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**Uganda's
Agricultural
Extension Systems:
How appropriate is
the *Single Spine*
Structure?**



Mildred Barungi, Madina Guloba and Annet Adong

MARCH 2016

RESEARCH REPORT NO. 16

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March 2016

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ABSTRACT

Uganda's agricultural extension system has experienced several changes since colonial times. Despite well-intended interventions in extension reforms, a large number of smallholder farmers and other vulnerable groups remain unreached by the various public extension systems, and the private sector plays only a limited role. Numerous organisational performance issues and changing institutional mandates—for example, in the National Agricultural Advisory Services (NAADS)—have hindered the effectiveness and efficiency of the public extension system. These problems include inadequate extension staff, corruption, inadequate funding from the central government, the small number of private-public partnerships, and a continued top-down linear focus on extension, as has been suggested by the new reform of the *Single Spine* extension service system. This paper presents a critical review of the historical and current state of agricultural extension reforms in Uganda based on the Medium Term Expenditure Framework Fiscal Year data for the agricultural sector, the 2014 ATAAS baseline survey dataset and key informant interviews in Kampala. It identifies not only opportunities and challenges but also key policy options for further refining the implementation and effective rollout of Uganda's *Single Spine* extension system.

Key words: Agriculture, extension reforms, *Single Spine*, Uganda

JEL Classification: Q16, Q18

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1. INTRODUCTION

Many farmers in African countries, like in other developing countries, continue to experience obstacles to obtaining consistent, adequate access to agricultural extension services. However, the presence of an effective, efficient extension system is a crucial factor in agricultural development. For farmers to acquire knowledge of new technologies and practices and improve their current practices, dissemination of new developments can be achieved through the provision of an agriculture extension service. Moreover, an extension service serves not only to introduce or enforce agriculture policies but also to report farmers' problems for research purposes (Srivastava and Jaffe 1992).

Today's understanding of extension goes beyond technology transfer to facilitation, beyond training to learning, and includes assisting in the formation of farmer groups, addressing marketing issues, and partnering with a broad range of service providers and other agencies (Davis 2009). As governments explore the option of providing farmers with efficient, cost-effective extension systems, both private and public extension options have been explored (Oladele 2008). Advocates for privatising extension services argue that there is a need for agricultural information to reach farmers at the right time, for the right purpose and in the right place, which is likely to occur if extension is both demand-driven and delivered by a private sector that receives significant public support (Umali and Schwartz 1994). Conversely, the low excludability of agriculture information indicates that it is public in nature and therefore, that it should be publicly managed and funded. Extension systems in countries such as Ethiopia have largely been publicly driven and have ensured that information flow follows a bottom-top approach (Berhanu 2012).

Because agriculture remains a primary growth sector in Uganda, increasing agricultural productivity remains one of the government's most important goals. In 2014, agriculture accounted for approximately 25 percent of Uganda's Gross Domestic Product (GDP), representing more than 40 percent of the country's exports (MoFPED 2014). To achieve Uganda's goal of transforming itself from a low- to an upper-

middle-income country as envisioned in Vision 2040, production and productivity enhancement within the sector remains crucial. Farmers' access to an efficient, effective extension service remains one of the avenues for achieving this goal. Moreover, the link between agricultural productivity and extension services should not be underestimated.

Uganda, like its counterparts in Sub-Saharan Africa, has engaged in numerous reforms in the area of providing extension services, ranging from a commodity-focused extension system (in colonial times) to a farmer demand-driven extension system. In 2015, because of the on-going challenges associated with the latter approach, the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) spearheaded the development of a more integrated, coordinated and harmonised public extension system: the *Single Spine*¹ extension service delivery system. This new system is being rolled out at the district level. Although the *Single Spine* extension system has been approved by the Cabinet, there is little documentation/critique related to whether this system is clearly distinct from or complementary to Uganda's previous approaches to agricultural extension. This paper discusses this new initiative's efficacy in fulfilling farmers' extension needs.

It is from this perspective that this paper addresses several related issues regarding Uganda's agricultural extension services. First, it analyses the entire spectrum of extension services delivery systems that have been provided from colonial times to the present. This analysis provides a foundation for shaping the *Single Spine* as a way forward. First, the paper articulates the effectiveness of Uganda's predecessor extension systems in attaining their goals, documenting their successes and challenges. Institutional frameworks and stakeholders involved are highlighted, along with whether Uganda's approaches to extension were different or complementary in terms of their formulation and implementation. Documented grey literature and key informant interviews (KIIs) are helpful in satisfying this objective. Second, the paper discusses the effectiveness of the provision of extension services by investigating aspects of funding, farming practices by crop type, and the extent and level of access to and utilisation of extension services. To investigate the

issue of funding, the study uses administrative data from the Ministry of Finance, Planning and Economic Development (MoFPED). Other issues are discussed based on survey data from the 2014 Agricultural Technology and Agribusiness Advisory Services (ATAAS) gathered by the Uganda Bureau of Statistics (UBoS). Finally, the paper leverages its findings to review and critique Uganda's *Single Spine* systems.

The remainder of this paper is structured as follows. Section 2 outlines the approach and data used in the analysis. Section 3 reviews the history of agricultural extension reforms in Uganda, highlighting their success, challenges and opportunities. Section 4 is the anchor of the paper, providing findings and discussing results related to key issues in extension involving financing, cropping methods, access, lessons from elsewhere/within, and the *Single Spine* mechanism. Conclusions and policy recommendations for strengthening *Single Spine* implementation are highlighted in section 5.

2. DATA AND METHODS

This paper utilises data from various sources. First, data on financing modalities in the agricultural sector (particularly with respect to extension services) are obtained from the Medium-Term Expenditure Framework (MTEF) produced by the MoFPED on a fiscal year basis. This information is used to investigate the government's commitment to funding extension services and aims to enhance agricultural production and productivity.

Second, data on various extension indicators are obtained from the ATAAS baseline survey conducted by UBoS in 2014 over a period of four months. The survey covered all of Uganda's 112 districts; households were selected from 900 enumeration areas (EAs), using the 2012 Uganda Population and Housing Census Mapping Frame.² A two-stage stratified sampling design was used.³ The sample covered 11,881 agricultural households nationwide. The survey administered three modules: the household module, the community service provider module, and the community service recipient's module. The household module is relevant to this paper. This module collected information about household members' individual characteristics. With

respect to agriculture, information was collected on agronomic and soil fertility management practices, marketing information, and access to agricultural extension services. All of the estimates based on the ATAAS dataset are weighted using the sample weights provided by UBoS.

Third, to substantiate some of this paper's key findings, information gathered from key informant (KI) interviews conducted between April to August 2015 is used. Most of the targeted KIs were members of the committee that drafted the *Single Spine* extension system while being expected to monitor and coordinate its implementation. The other stakeholders included development partners, civil society organisations (CSOs), and non-governmental organisations (NGOs) with an interest in the provision of agriculture extension services (see Questionnaire Guide and List of KIs in Annexes IV and V, respectively).

3. HISTORY AND INSTITUTIONS IN AGRICULTURAL EXTENSION PROVISION IN UGANDA

According to Semana (1998) agricultural extension in Uganda began during the early colonial period (1898-1907) with the importation of cash-crop planting materials such as coffee, cotton, rubber, and tobacco. During this same period, research stations were put into place to conduct agriculture and forestry research. Nonetheless, extension services were not taken seriously until 1920-1958, when chiefs used their status to coerce (rather than to educate) farmers to use good husbandry practices and proper land use to ensure food security. In addition, extension was considered an economic necessity through which the colonial administration required agricultural produce as raw materials for British industry. Thus, chiefs were solicited as expatriate field officers and instructors to engage in extension work such as distributing planting materials and communicating messages about how to grow the above-described crops (ibid).

From 1956-1963, Uganda shifted to providing extension through progressive farmers. Here, as Semana (1998) explains, technical advice and

support were emphasised in form of inputs and credit to selected progressive farmers. Peer-to-peer farmer demonstrations were observed to foster agricultural production and productivity. Although this approach was deemed effective in situations involving an inadequate number of trained extension staff, questionable criteria were used to select farmers, many of whom abused the special support (i.e., credit and subsidised inputs) that they received. In some instances, farmers were found to be uncooperative and unwilling to educate their colleagues. The selected progressive farmers were looked at as a privileged group by others, alienating them and rendering the initiative unproductive. Thus, the extension model of providing services through progressive farmers—also called the technology transfer model (Comptom 1989) was unsustainable. It was a one-way communication model in which technologies/innovations relied on the extension worker and therefore lacked continuity (feedback). Overall, this element contained an element of selfishness and created divisions among farmers.

Because of the failure of the previous extension model, new extension methods were introduced in 1964-1972 that promoted two-way communication. In 1964, the United States Agency for International Development (USAID) began to provide financial assistance through the Ministry of Agriculture and the extension approach changed to helping farmers to help themselves through education. This objective was achieved by giving field tours to farmers with similar farming characteristics, fostering peer-to-peer learning and providing radios, television, posters, group farms, field trials, district farm institutes and experimental stations. This approach promoted “technology development and dissemination”. In 1972, however, Uganda experienced a period of political turmoil, and the country's extension services lay dormant from 1972-1980. Uganda's lack of an extension-services policy partly led to disorganisation and low productivity as extension slipped into a form in which inputs were distributed to farmers (for example, through the National Agricultural Advisory Services (NAADS), which are discussed later in the paper), thus impairing the delivery of goods and services.

As a result, 1981-1991 was marked as a recovery period in extension services, with an initial emphasis

on infrastructure rehabilitation and the restoration of basic services, with aspects such as institutional organisation and education factored in at a later date. However, there were no significant improvements in the extension service's performance over this entire period because of issues related duplication, conflict and confusion: several ministries and NGOs were performing the same job, and many parallel extension-service approaches were implemented (Semana 1998). The lesson here is that the system suffered from too many uncoordinated actors, each of which took action based on its own objectives. Such implementation frameworks led to the wasteful use of resources that could have been consolidated to achieve much better results.

Unified Extension System: In 1990, as a result of the parallel approaches to extension implementation seen in the 1981-1991 period, the World Bank supported the government of Uganda (GoU) in creating a new policy on the provision of agricultural extension services. Therefore, three ministries (i.e., Ministry of Agriculture; Ministry of Animal Industry; and Ministry of Fisheries) were merged in 1992 to create the present Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Following the merger, overall responsibility for agricultural extension was consolidated into a Unified Extension System (UES). The objective of this consolidation was to increase public extension programmes' efficiency and effectiveness by eliminating duplicative efforts. The UES followed the “train and visit” approach and recruited extension workers at the district level. These workers were supposed to transverse the entire district and provide farmers with advisory services. With a required extension ratio of one extension worker to 33,000 farmers; the system had too few extension workers to meet with all of the farmers. In addition, challenges such as the system's supply-driven, top-down nature, a weak management and financial control system, inadequate funding (the scope of which was limited by poor facilitation), and centralised implementation and concentration of resources at MAAIF headquarters. Given the challenges experienced by the UES, its performance was rated unsatisfactory because the system failed to respond sufficiently to farmers' needs.

Despite the UES's frustrating results, its work

continued. During the late 1990s, however, the provision of extension services was decentralised, i.e., both financial and administrative responsibilities were transferred to local governments. The purpose of decentralisation was to address issues created by the centralised nature of the UES, particularly its failure to transfer resources to local governments. However, even the decentralised UES system experienced numerous challenges, primarily budget constraints. Consequently, extension agents at the local government level were not adequately facilitated to provide services to farmers (Sserunkuuma and Pender 2001; Enyipu et al. 2002). In addition to the inadequacy of funds, the decentralised UES was criticised for having inadequate numbers of field extension workers, limited private-sector involvement, limited access to inputs and markets, and insufficient response to farmers' needs. The UES framework provides key lessons to inform the *Single Spine* approach.

National Agricultural Advisory Services: The period from mid-2001 to the present has been marked with a shift in approach from a supply- to a demand-driven system, resulting in the creation of the National Agricultural Advisory Services (NAADS) as one of the seven pillars of the Plan for the Modernisation of Agriculture. Nonetheless, the UES continued to exist alongside the NAADS programme, once again creating parallel systems. Essentially, the NAADS programme was decentralised, largely farmer-owned (through formation of farmer groups) and private sector-led in terms of the provision of advisory services.⁴ In terms of institutional arrangement, NAADS implementation followed the village-level approach to farmer mobilisation. At the village level, NAADS enabled the formation of Village Farmer Forums (VFF), which included members of farmer groups in the village. Seven members of the VFF comprised the VFF Executive, whose responsibilities included the identification of VFF members' advisory service needs (NAADS Secretariat 2010). This structure was intended to enable the easy identification and flow of farmer extension needs, but in practical terms, it was never used.

Furthermore, during NAADS implementation, public research and education institutions [National Agricultural Research Organisation (NARO), Agricultural Research Information System (ARIS) and

Zonal Agricultural Research and Development Institutes (ZARDIs), Agricultural and Research Development (ARD), Council for Scientific and Industrial Research, Sasakawa Africa Fund for Extension (SAFE) and Makerere University] were independent of NAADS, but continued to support the provision of extension services by providing both human resources and research and technology. Consequently, direct research and extension linkages were broken. Farmer-based organisations and cooperatives, including the Uganda Cooperative Alliance (UCA) and the Uganda National Farmers Federation (UNFFE), remained more active in the provision of extension services. It should be noted that NAADS was supposed to create better linkages among researchers, advisors and farmers (MAAIF 2000).

Nonetheless, like other extension initiatives, during its more than 12-year tenure, NAADS was associated with a myriad of challenges that caused inefficiencies in the delivery of extension services. According to an MAAIF (2010) assessment, these challenges included inadequate funding, an inconsistent flow of funds, poor accountability, limited transparency, corruption (especially in the procurement of inputs), local government-based service providers' inadequate numbers and technical capacities, limited out-reach of farmers, political interference, and deviation from the original core goal of offering advisory services to farmers as input provision. The NAADS programme continues to be operational as the government institution that primarily provides farmers with agricultural inputs and value-addition equipment. One KI stated:

"This change in the mandate of NAADS is illogical and it is thought that NAADS was better placed institutionally to retain the role of advisory service provision." (KII 2015)

The change in NAADS' mandate led to the restructuring of the ATAAS project, which is a five-year, Uganda-initiated project funded by the World Bank, with the primary objective of both increasing participating households' agricultural productivity and incomes and improving Uganda's agricultural research and advisory services' performance while enhancing both environmental sustainability and resilience to climate

risks and land degradation. Through GoU/MAAIF, this project is being operationalised in the agriculture sector as the Development Strategy and Investment Plan (DSIP) in collaboration with NARO and NAADS. However, following changes in NAADS' institutional mandate, that agency no longer implements the advisory/extension component of the ATAAS project. Implementation has been transferred to MAAIF and NARO. Furthermore, some workers have been transferred from the NAADS Secretariat to MAAIF to support project implementation. To provide a fuller explanation of the project, its structure is described in Annex I.

Finally, in mid-2013, an inter-ministerial technical committee (composed of MAAIF; MoFPED; the Ministry of Tourism, Industry and Cooperatives (MTIC); the Ministry of Local Government (MoLG); and the Ministry of Public Service (MoPS)), was formulated to create a path forward for Uganda's provision of extension services following NAADS' failure to do so. The committee's assessment concluded that NAADS had failed to adequately address farmers' needs, therefore recommending that MAAIF establish an integrated, coordinated and harmonised public extension system known as the *Single Spine* agricultural extension service delivery system.⁵ This new extension approach was adopted in June 2014 with the aim of not only streamlining the agricultural extension system but also addressing the constraints experienced by smallholder farmers. A detailed synthesis of the *Single Spine* is provided in sub-section 4.5.

The historical review of Uganda's provision of extension services describes a system that has undergone several reforms in the provision of agricultural extension services. The implementation of several extension reforms is not unique to Uganda; numerous developing countries in sub-Saharan Africa have followed the same trajectory (Davis 2009). Reforms in the extension system have included privatisation, decentralisation, outsourcing and participatory- or demand-driven aspects (Davis 2009). One major issue in all of these approaches is that research-extension linkages are critical to sustaining farmer agricultural production and productivity. Farmer-centred and two-way communication that allows for a feedback mechanism from farmers to researchers and

vice versa is necessary for up-take. It is also noted that past extension-system reforms failed to solve critical challenges such as, inter alia, inadequate funding, a low extension worker-to-farmer ratio, the use of inefficient service-delivery approaches, a weak research-extension-farmer linkage, and poor coordination of institutions. Countries such as Uganda should focus on "best fit" models that are location-specific, participatory, and sustainable, and "smart", not "best practices" (imported and standardised) models (Ibid). Long-term extension initiatives should address the root causes of low productivity and adapt to climate change through the use of cutting-edge technologies.

4. EFFECTIVENESS OF THE EXTENSION SERVICE PROVISION

This section highlights financing gaps in Uganda's provision of extension services and the implications of those gaps for *Single Spine* implementation. For any successful programme to succeed, adequate and timely financing modalities are essential. Because most of Uganda's extension systems have been affected by inadequate funding, a factor that partially explains reports that those services have had only a limited reach, it is necessary to analyse the financing-gap trend and its future implications for general extension provision. Furthermore, section 3 demonstrated that extension service providers had limited capacity to respond to farmers' needs, thus necessitating insights into current farming practices to support the generation of technologies and advisory messages that correspond to farmers' revealed needs based on evidence. This section also presents findings on access to extension and advisory services, discusses the level of farmer reach for extension services, and specifies the types and sources of extension/advice. This information can help inform proper extension targeting according to agro-ecological zone. Finally, this section examines the NAADS extension model together with selected models used in Ethiopia and India to draw lessons for Uganda's *Single Spine* system, assessing the feasibility of the *Single Spine* system.

4.1 Financing agricultural extension services

This sub-section provides insights into public funding of agriculture and extension service provision based on MTEF provisions (see Table 1).

Public funding for MAAIF has been geared towards wages; such funding has steadily increased from 1.23 percent in 2009-2010 to 1.71 percent in 2014-2015 (Table 1). In addition, domestic development expenditures have averaged approximately 10.4 percent over the same period and are projected to increase by 1.2 percentage points in 2015-2016. These expenditures remain very low compared to the average 18.5 percent public development expenditure for the NAADS secretariat and are projected to increase to 44.48 percent in 2015-2016. This clearly shows that administrative functions are much stronger at the NAADS level than at MAAIF headquarter. As a result of decentralisation and the assumption of NAADS activities at the district level, statistics also indicate that development expenditure has been highest at the NAADS district level, which was more than 50 percent of public expenditures in the agriculture sector in 2009-2010 but has declined steadily to 6.67 percent in 2014-2015 and is projected to be 0 percent in 2015/16 (Table 1). The funds were primarily used to establish NAADS demonstration centres, many of which either existed only on paper (but not on the ground) or were non-functional because of the limited human capital available to manage them.

Although agricultural extension service provision should have been the core activity at the district level, public expenditures do not reflect these services as a priority. District Agricultural Extension (DAE), the arm of government at the local level, generally did not receive funds to carry out development activities at the grassroots (Table 1). It was not until 2011/12 that DAE began to receive public support. It is important to note that even the projected public expenditure budget for 2015/16 does not include support to DAE domestic development activities despite the 2014 termination of NAADS' provision of extension services. Nevertheless, LGs receive a production and marketing grant, which they spend on capital development (e.g., procuring planting materials) and facilitating extension workers. The grant is conditional and only 45 percent

of it is intended to facilitate extension workers. The large number of LGs among which the grant is divided implies that farmers will continue to be deprived of government extension service support, even with the implementation of the *Single Spine*. In addition, lack of an approved budget at the DAE level for domestic development activities in 2015/2016 indicates that as of 2015, the prospects of the *Single Spine* extension system playing a successful role are doomed. Even if other extension support organs such as production and marketing grants are included, the total public funding of extension services remains low. NARO and NAGRCDB, the research arm that supports agriculture, have also received limited government support. Most research funds come from external financing (not reported here).

In conclusion, government allocations (excluding external support) to the entire agriculture sector remain low (US\$ 344.44 billion in 2014/15, projected at US\$ 388.25 billion in 2015/16), at 2 percent of Uganda's national budget. Moreover, the largest proportion (over 46.10 percent) of the sector's budget for FY 2015/16 is projected to go to the NAADS Secretariat to procure and distribute inputs to farmers through the Operation Wealth Creation programme. MAAIF headquarters, which has a mandate to coordinate and provide extension services, is projected to receive only 24 percent of the sector's public budget (Table 1). Given that Uganda's previous extension systems suffered from inadequate funding, this challenge is likely to persist in the implementation of the *Single Spine* extension system, which operates directly under MAAIF.

Table 1: Public expenditure budget for agricultural extension (Ush. Billion)

	Percent allocation (%)											Total (Ushs bn)
	MAAIF	DDA	NAGRCDB	NARO	NAADS Secretariat	UCDO	UCDA	District Agricultural Extension	NAADS (Districts)	Production and Marketing Grant	KCCA Agricultural Grant	
2009/10 outturn												
Wage	1.23	0	0	0	0	0	0	0	0	0	0	2.52
Non-Wage recurrent	5.37	0	0	2.9	3.12	2.79	0.43	0	0	2.47	0	34.95
Domestic development	11.15	0	0	8.57	5.18	0	0	0	57.29	0	0	168.2
<i>Total exl external financing</i>	<i>17.75</i>	<i>0</i>	<i>0</i>	<i>11.47</i>	<i>8.31</i>	<i>2.79</i>	<i>0.43</i>	<i>0</i>	<i>57.29</i>	<i>2.47</i>	<i>0</i>	<i>204.64</i>
2010/11 outturn												
Wage	1.34	0	0	0	0	0	0	0	0	0	0	3.88
Non-Wage recurrent	6.65	0	0	8.75	2.21	1.97	0.3	0	0	0	3.51	67.68
Domestic development	9.83	0	0	3.42	16.24	0	0	0	45.78	0	0	217.79
<i>Total exl external financing</i>	<i>17.82</i>	<i>0</i>	<i>0</i>	<i>12.18</i>	<i>18.44</i>	<i>1.97</i>	<i>0.3</i>	<i>0</i>	<i>45.78</i>	<i>0</i>	<i>3.51</i>	<i>289.35</i>
2011/12 outturn												
Wage	1.32	0.32	0	6.82	0.71	0	0	1.11	0	0	0.01	30.33
Non-Wage recurrent	5.91	1.12	0	1.77	1.41	1.94	0.39	0	0	3.41	0.03	47.08
Domestic development	9.65	0	0	3.24	15.86	0	0	0	44.56	0	0.41	217.14
<i>Total exl external financing</i>	<i>16.88</i>	<i>1.45</i>	<i>0</i>	<i>11.83</i>	<i>17.98</i>	<i>1.94</i>	<i>0.39</i>	<i>1.11</i>	<i>44.56</i>	<i>3.41</i>	<i>0.46</i>	<i>294.55</i>
2012/13 Approved budget												
Wage	1.8	0.31	0	5.07	0.69	0	0	1.32	0	0	0.01	27.96
Non-Wage recurrent	4.86	1.01	0	3	1.35	0.46	0.96	0	0	4.98	0.03	50.62
Domestic development	11.65	0	0	3.14	15.37	0.72	0	0	43.19	0	0.4	226.34
<i>Total exl external financing</i>	<i>18.31</i>	<i>1.33</i>	<i>0</i>	<i>11.22</i>	<i>17.41</i>	<i>1.19</i>	<i>0.96</i>	<i>1.32</i>	<i>43.19</i>	<i>4.98</i>	<i>0.44</i>	<i>303.92</i>
2013/14 Approved budget												
Wage	1.87	0.5	0.44	6.02	0.67	0	0	1.65	8.54	0	0.01	62.09
Non-Wage recurrent	7.57	0.78	0.65	2.78	0.66	0.44	2.51	0	0	4.49	0.03	62.75
Domestic development	10.27	0.32	0	1.95	13.63	0.7	0	0	33.12	0	0.39	190.17
<i>Total exl external financing</i>	<i>19.71</i>	<i>1.6</i>	<i>1.1</i>	<i>10.75</i>	<i>14.96</i>	<i>1.14</i>	<i>2.51</i>	<i>1.65</i>	<i>41.66</i>	<i>4.49</i>	<i>0.43</i>	<i>315.02</i>
2014/15 Approved budget												
Wage	1.71	0.46	0.41	5.51	0.63	0	0	1.32	6.04	0	0.01	55.4
Non-Wage recurrent	7.17	0.72	0.6	2.55	1.19	0.4	2.3	0	0	4.11	0.02	65.6
Domestic development	9.66	0.29	0	2.65	44.61	0.64	0	0	6.67	0	0.35	223.44
<i>Total exl external financing</i>	<i>18.54</i>	<i>1.46</i>	<i>1</i>	<i>10.7</i>	<i>46.43</i>	<i>1.04</i>	<i>2.3</i>	<i>1.32</i>	<i>12.7</i>	<i>4.11</i>	<i>0.39</i>	<i>344.44</i>
2015/16 budget projection												
Wage	1.44	0.4	0.49	4.89	0.56	0	0	4.19	0	0	0.01	46.55
Non-Wage recurrent	10.91	0.64	0.58	2.26	1.05	0.36	7.19	0	0	3.64	0.02	103.46
Domestic development	11.66	0.26	0	2.35	44.48	1.01	0	0	0	0	1.6	238.23
<i>Total exl external financing</i>	<i>24.01</i>	<i>1.3</i>	<i>1.07</i>	<i>9.5</i>	<i>46.1</i>	<i>1.37</i>	<i>7.19</i>	<i>4.19</i>	<i>0</i>	<i>3.64</i>	<i>1.64</i>	<i>388.25</i>

* Excluding taxes and arrears

Notes: Diary Development Authority (DDA); National Animal Genetics Resource Centre and Data Bank (NAGRCDB); Kampala Capital City Authority (KCCA); Ministry of Agriculture, Animal, Industry and Fisheries (MAAIF); National Agricultural Advisory Services (NARO); Uganda Coffee Development Authority (UCDA); Uganda Cotton Development Organisation (UCDO).

Source: Budget to the Budget Reports, MoFPED

4.2 Farming practices and priority areas for extension service provision.

To equip extension service providers with the correct information about how best to enhance the knowledge that farmers already possess and to advise them on new or improved approaches to farming, it is vital to understand farming practices. Thus, to manage the aspect of farming practices by crop type, 2014 ATAAS data are employed. The results are discussed in terms of three major farming practices: i) agronomic management practices; ii) soil fertility-management practices; and iii) post-harvest handling and marketing information practices.

4.2.1 Agronomic management practices

Table 2 presents summary statistics on farmers' agronomic practices by crop type. The findings indicate that practices vary by crop type. Specifically, practices such as weeding, row planting and seed selection were the most commonly employed agronomic practices. Other than weeding, which was common, the intensity of use of the latter two practices varied by crop type. For example, seed selection is critical when growing cereals (e.g., maize) and legumes (e.g., groundnuts and beans), with more than 50 percent of farmers indicating that they grew specific types of seeds.

Nevertheless, for crops such as coffee and banana varieties, seed selection was less specific, probably because these crops are perennial. Farmers were primarily growing the improved variety of maize, cassava and groundnuts and to certain extent, sweet bananas. Practices such as pruning, de-suckering and gap filling were more common in banana varieties and coffee, whereas grafting and budding was the least employed agronomic management practice (only applicable to sweet bananas). This result could be attributed to either less information about farming practices or the mind-set that these crops are genetically modified foods, which are less valuable on the local and international markets. Generally, there is low application of herbicides and pesticides across crop types, other than Irish potatoes, which stand out. Evidently, some households do not observe proper agronomic practices, highlighting the need for extension and advisory services in this aspect.

4.2.2 Soil fertility management practices

Table 3 presents soil fertility-management practices that farmers employ by crop type. It is noteworthy that 13.9 percent of farmers apply chemical fertilisers when they grow Irish potatoes, followed by coffee at 8.4 percent and maize at 8 percent. Almost no Ugandan farmers apply chemical fertiliser during

Table 2: Agronomic management practices employed by crop type, 2013

Crop type	Seed Selection	Improved Crop	Herbicide	Pesticide	Row Planting	Weeding	Gap Filling	Pruning	De-Suckering	Grafting and Budding
Rice	38.9	14.6	7.3	6.2	19.1	95.6	4.9	1.0	1.4	0.3
Maize	55.7	21.0	7.7	9.0	81.9	98.2	18.7	3.4	0.8	0.0
Milliet	29.8	6.3	0.0	0.3	6.2	97.4	1.7	2.2	0.0	0.0
Sorgum	45.7	2.2	0.3	0.6	3.1	95.4	1.1	2.0	0.1	0.0
Bean	58.1	11.0	5.6	7.5	34.6	97.2	4.1	0.9	0.2	0.0
Ground Nuts	59.8	15.5	2.9	7.2	49.6	98.2	2.7	0.5	0.1	0.0
Irish Potato	30.9	10.6	6.4	21.3	54.9	97.9	2.0	0.6	0.0	0.0
Sweet Potatoe	22.8	6.2	3.8	3.4	47.0	95.4	3.8	1.4	0.2	0.0
Cassava	25.3	20.1	3.0	2.1	76.9	95.3	16.9	1.8	0.6	0.0
Banana Food	13.6	4.3	3.8	2.3	28.8	96.4	22.3	50.9	73.2	0.4
Sweet Banana	17.5	3.5	6.6	0.8	16.6	97.6	25.7	51.8	72.0	0.0
Banana Sweet	19.5	13.9	3.9	2.9	34.8	91.7	29.7	41.9	67.3	7.5
Coffee	18.6	8.9	9.2	12.9	33.9	95.4	19.7	63.5	8.7	1.3

Note: Data are based on first cropping season
Source: Authors' calculations based on 2014 ATAAS data

sorghum and sweet banana planting. Kizza and Mbowa (2015) reveal that the generally low use of chemical fertilisers is partly attributed to the presence of low-quality chemical fertilisers on the market. According to laboratory analysis of fertiliser samples, commonly used fertilisers (NPK, Urea, DAP and CAN) that are sold on the market contain lower nutrient content than indicated on their packages.

Organic fertilisers—which include animal manure, green manure, composite and organic residue management, and mulching—were the most commonly employed forms of soil fertility-management practices. These fertilisers were often applied by households that are heavily involved in all types of banana (leading food crop) and coffee (leading cash crop) farming (Table 3). Rhizobia is more commonly used with legumes (groundnuts and beans that are often intercropped with maize). Because many farmers do not use fertilisers, the sustainability of rhizobial boosters is an important aspect of soil-fertility maintenance. Indeed, farmers assert that cereals were healthier and higher yielding when grown after a legume. Although irrigation is a good idea to ensure crop growth and good yield all year around, especially in a changing climate, it is very

expensive to implement and thus the least employed soil fertility-management method. Irrigation is more common in rice production because rice is found in swampy areas and farmers grow rice in large irrigation schemes (Doho and Kibimba) that cover irrigation machinery repair and maintenance costs.

Proper soil fertility-management practices are critical in agricultural production and productivity. Farmers realised that continuous application of chemical fertilisers, without the addition of farm-yard manure, resulted in soil degradation and ultimately, a decline in productivity (Bista et al. 2010). They further argue that farmers' low technical knowledge of new soil fertility-management practices coupled with resource constraints aggravated the problems of land degradation and soil-fertility deterioration.

In conclusion, most of Uganda's farming households have not adopted soil fertility-enhancing practices, suggesting that this is a critical area of intervention during implementation of the *Single Spine* extension reform. In a related development, MAAIF, in collaboration with the Economic Policy Research Centre (EPRC), has formulated a draft policy and

Table 3: Soil fertility management practices employed by crop type, 2013

Crop type	Chemical Fertilizer Application	Animal Manure	Green Manure	Rhizobia	Composting and Organic Residue Management	Mulching	Trenches/ Terraces/ Grass Bands	Irrigation
Rice	4.22	0.40	2.42	0.00	0.17	0.08	5.91	1.38
Maize	8.00	6.56	6.08	1.95	1.94	2.78	6.66	0.02
Milliet	0.78	2.50	6.08	0.31	1.39	1.31	1.42	0.00
Sorghum	0.01	2.78	5.06	0.94	2.39	0.78	5.08	0.04
Bean	4.79	7.40	5.81	4.04	3.28	3.51	8.95	0.06
Ground Nuts	1.53	2.75	5.22	1.60	1.23	1.19	2.23	0.00
Irish Potato	13.86	5.03	5.86	0.09	5.62	0.93	18.34	0.00
Sweet Potatoe	1.48	3.69	6.68	0.01	2.51	2.18	3.54	0.00
Cassava	1.13	3.94	7.96	1.31	1.65	2.26	3.51	0.01
Banana Food	2.05	28.35	9.05	0.79	10.44	39.92	16.94	0.18
Sweet Banana	0.00	19.65	3.51	0.00	8.25	30.25	1.96	0.00
Banana Sweet	1.35	19.97	6.41	0.00	8.74	25.26	2.85	0.40
Coffee	8.44	26.99	8.36	0.56	7.92	19.01	19.61	0.35

Note: Data are based on first cropping season
Source: Authors' calculations based on ATAAS baseline survey dataset, 2014

designed a strategy aimed to increase the availability and use of fertilisers in Uganda. Both documents are nearing Cabinet approval.

4.2.3 Post-harvest handling and market information practices

Table 4 shows that the most commonly employed post-harvest handling practices for seed crops (rice maize, millet, sorghum, beans, ground nuts and coffee) include drying methods, storage facilities and sorting. Other crops included cassava and sweet potatoes. All of the farmers engaged in these practices were equally aware of market information such as where to sell and the output market price. Although threshing/shelling is more commonly used on rice, it has not been widely adopted for other shelled crops. Table 4 further reveals that pest control and collective marketing were among the least-used methods during post-harvest handling and marketing, respectively. Their low use could be attributed to the high levels of investment/capital and trust that are required, especially in collective group marketing. Selling in cooperatives could be the answer. Evidence shows that farmers who have better post-harvest handling practices and are aware of market needs receive better output prices on the product markets. Many losses are observed at this stage of agricultural production and therefore, Ugandan extension service providers should give added emphasis on this aspect and offer training to farmers.

A key informant noted:

"Agriculture extension is the heart and soul of the economy. Technology generation (seeds, chemical fertiliser) is not the problem, it is the use of the technologies; are farmers doing it right?"(Kills 2015)

4.3 Access to agricultural extension and advisory services

Table 5 describes the characteristics of farmers who had access to extension services in 2011 and 2013. The T- statistic in the last column of Table 5 gives the statistically significant differences in the variable of interest with regard to extension service provision between the two recall periods. The discussion below focuses more on the significant T-statistic results. Hence:

Access to agricultural advisory services: The number of farmers seeking agricultural information increased significantly from 54.5 percent in 2011 to 60.4 percent in 2013. This could be attributed to the increased awareness of the NAADS programme at the grassroots level. There is a significant increase in the share of farming households sourcing advice from fellow farmers, NAADS service providers, NGOs/CBOs (community-based organisations), radio and call centres over time. There is need for advisory services to use Internet and trader/input supplier levels to send informa-

Table 4: Post-harvest handling/marketing information methods by crop type, 2013

Crop type	Drying Methods	Threshing/ Shelling Equipment	Storage Facilities	Pest Control Methods	Sorting	Output Prices	Where To Sell	Collective Marketing
Rice	47.4	11.7	50.5	3.9	30.3	29.4	36.2	5.5
Maize	37.4	8.7	45.7	7.1	26.0	19.1	21.9	2.6
Milliet	35.1	3.2	54.8	1.4	27.6	11.3	18.5	4.9
Sorghum	30.6	1.2	29.1	1.9	27.6	4.2	7.1	1.5
Bean	40.2	4.0	44.1	9.0	24.5	14.8	16.1	1.0
Ground Nuts	33.8	1.5	44.3	4.0	25.3	15.8	19.0	2.2
Irish Potato	0.9	0.0	12.5	4.8	6.6	11.5	14.2	0.0
Sweet Potatoe	1.8	0.1	15.7	0.4	7.0	3.2	4.3	0.8
Cassava	19.5	0.6	27.5	1.0	11.2	10.3	14.6	1.7
Banana Food	0.5	0.1	7.7	1.8	5.4	13.8	14.6	0.3
Sweet Banana	0.0	0.0	0.9	2.6	5.8	13.4	9.9	0.0
Banana Sweet	0.0	0.0	3.8	2.6	25.7	26.2	27.5	5.0
Coffee	34.8	5.0	29.0	1.4	8.2	25.4	25.9	2.6

Note: Data are based on first cropping season
Source: Authors' calculations based on 2014 ATAAS data

tion back to farmers about what the market requires.

Farmer groups: Despite an observed increase in the number of households belonging to farmer groups in absolute terms, there were no significant differences between 2011 and 2013 even across gender. Testing for within-year gender differences indicates that whereas in 2011 there was no significant difference between males and females in belonging to a farmer group, in 2013 more males were likely to be in a farmer group than females; this result is statistically significant at 10 percent. This could signal either that the NAADS farmer group model is not working or that uptake is slow. A key informant substantiates this finding by asserting the following:

“The conditions of joining NAADS farmer groups were quite stringent (e.g., opening a bank account, co-funding) – the single spine system will work with loose groups of farmers (naturally existing groups in the sub-counties and thus enabling every farmer have access to extension.” (KIs 2015)

Attendance at trainings: The number of members attending trainings organised by NAADS service providers/government extension workers increased significantly from 17.4 percent in 2011 to 20.6 percent in 2013 with no changes in gender dynamics across the recall period. This is attributed to the fact that trainings were open to all farmers, regardless of whether they were in a farmers group. In addition, the probability of males attending more trainings than females in 2011 was statistically significant at 1 percent and was even more robust in 2013. On average, farmers were attending 2 trainings in the three months prior to the survey. More than 88 percent of the trainings were conducted at community level/public venues, with relatively few trains conducted at farmer group/technology demonstration sites (4.6 percent) or market oriented/model farming learning centres (0.9 percent). Farmers' responses to the ATAAS baseline survey indicate that corruption in the NAADS project, limited transparency, not belonging to a group, selective invitation to training programmes, distance to training locations and family obligations were among the pressing reasons for never having attended NAADS training.

Nature of training: Many of the trainings provided were on issues of crop husbandry, pest and disease control in crops, and post-harvest handling/value addition. All of these issues showed significant differences in uptake at 1 percent. A key lesson here is that extension service/trainings need to increase in areas of soil-fertility management, crop varieties, and agribusiness and marketing. We hope the ATAAS project and the *Single Spine*, if well implemented, will improve these indicators.

Table 5: Summary statistics on access to extension services in 2011 and 2013

Variable Description	2011		2013		T-Statistic
	Mean	SD	Mean	SD	
<i>Did you have access to agricultural information / advisory services?</i>	0.545	0.498	0.604	0.489	2.97***
<i>If YES, what are your main sources for agricultural information / advisory services?</i>					
Fellow farmers	0.405	0.491	0.448	0.497	2.03**
NAADS service providers	0.121	0.326	0.147	0.354	2.46**
Other Local Government extension workers	0.024	0.153	0.028	0.166	1.02
NARO Researchers	0.001	0.029	0.001	0.024	-0.47
Other public Agencies (e.g. UCDA, DDA, CDO)	0.003	0.057	0.006	0.078	1.29
NGO/CBO	0.010	0.100	0.017	0.128	2.34**
Farmer Organisations/SACCO	0.010	0.101	0.012	0.109	0.59
Private Sector service Providers	0.020	0.140	0.024	0.152	0.81
Traders/ input suppliers	0.034	0.180	0.042	0.201	1.15
Newspapers & magazines	0.005	0.068	0.005	0.070	0.09
Radio	0.169	0.375	0.193	0.395	1.87*
Internet	0.000	0.007	0.000	0.019	1.3
Call Centre	0.000	0.015	0.002	0.039	2.09**
<i>Do you or any other member of this household belong to a farmer group?</i>	0.206	0.405	0.222	0.416	1.19
<i>If YES, specify the gender of the member of the household who is a member of the farmer group</i>					
Male	0.377	0.485	0.390	0.488	0.47
Female	0.360	0.480	0.347	0.476	-0.46
Both	0.263	0.440	0.263	0.440	-0.02
<i>Have you or any other member attended trainings organized by NAADS service providers / Government extension workers?</i>	0.174	0.379	0.206	0.404	2.81***
<i>If YES, specify the gender of the member of the household who has attended these trainings.</i>					
Male	0.453	0.498	0.476	0.499	0.73
Female	0.352	0.478	0.332	0.471	-0.68
Both	0.195	0.396	0.192	0.394	-0.11
<i>If YES, how many times have you or other member of the household attended in [...]?</i>	2.733	3.756	2.327	1.728	-1.95
<i>If YES, what was the training you attended about?</i>					
Crop Husbandry	0.128	0.334	0.155	0.362	2.75***
Animal Husbandry Management	0.076	0.264	0.085	0.279	1.3
Crop varieties	0.066	0.249	0.075	0.264	1.39
Animal Breeds	0.031	0.174	0.034	0.182	0.68
Pests and disease control in crops	0.033	0.179	0.047	0.212	2.82***
Pests and disease control in livestock	0.025	0.157	0.031	0.175	1.38
Soil fertility management	0.028	0.165	0.032	0.177	0.99
Post harvest handling/processing/value addition	0.009	0.094	0.016	0.126	2.81***
Agribusiness and marketing	0.007	0.086	0.011	0.105	1.55
<i>Have you or any other member of the household accessed or acquired technologies from NAADS/Other Local Government Extension Service?</i>	0.139	0.346	0.141	0.348	0.2
<i>Are you aware of some other modern practices/technologies which you are not using?</i>	0.041	0.198	0.072	0.258	4.28***
NAADS beneficiaries	0.224	0.417	0.261	0.439	2.70***
Organisation is affiliated to a NAADS farmer group	0.113	0.316	0.125	0.331	1.37

Source: Authors' computations based on 2014 ATAAS data

Regional distribution of NAADS beneficiaries: Figure 1 further presents NAADS beneficiaries across regions with notable discrepancies in benefits. The central region had the smallest number of beneficiaries, followed by the eastern region. It is unlikely that regional discrepancies can be associated with the nature in of the NAADS rollout over the years.⁶ Instead, it is highly likely that farmers in Northern and Western Uganda showed more eagerness to participate in the programme given that it was voluntary to join NAADS farmer groups.

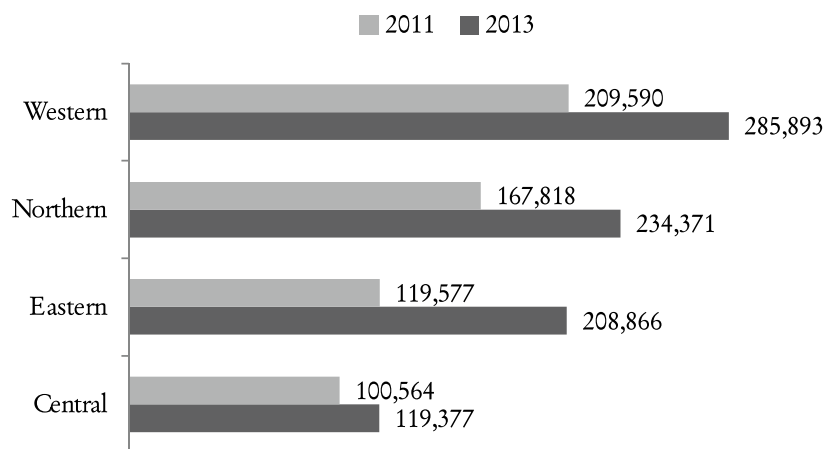
4.4 Lessons for Uganda's *Single Spine* agricultural extension service

This section highlights practical examples from other countries on the models, implementation and effectiveness of extension services. In addition, an assessment of the NAADS from an impact point of view is singled out to provide key features of success and failure in extension services. The insights here provide a good basis for implementing the *Single Spine*. Specifically, two models of extension service provision are singled out for discussion in this section, not only because of their lessons on how institutions should be aligned to effectively deliver but also because of their relative success and degree of innovativeness in implementation. These are the India's Agricultural Technology Management Agency (ATMA) extension model and Ethiopia's *Single Spine* agricultural extension model.

Most countries in Africa use pluralistic extension providers and approaches, for example, decentralisation/devolution, privatisation, contracting in and out, cost-sharing, demand-driven/participatory approaches, fee-for-service, and information and communication technologies (ICTs) (Davis 2009). Annex VII shows extension models in selected sub-Saharan African (SSA) countries.

Discussions around extension reforms have centred on, inter alia, privatisation and publicly funded extension services, pluralistic extension providers and approaches, decentralisation/devolution, and demand-driven/participatory approaches (Beynon et al. 1998; Oladele 2008; Davis 2009). According to the tenets of privately funded extension services (which involve private firms' provision of services or advice in exchange for a fee), private services enable the right message to reach the right user(s) at the right time through a demand-driven system. This approach facilitates cost-effective agricultural services that respond to farmers' needs (Umali and Schwartz 1994). The use of private extension service providers that requires the institutionalisation of farmer demand has resulted in setbacks. For example, the use of vouchers that can be exchanged for extension services are often misused when farmers collude with extension providers and transform the vouchers into cash (Oladele 2008). One key informant argued as follows:

Figure 1: NAADS beneficiaries by region



Source: Authors' computations based on ATAAS baseline survey dataset, 2014

“Demand-driven approaches to extension are not applicable to subsistence farmers. Farmers must first appreciate the usefulness of extension services before they begin to demand. This makes the single spine extension system more feasible.” KII, 2015

The literature highlights that for demand-driven extension to thrive, there is a need for pluralism in service provision so that farmers and their groups have options from which to choose (Oladele 2008). However, this is an ideal situation in many developing countries that have only limited service providers.

4.4.1 National Agricultural Advisory Services (NAADS) extension programme in Uganda

The NAADS secretariat was created by a 2001 Act of Parliament. The secretariat was a novel idea and fit into MAAIF's objective of having two umbrella

organisations under its oversight, with one providing advisory extension services (NAADS) and the other providing research (NARO). Here, the focus is on evidence on the ground of the NAADS programme's performance in providing extension services and the lessons that can be drawn for the *Single Spine*. Okoboi et al. (2013) have conducted an impact assessment of NAADS, a summary of which is presented in Box 1.

Okoboi *et al.*'s (2013) findings presented in Box 1 provide vital learning aspects for the *Single Spine*. To provide quality services to farmers, there is need to recruit full-time specialists in various agricultural fields such as agronomy, fisheries and entomology. Additionally, NAADS largely focused on allowing farmers to join groups to access delivery services. Ultimately, the programme excluded vulnerable categories of the community, namely, women, people living with disabilities and many others who for various reasons could not join groups.

Box 1: An impact assessment of NAADS programme in Uganda

This evaluation involved an examination of the level of participation of vulnerable households (headed by females, youths or people living with disabilities (PLWDs)) in Uganda's NAADS programme. It evaluated the programme's impact on agricultural households' access to extension services, the use of improved technologies, crop yield, the share of output sold, consumption expenditures and the poverty level.

Key findings

- The NAADS programme was designed to focus on supporting vulnerable households (i.e., households headed by women, PLWDs and youths). However, the programme did not effectively target those households.
 - A lack of information and guidance on how to join and effectively participate in NAADS, along with nepotism and discrimination by NAADS administrators were the main reasons cited by vulnerable households for their low participation.
- Access to extension services increased, but the quality of services had deteriorated over time.
 - Farmers noted that many Agricultural Service Providers (ASPs) lacked knowledge, skills and time to satisfactorily address their production and marketing challenges. Many ASPs were qualified in non-agricultural disciplines, had regular jobs and did their extension work on a part-time basis.
- Farmers supported by NAADS had increased access to credit. However, most of the farmers who accessed credit were not investing it in agricultural production.
- NAADS' distribution of free inputs neither spurred technology adoption nor enhanced productivity and commercialisation. Since its inception, NAADS both supported beneficiary farmers with improved technologies and built their capacity to use those technologies, with the objective of fostering technology adoption, increased productivity and commercialisation. This objective was barely achieved.
 - The poor quality of “improved” inputs that NAADS was distributing to beneficiaries is widely cited as the major discouragement of adoption and cause of low productivity.
- Overall, the impact of NAADS support on the income of its primary beneficiaries was minimal. Only, a few farmers benefited economically from NAADS. They include farmers who were given high-value enterprises such as perennial crops (e.g., coffee, bananas, etc.) and livestock (e.g., dairy cattle, pigs, etc.), along with those contracted to supply inputs (mainly seedlings) to farmers.

Source: Okoboi et al. (2013)

The tenets of publicly provided extension services note the public-good nature of extension. The limitation of exclusion means that a farmer who has not paid for information at a given point in time can receive that same information from other farmers, obviating the need to pay for services. For example, NAADS' idea of co-funding between farmers and the government failed because farmers who did not join NAADS groups (which were voluntary) benefitted from technology development sites even though they had not paid for the service. However, publicly funded extension systems have been criticised for their lack of sustainability because of the huge cost burden that they imposed on the national budget.

NAADS' problems are well articulated in section 3. These problems culminated in the involvement of the Uganda Police Defence Force (UPDF), whose expertise is not in extension service provision, as a presidential directive to curb some of the inefficiencies in NAADS. The KIIs' (2015) feedback on the NAADS programmes was mixed:

"NAADS created wide awareness of agriculture in the country and the farmer groups' model under the programme was a good idea for promoting peer-to-peer learning. The initiative's political support was both a strength and a weakness in how farmers perceived it on ground. The major lesson we have learnt in the NAADS implementation is that we cannot combine input supply with extension services. Furthermore, fragmentation of power is not a good idea because MAAIF lost its power and coherence in providing extension services on behalf of the public." (KIIs 2015)

4.4.2 India's Agricultural Technology Management Agency (ATMA) extension model and Ethiopia's *Single Spine* Structure

The ATMA model provides a good case scenario showing how extension programmes can be integrated across departmental lines, how research and extension can be linked and how bottom-up planning procedures can also be integrated into extension. ATMA has been judged as one of the most successful models of extension reform (Davis 2009). A synopsis of the ATMA model is discussed in Box 2.

The ATMA model provides a key lesson: the importance of first plotting and piloting an extension model before rolling it out. In addition, the decentralisation approach is important to ensure that districts both identify their extension needs in a participatory manner and generate their budgets prior to receiving funds. Hence, a bottom-up approach is important due to the heterogeneity in extension service provision at each district.

In the case of Ethiopia, the agricultural extension service provision model is structured so that there is a single, clear chain of command. This is similar to the *Single Spine* system being implemented in Uganda. Box 3 provides highlights of Ethiopia's extension implementation, the key lessons of which are as follows: (i) it is a good practice to provide extension services in a decentralised manner; (ii) the role of the private sector at the grassroots level is vital in a system that is operating and that monitors the private sector's activities; and (iii) it is necessary to create training centres both to ensure continuity and to provide extension workers with new knowledge that can be passed on to farmers.

Box 2: Implementation of the ATMA extension model in India

In a country such as India, where both agro-climatic zones and farmers' socio-economic statuses vary widely, a uniform extension service is not the panacea for all regions. It was realised that a public extension system need to be placed into decentralised institutional arrangements that are demand-driven, farmer-accountable, bottom-up and adopt a farming system approach. To address these issues, the ATMA was envisaged as an alternate public extension institution. The ATMA extension mechanism/model was first implemented in 1988 in four districts representing each state in India under the guidance of the National Institute of Agricultural Extension Management, Hyderabad. Lucknow's evaluation of the Indian Institute of Management (IIM) has revealed that the ATMA's extension approaches have proven very promising in executing the reforms, resulting in progress being extended to other states. The Indian government is funding the ATMA programme in every district in the country. The ATMA is a registered society of key stakeholders (farmers, line/development departments, non-governmental organisations, input dealers, mass media, agribusiness companies, farmers' organisations, etc.) involved in agriculture activities for sustainable agricultural development in the district.

Although the State Department of Agriculture serves as a nodal agency for implementing ATMA, the programme aims to increase coordination and integration among developmental departments. Emphasis has been placed on providing a flexible working environment and establishing an effective method of integrating all of the stakeholders at the district level. This approach is expected not only to increase input into programme planning and resource allocation, especially at the block level, but also to foster stakeholder accountability. Every district must prepare a Strategic Research and Extension Plan (SREP) for implementing ATMA. The SREP is prepared through participatory methodologies such as participatory appraisal techniques that involve all stakeholders and farmers. The SREP contains a detailed analysis of all of the information on existing farming systems in the district and research-extension gaps that must be filled. It also prioritises districts' research-extension strategies. The SREP becomes the basis for development work plans at the block/district level. The ATMA is a more comprehensive, farmer-centric bottom-up approach extension programme operating in all of India's districts.

Source: http://www.syngentafoundation.org/_temp/Gowda_Extension_Systems_India.pdf

Box 3: Ethiopia agricultural extension model

Agriculture extension in Ethiopia is one of the largest in sub-Saharan Africa and forms a core part of the Ethiopian government's investment in the sector. Extension is primarily provided by the public sector operating in a decentralised manner, with implementation at the district level (woreda). The private sector and NGOs are not as active and primarily work at the woreda level through the boards. Institutions engaged in extension provision include public extension institutions such as the Ministry of Agriculture and Rural Development, public research and education institutions, and the semi-autonomous Ethiopian Institute of Agriculture Research, which coordinates decentralised agricultural research activities at federal and regional research centres and through institutions of higher education. At the regional level, there is the Bureau of Agriculture and Rural Development; at the district level (woreda level), there is the Office of Agricultural and Rural Development; and at the kebele level, there are farmer training centres.

Programmatic Components of the Ethiopian Extension System

- **Participatory Demonstration and Training Extension System (PADETES):** This system was introduced in 1995 to provide a small amount of inputs through packages provided directly to farm households. Approximately 35 to 40 percent of farm households are reached and served through the system, with a low number of visits by public development agents.
- **Farmer Training Centres (FTCs):** These exist at the kebele level (one level lower than the district). They are staffed with development agents (DAs)/extension workers and are responsible for providing extension activities in rural areas.
- **Agricultural Technical and Vocational Education:** This centre is tasked with training DAs charged with carrying out agricultural extension activities with farm households.
- **Institutional Coordination:** The rapid expansion of the extension system has brought with it an administrative model to support both an extensive set of responsibilities adapted to 32 agro-ecological zones and a DA corps of approximately 65,000.

Source: <http://www.worldwide-extension.org/africa/ethiopia/s-ethiopia> "Agriculture Extension and Advisory Services Worldwide"

4.5 Feasibility of *Single Spine* implementation

The *Single Spine* agricultural extension system spearheaded by MAAIF began in June 2014. Its objective is to harmonise and coordinate all extension service delivery in the country to address the inefficiencies associated with its predecessor systems. Box 5 clearly maps out the approach's requirements.

approximately 59 percent. Thus, because of budgetary constraints, the farmer-to-extension-worker ratio will remain high, leading to limited out-reach, as noted in the history of Uganda's provision of extension services.

Box 4: Reforms from NAADS to *Single Spine*

The reforms from NAADS to *Single Spine* involved:

- Mainstreaming the agricultural extension function into MAAIF at the national level so that MAAIF takes responsibility for coordinating extension service delivery in Uganda's private and public sectors.
- Mainstreaming the NAADS programme into local governments' production departments and eliminating parallel institutional arrangements.
- Supporting the development of an efficient private-sector input distribution system and separate promotion of inputs from the extension service delivery system.

Principles to guide *Single Spine* implementation

- The promotion of institutional efficiency and the maximisation of existing technical capacities.
- Agricultural extension remains a decentralised function with MAAIF providing technical support and backstopping in line with the decentralisation policy.
- Farmer empowerment concept will remain a core component in agricultural extension.
- Prioritising the nurturing and promotion of private-sector service delivery in implementing reform.
- The promotion of ATAAS' current efforts to strengthen linkages with agricultural research.
- The perception of agricultural extension as part of a broad agricultural system, not an isolated component.
- A shift in mindset away from primary production to value addition, manufacturing and marketing.
- Ensuring that monitoring and evaluation are a permanent feature during reform implementation
- Embedding the value of career growth for extension staff into the new reform.
- Emphasising strengthened professional linkages between central and local governments.
- Omitting the distribution of free inputs from the "*Single Spine*" extension system and maintaining input supply as a private-sector function, with MAAIF playing the regulatory role.

Source: Report by the Inter-ministerial Technical Committee (ITC) submitted to the Minister of the Presidency in November 2013

To assess the feasibility of the *Single Spine* agricultural extension system, we focus the discussion on financing, human resource, implementation strategy, linkages between the extension service delivery system and the input distribution system, linkages between extension and farmers, and linkages between extension and non-state actors.

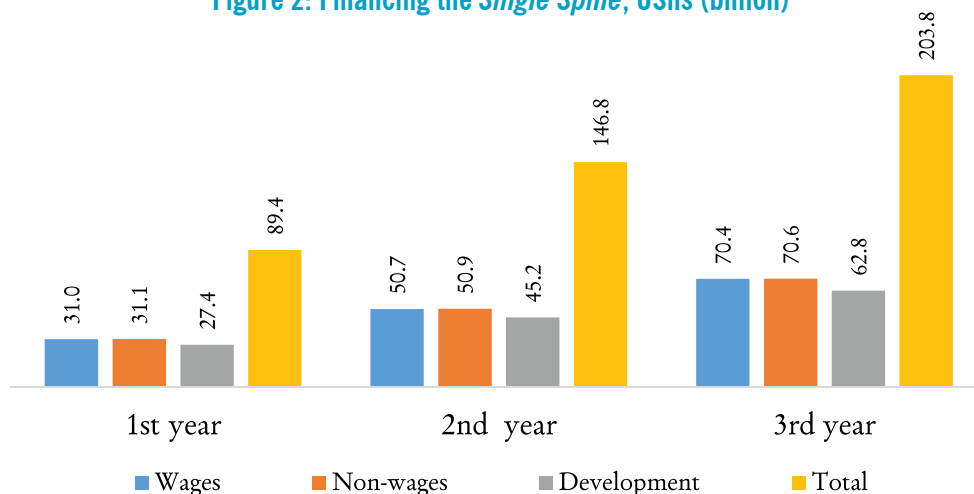
a) Financing the *Single Spine*

To implement the *Single Spine* extension system, MAAIF will need Ushs 89.4 billion (Figure 2) in its first year of implementation; however, only Ushs 36.77 billion has been allocated for this purpose (MAAIF 2015). This means that there will be a funding gap of up to Ushs 52.63 billion, i.e., a budget shortfall of

Increased budget allocation to the sector is a necessary condition for successful implementation of the *Single Spine* extension system. According to the Inter-ministerial Technical Committee's (ITC) recommendation to the Minister for the Presidency on extension reforms, implementation of the *Single Spine* should be matched by an increased budget allocation to the agriculture sector of approximately 6 percent if the *Single Spine* extension system is to be operationalised.

However, MAAIF should simultaneously increase its absorption capacity to use its allocated funds more effectively and efficiently. Budgetary limitations will hinder the recruitment of adequate numbers

Figure 2: Financing the Single Spine, UShs (billion)



Source: ITC report, 2013

of extension workers to serve the growing number of farming households, extension workers will not be well facilitated, and some critical specialised disciplines (such as entomology and fisheries) will gradually disappear. These anticipated challenges are synonymous with previous UES and NAADS approaches identified as factors that partially hindered their performance that therefore should be mitigated.

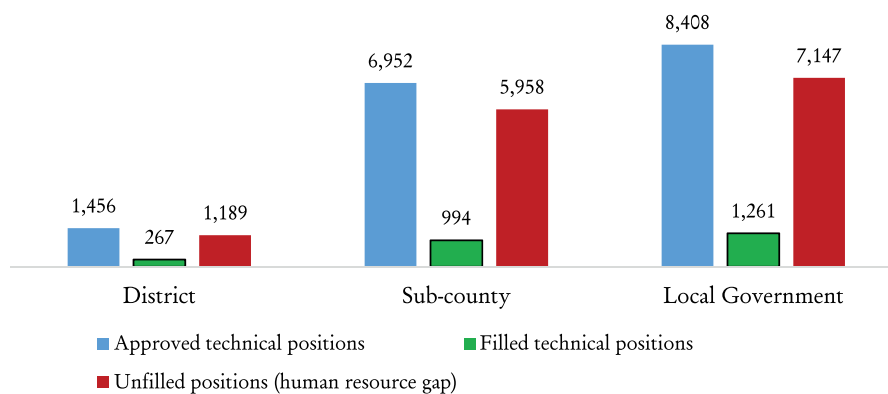
Government usually funds some of its investments through donor funding. There are indicators that donors will remain committed to fund specific projects, for example, the World Bank continues to fund the ATAAS project as it is funding MAAIF to develop a framework implementation plan for the *Single Spine* extension system. However, there are mixed feelings about donors' commitment to funding agriculture, particularly given MAAIF's inefficiencies at implementing programmes, as highlighted by one key informant:

"As of now, it's more logical to fund NGOs (such as Abi Trust) and the private sector to reach out to farmers than to work with MAAIF, which has some inefficiencies in implementing programmes". (Kils 2015)

This implies that MAAIF has a very clear role to play in streamlining its governance structure to deliver as a means of recreating its image to attract donor funding at the ministerial level instead of the project level. Such a move, if successful, will attract massive investment in the *Single Spine* extension system.

b) Human resource (extension workers) required There is a human resource crisis that must be urgently approached to ensure the successful implementation of the *Single Spine* extension system. This crisis arose when MAAIF adopted the *Single Spine* immediately even though the contracts of the NAADS coordinators and agricultural service providers had not been renewed. This has caused a significant gap in the current number of extension workers. Moreover, since NAADS' launch in 2002, there has been a donor ban on further recruitment of any more public extension staff at the district level: accordingly, extension workers who retired, resigned or died were never replaced. As a result, the *Single Spine* is being rolled out amidst a massive resource gap in extension workers. According to Figure 3s, the human resource gap is highest at the sub-county level and it is estimated at approximately 86 percent: out of the 6,952 approved technical positions, only 994 have been filled. Nevertheless, the human resource gap will gradually be closed partially because the ban on recruiting public extension staff has been lifted and as a result, staffers who previously served in the public extension system before being contracted by NAADS have been recalled. The recall of former public extension staff is partially intended to reduce the burden of recruitment.

Figure 3: Human resource gap in the Single Spine institutional structures



Source: ITC, 2013

The information provided in section 4.1-Table 1 clearly alludes to the fact that district and local governments will not be able to recruit extension workers in the district production departments to fill the many vacant posts approved for the *Single Spine* system.⁷ Although it is documented in the MTEF FY 2015-2016 budget projections that MAAIF will focus on recruiting district production staff and sub-county extension workers, this focus is not reflected in budget allocations to the agriculture sector.

c) Implementation strategy and governance structures

The *Single Spine* extension system shows no key distinctions with the UES, primarily because the key providers of extension services are local extension staff at the district level. However, the *Single Spine* shows a clear distinction from NAADS (Annex I) given that unlike NAADS, which was intended to be demand-driven, the *Single Spine* extension system follows a supply-driven approach, with advisory services provided by extension staff at the district level. Annex III provides the *Single Spine* governance structure. The following was noted by a KI:

“Single spine can deliver our extension needs, but what is the strategy for operationalising it? Essentially, the single spine lacks a clear framework of implementation. That is, institutional and implementation arrangements for single spine (capacity building, providing of knowledge to farmers, information dissemination) are not well articulated in single spine. Ideally, NAADS’

mandate should be to carry out extension while MAAIF distributes inputs.” (KII 2015)

Cognizant of this missing link, the World Bank (under the ATAAS project) has provided funds to MAAIF to articulate and formulate the *Single Spine* implementation strategy.

d) Linkages between extension and input distribution systems

MAAIF has always perceived the NAADS Secretariat as an independent entity; however, it is not. This perception has often created friction, envy and fighting between the two institutions. The envy was partly caused by the fact that NAADS was receiving more than 50 percent of the agriculture sector’s budget, an arrangement that was viewed by MAAIF as unfair/not justified; consequently, some components (e.g., disease control) that were intended to make NAADS a success were never funded. Despite the reforms in institutional structure and mandates, the NAADS Secretariat continues to command the lion’s share of agriculture sector budget (more than 37 percent). Accordingly, envy might persist. Its greater financial muscle makes NAADS Secretariat appear more powerful than its mother ministry (MAAIF), a perception that constrains the relationship between the two institutions. As Rwamigisa and Per Hartmann (undated) note, for the agricultural extension system to function properly, an independent input distribution system is crucial; such a system enables farmers to access inputs recommended by extension workers to boost production and productivity.

e) Linkage between research and extension
Numerous scholars (Binswanger-Mkhizi and Zhong 2012; Rasheed 2012) have reported that for any extension reform to be successful, a well-functioning agricultural research system is a prerequisite. This is because it is research that generates improved technologies, which are then passed on to the extension system for use by the target users (farmers). NAADS was supposed to work closely with district agricultural research support teams (DARSTs) that link extension to research to generate technologies and advice that is responsive to farmers' needs. However, evidence on the ground shows that this never occurred. Because extension will now be provided directly by MAAIF through the district extension workers, NARO should be included through the DARSTs. In addition, the restructured district far institutes (DFIs) will be important in bridging the gap between research extension and farmers: technologies generated through research will be tried at the DFIs and recommendations that are localised to suit farmers' situations will be made. Thus, under the *Single Spine* arrangement, strengthening the link between NARO and extension providers and application is critical. This link was missing during NAADS' tenure. If possible, NARO should establish small collection centres for improved varieties that district extension workers will recommend to farmers for collection. This will be very helpful in solving the problem of timely distribution of seed and farmers will remain "in season" with close proximity to recommended seeds for planting.

f) Linkages between extension and farmers
Although one of the principles of the *Single Spine* system is farmer empowerment, the approved structures do not clearly show how farmers will be involved either in identifying their own needs or in finding and proposing solutions to their problems. Unless there is a system through which farmers can communicate their extension needs (that will then be addressed by extension workers), extension service provision will remain supply-driven. The preferred situation is one in which extension is demand-driven; such a system gives farmers more of a voice in setting the extension and research agenda (Suresh et al., 2013).

g) Linkages between extension and private actors

It is not clear in the *Single Spine* structure how private actors (such as non-governmental organisations (NGOs)) will be leveraged to provide extension services. There is an opportunity in that one of the guiding principles of *Single Spine* implementation is nurturing and promoting the delivery of extension services by the private sector. Unless this principle is applied, the *Single Spine* system will be challenged by limited private-sector involvement, as was the public UES system in the 1990s.

In summary, one emerging issue is that the *Single Spine* extension system is necessary to empower MAAIF to control and regulate extension services. Previously, NAADS' semi-autonomous nature left MAAIF with less power in that NAADS employees were earning more than MAAIF employees at both the national and the district levels. This issue simultaneously represents an opportunity to address some of the inequality concerns associated with NAADS' focus on wealthy farmers. The *Single Spine*'s focus on all farmers in their respective community groups is positive, unlike the NAADS programme, which seemed to devote more attention to food security and commercial farmers.

5. CONCLUSION AND POLICY OPTIONS

5.1 Conclusion

The rationale for providing extension services in Uganda is still relevant, but evidence suggests that the extension approach used by NAADS was not efficacious. Since colonial times, Uganda's overall record of implementing an extension system has been disappointing. The NAADS-adopted extension system has proven ineffective and therefore unsuitable (as it was not carried out from the onset). Although the system's geographical coverage, research extension linkages, and staff skills have improved, its outreach system is weak and interactions between extension workers and farmers remain minimal. A more rational allocation of extension resources would have been cost effective; the shifting of NAADS' mandate to input provision did not help matters.

This paper's findings reveal both that there remains an unmet demand for extension services and that farmers value access to advice. However, this paper does not inquire whether given the reality of limited resources (as clearly seen from expenditure to agriculture and to extension in particular), farmers are willing to pay for extension services. Farmers' willingness to pay will be very helpful in offsetting the budget constraints that will accompany implementation of the *Single Spine*.

The decentralisation framework that is already entrenched in government policy represents a key opportunity for the implementation of any extension reform. The availability of district-level government employees who are already playing a role in providing extension services represents a key opportunity for the operationalisation and feasibility of the *Single Spine* extension system. The important aspect that is needed is proper coordination across departments both within and outside of the agriculture sector.

Consequently, the feasibility of the *Single Spine* is heavily dependent on streamlining governance structures, increasing human capital at the district level, and using research as extension workers engage with farmers. Furthermore, because the Ugandan government strives to identify avenues through which to improve the provision of extension services, it is important to consider the issue of finances, which remain central to making systems work. The feasibility of the *Single Spine* extension system can only be realised if challenges that are akin to those of other extension systems are addressed immediately.

5.2 Policy options

- **Financing options:** Given that the reported current budget constraints are likely to persist, there is need to explore other financing options, including the following:
 - Money initially allocated for NAADS districts should be allocated to local governments to deliver extension services to farmers. Indeed, when the *single spine* was adopted, the Cabinet's decision was to integrate financial and human resources. Currently, only human resources have been integrated into the *Single Spine* system.
 - Leveraging, coordinating and consolidating scattered funds in various ministries, departments, and agencies that provide extension services, e.g., UCDA.
 - MAAIF should create and improve linkages with CSOs and NGOs that are already engaged in the delivery of extension services. However, coordination issues should be addressed both to standardise extension messages and to ensure that farmers do not receive conflicting information on a single subject.
 - MAAIF headquarters (the Directorate of Agricultural Extension Services) should minimise duplicative efforts by focusing on coordination and empowering local governments to deliver extension services.
- **Human capital:** Human resource gaps arising out of low staffing levels will definitely stifle service delivery, thus calling for the recruitment of at least enough employees to fill critical technical posts. In the face of severe staffing gaps, MAAIF should leverage existing alternatives for the delivery of extension services, such as ICT and mobile phones, radio talk shows and call centres.
- **Governance and coordination:** To sufficiently respond to farmers' needs, MAAIF (and specifically, the Directorate of Agricultural Extension Services) needs to play its coordination role very well in harnessing input from other institution such as NAADS and NARO. This provision needs to be well articulated in the national policy for agricultural extension service delivery and implementation plan. Processes to formulate this policy are ongoing.

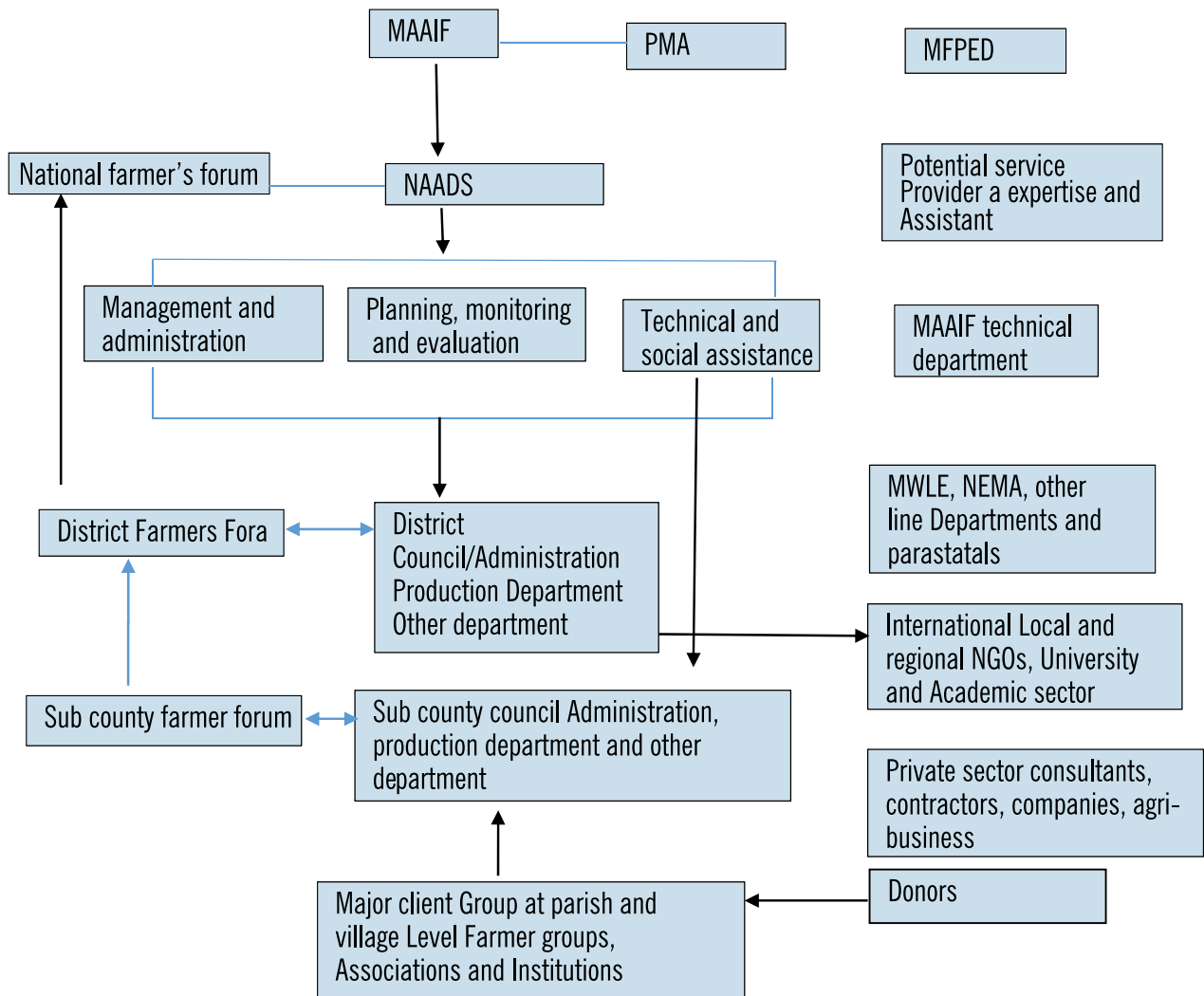
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ANNEXES

Annex I: National Agricultural Advisory Services Programme Organogram



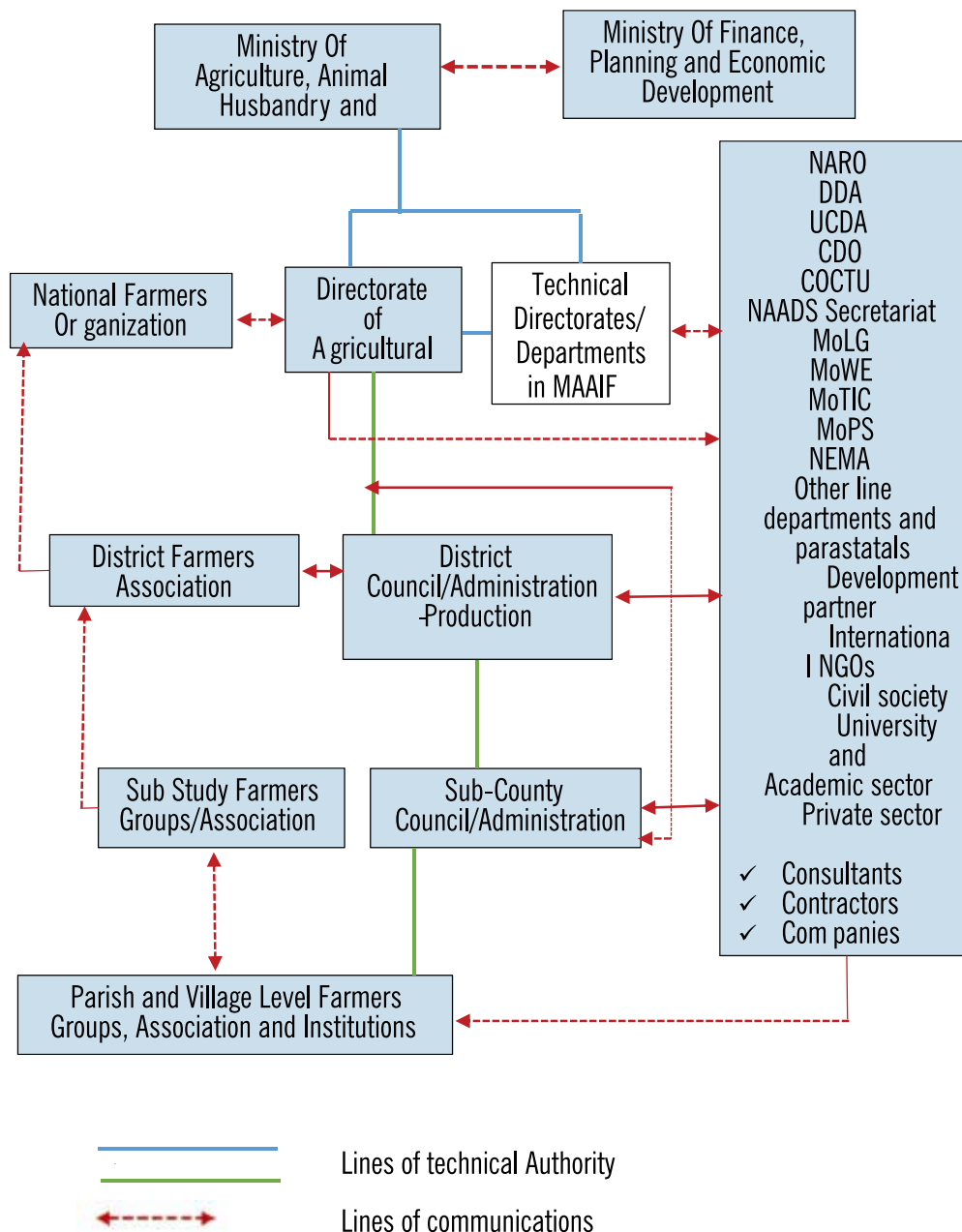
Source: NAADS manual 2001

ANNEX II: NEW ATAAS STRUCTURE APPROVED IN JUNE 2010

Components (5)	Components (4)	Lead implementing agency
1 Developing agricultural technologies and strengthening the NARS		
1.1 Technology identification and development	1.1 Technology identification and development	NARO
1.2 Institutional strengthening of NARO and ARSPs	1.2 Institutional strengthening of NARO and ARSPs (+ CGI)	
2. Enhancing partnerships between agricultural research, extension and other stakeholders		
2.1 Joint planning and adaptive research	2.1 Joint planning, Priority setting, Adaptive research and Demonstrations	ZARDI & DARST
2.2 Sustainable land management	2.2 Enabling technology scaling up: capacity development for seed and planting material production	NARI/MAAIF ZARDI/DARST
2.3 Institutional and human capacity strengthening	2.3 Sustainable land management	MAAIF & NARO
2.4 Joint RF/M&E		
2.5 Joint applications		
3. Strengthening the National Agricultural Advisory Services		
3.1 Farmer institutional Development (FID)	3.1 Farmer empowerment and Organisation for strengthened linkages to markets	MAAIF -PCU
3.2 Technology promotion and farmer access to information/knowledge	3.2 Support design of a strategy for the new extension system and its institutional and implementation arrangements	
3.3 Technology Uptake grants	3.3 Development of ICT-based systems in support to MAAIF priority functions (information platform and specialized e-tools)	MAAIF & NARO
4. Support agribusiness services and market linkages		
4.1 Agribusiness Development Services	4.1 NARS Coordination and NARO Management	NARO
4.2 Establishing a commercial challenge fund	4.2 MAAIF Components Management and Coordination	MAAIF
	4.3 Strengthening join M & E and data systems for NARO and MAAIF	MAAIF & NARO
5. Program management		
5.1 NARS Coordination and NARO Management		
5.2 NAADS Management and Coordination		

Source: New ATAAS (main PAD Summary – Draft 30 Oct) obtained from NAADS Secretariat

ANNEX III: ORGANOGRAM FOR DIRECTORATE OF AGRICULTURAL EXTENSION, AGRIBUSINESS AND ADVISORY SERVICES



Source: Policy Guide for the National Agricultural Extension Services; MAAIF 2015

ANNEX IV: KEY INFORMANTS QUESTIONNAIRE GUIDE

REFORMS IN THE DELIVERY OF AGRICULTURAL EXTENSION SERVICES IN UGANDA: AN ASSESSMENT OF THE PROPOSED SINGLE-SPINE EXTENSION SYSTEM

KEY INFORMANT INTERVIEW GUIDE

[To be used with actors across key MDAs and adapted per interview as appropriate]

1. What is the *Single Spine* extension service delivery system all about?
2. Who have been the key players in causing this reform in provision of agricultural extension services?
3. What strategies have been proposed in the *Single Spine* extension service delivery system to ensure that the challenges faced before the reform do not persist or worsen? [*Challenges faced by NAADS included: a) inadequate funding, b) inconsistent flow of funds, c) poor accountability, d) limited transparency, e) corruption tendencies, f) limited reached, g) deviation from official mandate, h) inefficient extension approaches, i) weak research-extension-farmer linkages, and j) focus on a few enterprises*]
4. What is the current and foreseeable impact of establishing the *Single Spine* extension service delivery system?
5. Did the former extension systems (NAADS together with the Public extension system) have some good practices that would serve as lessons for successful implementation of the *single spine* extension system?
6. What are the key wider policy implications of the extension reform on other policies, policy implementation, resources, and other institutions?

ANNEX V: EXTENSION MODELS AND NUMBER OF AGENTS IN SELECTED SSA COUNTRIES

Country	Extension model as of 2009
Angola	Rural Development and extension program; Farmer Field Schools (FFS)
Benin	Participatory management approach; decentralized approach; FFS
Burkina Faso	FFS
Cameron	National Agricultural Extension and Research Program Support Project; FFS
Ethiopia	Participatory Demonstration and Training Extension system; FFS
Ghana	Unified Extension system (modified T&V), pluralistic with NGOs and private companies part of the national extension system; decentralized; FFS
Kenya	Pluralistic system including public private NGOs, FFS, stakeholder approach, sector wide, focal area, demand driven, group based
Malawi	Pluralistic, demand driven, decentralized; "one village one product"; FFS
Mozambique	Government led pluralistic extension; FFS
Nigeria	FFS, Participatory
Rwanda	Participatory, pluralistic, specialized bottom-up approach, FFS
Tanzania	FFS; Group based approach, private extension; decentralized participatory district extension, pluralism modified
Uganda	Until 2014; pluralistic, demand driven, client oriented and farmer led approach

Source: Authors own compilation, 2015

ANNEX VI: LIST OF KEY INFORMANTS

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9.	Agnes Kirabo, Executive Director, Food Rights Alliance (FRA). Mobile: +256-772564951; Email: agneskirabo@fra.ug or agneskrb09@gmail.com
10.	Per Hartmann, Senior Advisor (former), Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Email: amphartmann@hotmail.com

ENDNOTES

- ¹ The name *single spine* is derived from its delivery system: in other words, there is a single decision-making process from the top (MAAIF), without subsidiary bodies sharing the final decision about what is to be done.
- ² These EAs were distributed to the 9 ZARDI agro-ecological zones in equal proportions with consideration of the rural-urban domains.
- ³ At the first stage, enumeration areas (EAs) were grouped by ZARDI and rural-urban location and then drawn using probability proportional to size (PPS). At the second stage, households, which are the ultimate sampling units, were drawn using systematic random sampling.
- ⁴ Details of the NAADS programme's structure, goals and objectives are well documented in the Ministry of Agriculture, Animal Industry and Fisheries' (MAAIF) 2000 and 2008 reports.
- ⁵ For details refer to the Inter-ministerial Technical Committee Report (November, 2013) submitted to the Minister for the Presidency.
- ⁶ In 2001, NAADS was initiated in six trailblazing districts (Arua, Kabale, Kibaale, Mukono, Soroti and Tororo) working in 24 sub-counties. In 2002/03, NAADS rolled out in ten new districts (Bushenyi, Busia, Iganga, Kabarole, Kapchorwa, Kitgum, Lira, Luwero, Mbarara and Wakiso). By the end of 2006/7, the program had reached 545 sub-counties. In its second phase, NAADS was implemented in all of Uganda's districts and sub-counties (Benin et al., 2007).
- ⁷ Under the *single spine* extension system, there is a projected shortfall of US\$ 2,832,183,000 from the wage budget of both MAAIF and NAADS, whereas under the non-wage recurrent budget there is a shortfall of US\$ 29,869,793,000/= and US\$ 11,157,825,000 shortfall under the development budget. (Inter-ministerial Technical Committee Report, 2013.)

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