6	8	12
International stakeholders	International Institute of Tropical Agricultural (IITA), DG	2	17	7	3
NGOs and Public Interest Groups	Catholic Relief Services (CRS)	2	17	7	3
Academic and Research Institutions	International Centre for Research in Agroforestry, (ICRAF)	1	16	7	5
NGOs and Public Interest Groups	SELF HELP AFRICA	2	19	5	2
Morocco					
Academic and Research Institutions	Institut National de la Recherche Agronomique	NA	3	6	NA
Academic and Research Institutions	Institut Agronomique et Vétérinaire Hassan 2	NA	3	6	NA
Academic and Research Institutions	Université Mohammed VI Polytechnique (UM6P)	NA	4	5	NA
Business	OCP Group	NA	2	6	NA
Business	COSUMAR	NA	3	6	NA
Business	Groupe Crédit Agricole du Maroc	NA	5	4	NA

Government	Office National de Sécurité Sanitaire des produits Alimentaires (ONSSA)	NA	5	4	NA
Government	Agence Nationale pour le développement des zones oaziennes (ANDZOA)	NA	2	7	NA
International Organisation	World Bank Group	NA	8	1	NA
Academic and Research Institutions	Moroccan Foundation for Advanced Science, Innovation and Research (MASCIR)	1	6	2	NA
Government	Office National Interprofessionnel des Céréales et Légumineuses (ONICL)	1	5	3	NA
Academic and Research Institutions	Université Mohamed V	NA	5	1	2
Mass Media	EcoActu	NA	6	NA	2
Mass Media	Aujourd'hui le Maroc	2	6	NA	1
Government	Conseil Général du Développement Agricole	2	5	1	1
Business	Agroconcept	NA	3	2	3
Mass Media	MAP	3	5	NA	1
Government	Conseil Supérieur de l'Education, Formation et la Recherche Scientifiqu	4	3	2	NA
Government	Office de la Formation Professionnelle et de la Promotion du Travail (OFPPT)	3	2	3	1
Government	Haut Commissariat au Plan (HCP)	3	4	1	1
Academic and Research Institutions	Université Hassan II	1	4	NA	3
Academic and Research Institutions	Abdelmalek Essaâdi University	1	3	NA	3
Academic and Research Institutions	J-Pal	NA	1	NA	6
Mass Media	Global Media Holding	NA	1	NA	6
Mass Media	Le Quid	NA	1	NA	7
Mass Media	Panorapost	NA	NA	NA	8
Business	InspireCorp	NA	NA	NA	7
International Organisation	Young Arab Voices British Council	NA	NA	NA	8

Names of added Stakeholders/Organisation to be considered relevant by stakeholders in PART 3 of the surveymonkey

Stakeholders	**Count**	**Country**
AgriEn Network	1	**Zambia**
Cooperative Department, Zambia Development Agency and Musika	1	**Zambia**

Cooperatives Department (Ministry of Commerce, trade and Industry), Prospero and USADF	1	**Zambia**
Dairy Association of Zambia	1	**Zambia**
Dairy Association of Zambia, Cotton Association of Zambia	1	**Zambia**
INDABA AGRICULTURAL POLICY RESEARC INSTITUTE(IAPRI)	1	**Zambia**
Indaba Agricultural Policy Research Institute, Ministry of Higher Education	1	**Zambia**
Kasisi Agricultural Training Centre, Musika Development Iniatives, Conservation Farming Unit, Indaba Agricultural Policy Research Institute	1	**Zambia**
Livestock Development Trust (LDT)	1	**Zambia**
Ministry of community development and social services	1	**Zambia**
None	1	**Zambia**
Traditional leadership when it comes to allocation f traditional land to farmers	1	**Zambia**
World Vision Zambia	1	**Zambia**
Total	**13**	
Bishop Stuart University	1	**Uganda**
Food & Agriculture Organisation (FAO) of the UN	1	**Uganda**
Horticultural exporters association Uganda limited	2	**Uganda**
KOICA- Project, World Vision, One Acre Fund, PELUM, Plan International-Uganda	1	**Uganda**
Masvingo, Zimbabwe	1	**Uganda**
Private Sector Foundation	1	**Uganda**
Private sector foundation Uganda, Microfinance support centre	1	**Uganda**
Private sector foundation Uganda, NUSAF	1	**Uganda**
The International Livestock Research Institute (ILRI), IFPRI, IITA,	1	**Uganda**
The New Visio and Monitor Newspapers	1	**Uganda**
UBBC, private universities and vocational institutions	1	**Uganda**

Uganda national Agro input dealers Association (UNADA)	1	**Uganda**
Various radio stations in Uganda(both national and regional), other news prints in media like Newvision, monitor, bukedde as well as various Television stations stat	1	**Uganda**
WWF, FAO and Bushenyi district farmers association	1	**Uganda**
abitrust, Innovent Labs Africa LTD	1	**Uganda**
Total	**16**	
Agribusiness Valuechain Federation Ghana	1	**Ghana**
Crops Research Institute, National Seed Trade Addiction of Ghana(NASTAG)	1	**Ghana**
Financial Institutions	1	**Ghana**
GPP: GHANA POULTRY PROJECT	1	**Ghana**
Ghana Chamber of Agribusiness	1	**Ghana**
Innovation/incubation centers such as KOSMOS energy	1	**Ghana**
International water management Institute, already involved in p[rivate sector capcity development for supporting water management in agriculture	1	**Ghana**
N/A	1	**Ghana**
Peasant Farmers Association of Ghana(PFAG) and USAID	1	**Ghana**
University of Energy and Natural Resources, Sunyani	1	**Ghana**
Total	**10**	

ANNEX II: PCA analysis and statistical test

PCA Output (identifying the statements of Part 1 and Part 2 that show the best fit to form a variable)

All countries combined	Comp1	Comp2
Q1_4	0.605	-0.301
Q1_5	0.841	0.532
Q1_6	0.592	0.669

Variables	BC	FA
	Q1_4	Q1_6
	Q1_5	

All countries combined	Comp1	Comp2
Q1_7_a	0.5496680	-0.05625409
Q1_7_b	0.4563561	0.35887945
Q1_7_c	0.3317675	0.61013852
Q1_7_d	0.4990065	0.65788411
Q1_7_e	0.5071256	0.52021929
Q1_7_f	0.7113527	-0.03209007
Q1_7_g	0.7059382	0.24499471
Q1_7_h	0.7090796	-0.38897924
Q1_7_i	0.7393856	-0.36590436
Q1_7_j	0.6029081	0.29418699
Q1_7_k	0.6214600	-0.15356714

Variables	FBC	AB
	Q1_7_a	Q1_7_c
	Q1_7_b	Q1_7_d
	Q1_7_f	Q1_7_e
	Q1_7_g	
	Q1_7_h	
	Q1_7_i	
	Q1_7_j	
	Q1_7_k	

All countries combined	Comp1	Comp2	Comp3	Comp4
q2_1	-0.43164	0.55645	-0.20525	-0.08710
q2_2	-0.25434	0.46809	0.37668	0.58024
q2_4	-0.50067	0.39620	-0.49601	-0.27930
q2_5	0.62975	-0.24864	0.41242	0.25699
q2_6	-0.69203	-0.02230	0.10893	-0.07212
q2_7	0.48415	-0.04652	0.21130	-0.28148
q2_8	-0.40190	0.34517	0.38487	-0.17218
q2_9	0.51599	-0.29268	-0.09039	0.19504
q2_10	-0.37412	0.10740	-0.49174	0.51208
q2_11	-0.45720	-0.51547	-0.31363	0.05429
q2_12	-0.44705	-0.51403	0.47368	0.24649

Variables	ENV	CV	RPOG	ICD
	q2_5	q2_1	q2_6	q2_2
	q2_7	q2_4	q2_8	q2_10
	q2_9		q2_12	q2_11

Principal component analysis(PCA) creates variables that are linear combinations of the original variables. The new variables have the property that the variables are all orthogonal. The PCA transformation can be helpful as a pre-processing step before clustering. PCA is a variance-focused approach seeking to reproduce the total variable variance, in which components reflect both common and unique variance of the variable. PCA is generally preferred for purposes of data reduction (that is, translating variable space into optimal factor space) but not when the goal is to detect the latent construct or factors. Here we we combined the eigenvectors with the highest eigenvalues and construct the variable accordingly. According to above results, we created variables BC, FA, FBC, AB and ENV, CV, PROG, ICD. From intuitive understanding, Q1.1 Q1.8, Q2.3 did not fit the combination with other variables, so we did not include it. Here we also exclude Q1.2 and Q1.3 because we have lower number of participants in Q1.2 and Q1.3(only 77 responded).

Tests for Uganda Survey Only

Number of clusters	Calinski/Harabasz pseudo-F
2	40.220
3	19.900
4	13.120

Everitt et al. (2011) and Gordon (1999) discuss the problem of determining the number of clusters and describe several stopping rules, including the Calinski‑Harabasz (1974) pseudo-F index and the Duda-Hart (2001, sec. 10.10) Je(2)/Je(1) index.

Large values of the Calinski-Harabasz pseudo-F index indicate distinct clustering. Here large values of Calinsk-Harabasz pseudo-F index indicate that 2 clusters are the optimal number for Uganda.

The Mahalanobis Distance tests below also shows that the clusters are sufficiently distinct.

Prob > Mahalanobis Distance for Squared Distance		
Cluster	**1**	**2**
1	1	0.0006
2	0.0006	1

Multivariate Statistics and F Approximations					
Statistic	Value	F-value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.2090	7.1	1	22	0.0006
Pillai's trace	0.7910	7.1	1	22	0.0006
Lawley-Hotelling trace	3.7843	7.1	1	22	0.0006
Roy's largest root	3.7843	7.1	1	22	0.0006
NOTE: F Statistic for Roy's Greatest Root is an upper bound.					
NOTE: F Statistic for Wilks' Lambda is exact.					

The multivariate F-tests (Wilk's, Pillai's, Hotelling-Lawley's, Roy's statistics) showed significant difference among clusters in Uganda.

Univariate Test Statistics				
F Statistics, Num DF=1, Den DF=22				
Variable	R-Square	R-Square/ (1-RSq)	F	Pr > F
CV	0.4772	0.4534	20.079	0.0002
PROG	0.3728	0.3443	13.078	0.0015
ENV	0.0747	0.0326	1.778	0.1963
ICD	0.0598	0.0170	1.399	0.2496
FA	0.2847	0.2522	8.757	0.0072
BC	0.1816	0.1444	4.883	0.0378
AB	0.0559	0.0130	1.303	0.2660
FBC	0.2107	0.1748	5.873	0.0240

For Ghana, univariate tests showed significant mean differences in the variables for "CV", "PROG", "FA", "FBC", "B".

Tests for Ghana Survey Only

Number of clusters	Calinski/Harabasz pseudo-F

2	12.18
3	6.03
4	7.45

Here large values of Calinsk-Harabasz pseudo-F index indicates that 2 clusters are also the optimal number for Ghana.

Prob > Mahalanobis Distance for Squared Distance		
Cluster	**1**	**2**
1	1	0.0003
2	0.0003	1

Multivariate Statistics and F Approximations					
Statistic	Value	F-value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.2445	9.66	1	25	0.0000
Pillai's trace	0.7555	9.66	1	25	0.0000
Lawley-Hotelling trace	3.0901	9.66	1	25	0.0000
Roy's largest root	3.0901	9.66	1	25	0.0000
NOTE: F Statistic for Roy's Greatest Root is an upper bound.					
NOTE: F Statistic for Wilks' Lambda is exact.					

The multivariate F-tests (Wilk’s, Pillai’s, Hotelling-Lawley’s, Roy’s statistics) showed significant difference among clusters in Ghana.

Univariate Test Statistics				
F Statistics, Num DF=1, Den DF=32				
Variable	R-Square	R-Square/ (1-RSq)	F	Pr > F
CV	0.1018	0.0738	3.628	0.0658
PROG	0.0001	-0.0312	0.003	0.9562
ENV	0.0004	-0.0309	0.011	0.9157
ICD	0.2734	0.2507	12.04	0.0015
FA	0.4144	0.3961	22.643	0.0000
BC	0.4315	0.4137	24.289	0.0000
AB	0.0002	-0.0310	0.008	0.9310
FBC	0.0114	-0.0310	0.369	0.5479

For Ghana, univariate tests showed significant mean differences in the variables for “ICD”, ‘FA, “BC”.

Tests for Zambia Survey Only

Number of clusters	Calinski/Harabasz pseudo-F
2	8.86
3	7.79
4	6.92

Here large values of Calinsk-Harabasz pseudo-F index indicates that 2 clusters are also the optimal number for Zambia.

Prob > Mahalanobis Distance for Squared Distance		
Cluster	**1**	**2**
1	1	0.0006
2	0.0006	1

Multivariate Statistics and F Approximations					
Statistic	Value	F-value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.2831	6.65	1	25	0.0002
Pillai's trace	0.7169	6.65	1	25	0.0002
Lawley-Hotelling trace	2.5324	6.65	1	25	0.0002
Roy's largest root	2.5324	6.65	1	25	0.0002
NOTE: F Statistic for Roy's Greatest Root is an upper bound.					
NOTE: F Statistic for Wilks' Lambda is exact.					

The multivariate F-tests (Wilk's, Pillai's, Hotelling-Lawley's, Roy's statistics) showed significant difference among clusters in Zambia.

Univariate Test Statistics				
F Statistics, Num DF=1, Den DF=22				
Variable	R-Square	R-Square/ (1-RSq)	F	Pr > F
CV	0.4772	0.4534	20.079	0.0002
PROG	0.3728	0.3443	13.078	0.0015
ENV	0.0747	0.0326	1.7756	0.1963
ICD	0.0598	0.0170	1.3983	0.2496
FA	0.2847	0.2522	8.7566	0.0072
BC	0.1816	0.1444	4.8829	0.0378
AB	0.0559	0.0130	1.3029	0.2660
FBC	0.2107	0.1748	5.8734	0.0240

For Zambia, univariate tests showed significant mean differences in the variables for “CV”, “PROG”, “FA”, “FBC”, “BC”.