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Training for innovation: capacity-building in agricultural research in post-war Sierra Leone

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This paper examines how the Sierra Leone Agricultural Research Institute (SLARI) used training and development to build capacity for innovation in agricultural research following the country's civil war which ended in 2002. The Institute's training for innovation addressed different agricultural product value chains (APVCs) within the framework of the Integrated Agricultural Research for Development approach, which recognizes the need for collective action by involving a broad range of stakeholders and multiple knowledge sources that can be used to address complex development challenges along the value chains. In this context, the SLARI conducted a diagnostic audit, which concluded with recommendations for capacity building of staff in both the short and long term. Over the 5 years of implementation of its capacity building plan, the Institute has trained staff at all levels including research scientists, senior support staff, lab technicians, field supervisors and farmers for various responsibilities along the APVCs within the Institute's mandate.

Introduction

When violent conflicts are initiated, destruction of human life, livelihood support systems, the environment, physical and economic infrastructure and social fabrics is inevitable. Human populations, especially those in rural areas and the poor in urban areas suffer internal and cross-border displacement into congested camps far removed from their homes (Forum for Agricultural Research in Africa – FARA, 2012). In addition to the loss of human life, the displacement of populations leads to erosion of agricultural knowledge and skills, loss of the labor force, dysfunctional organizational structures and market systems, infrastructural damage and weakened institutional linkages.

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In Sierra Leone it is difficult to quantify the social and economic costs of a brutal war that lasted for 10 years in terms of loss to human lives, disablement of many people, lost opportunities and damage to both private and public property and the economic infrastructure. Various assessments of the war reveal consequences for socio-economic development. With the disruption in agricultural production, official mining and general economic activity, economic growth was severely constrained, with negative GDP growth rates recorded on a year-on-year basis (MAFFS, 2004; Food and Agriculture Organisation *et al*., 2002). The impact on infrastructure and property is also substantial, taking into account the destruction of a large number of educational, health, research and community institutions. Overall, the war was destructive of the socioeconomic infrastructure (Food and Agriculture Organisation *et al*., 2005).

For the vast numbers of rural households in Sierra Leone, agriculture constitutes the prevalent livelihood base and is a key driver for food security, poverty reduction and overall economic growth. For this reason, the government of Sierra Leone designated agriculture as the engine for socio-economic development (Government of Sierra Leone, 2008). The agricultural research and development systems in post-conflict Sierra Leone suffered from poor research infrastructure, high staff turnover, weak regional and international collaborative research ties, and virtually non-existent intra-country collaboration between researchers, universities, producer organizations and the private sector. Nevertheless, Kilewe and Kirigua (2012) observed that the post-conflict environment also offers a window of opportunity for re-inventing the agricultural innovation capacity in view of changing international and national contexts and development agendas. To ensure viability and sustainability in unstable settings, it is crucial to build capacity through training and development of institutions representing people and reflecting their needs and priorities.

Research to address identified challenges and constraints under different agricultural product value chains (APVCs) in the Sierra Leone Agricultural research Institute (SLARI) is carried out within the Integrated Agricultural Research for Development (IAR4D) framework that recognizes the need for collective action by involving a broad range of stakeholders and multiple knowledge sources that can be used to address complex development challenges. The IAR4D approach to research is guided by four interactive process-oriented support principles: (1) integration of perspectives, knowledge and actions of different stakeholders around a common theme; (2) integration of learning that stakeholders achieve through working together; (3) integration of analysis, action and change across different dimensions of development; and (4) integration of analysis, action and change at different levels of spatial, economic and social organization. The implementation of IAR4D is achieved by (1) bringing about organizational and institutional change, capacity building for project teams and institutions; (2) knowledge management and information sharing; (3) monitoring, evaluation, impact assessment and lesson learning; and (4) the integration of markets, policies, natural resource management and productivity into innovation processes carried out through innovation platforms (Hawkins *et al*., 2009).

The adoption of the APVC approach to research for development within the framework of IAR4D implies expansion of the research portfolio to components such as post-harvest processing, marketing and internalization of consumer needs. The approach involves working with all players along different APVCs from resources, production, processing, marketing to consumption. The APVC approach is characterized by increased vertical coordination of many actors and would be expected to demand more integration and coordination of all different service providers around priority APVCs (FARA, 2007). This would require strengthening of capacity beyond the simple training and, therefore, a need for the development and operationalization of an effective and efficient capacity development programme was identified during the development of the SLARI Strategic Plan, covering the period 2012–2021 (SLARI, 2011a) and a five-year Operational Plan (SLARI, 2011b) and an Investment Plan (SLARI, 2011c). This need for strengthening of capacity for implementing APVC research was subsequently addressed as one of the institutional level result areas.

It is against this background that the Networking Support Function Four of the FARA, in collaboration with the other FARA networking support functions, initiated the capacity assessment of SLARI in 2011 and its functional relationship with the wider Sierra Leone national agricultural research system. The purpose of this assignment was, therefore, to undertake assessment of capacity needs for innovation of the SLARI. The objectives for the assignment included (Kilewe & Kirigua, 2012):

1. Diagnostic audit of SLARI identifying the bottlenecks, constraints to, and opportunities for agricultural innovation.
2. Identification of specific innovation capacity strengthening needs.
3. Recommending capacity strengthening investment priorities of SLARI within the wider agricultural innovation systems of Sierra Leone.

Post-war crisis capacity strengthening interventions and their consequences for agricultural development

For the purpose of this paper, capacity is defined as the outcome of collaborative action by individuals, organisations, networks and alliances within an enabling environment. According to FARA (2012), the concept of capacity gets meaning when it refers to a specific entity or system. For this reason, the authors have specifically looked at the agricultural development capacity of stakeholders in post-conflict Sierra Leone. As pointed out in the Introduction the agricultural research and development systems in post-conflict Sierra Leone have invariably suffered from poor research infrastructure and financial resources, high staff turnover, weak regional and international collaborative research ties and virtually no intra-country collaboration between research, universities, producer organizations and the private sector.

During the 10-year period of devastating national conflict most highly skilled research scientists left the country for the safety of their families and for livelihood sustenance. Because of this conflict, the national universities, colleges and polytechnics were not able to train new staff due to lack of teachers and professors. In addition to this, the research scientists that were able to stay are now approaching retirement. Further to this, the agricultural sector is weakened by staff movement to better paying jobs due to low remuneration to staff by government as well as limited staff development and promotion opportunities. Given this state of affairs, the government, and SLARI in particular, may find it difficult to fully provide strategic and technical direction for the implementation of key agricultural sector development strategies without external technical assistance. Table 1 reflects the staffing situation immediately after the cessation of hostilities in 2002.

The numbers of research scientists in SLARI, as can be seen in Table 1, were below the critical mass of scientists required for delivery of output approved in the first strategic plan (2008–2017) developed by SLARI. In fact at this time, no capacity assessment had been done and so it was impossible tell the critical mass of research scientists required by SLARI for undertaking agricultural research.

Table 1 shows that the status of research scientists in all the SLARI centres. This was below expectation in 2007 when the institution was established by an Act of Parliament. The same table also shows the majority of the research scientists at the time were clustered around the age range of the 41–61 years. All the centres have very few young scientists – under 41 years of age. According to the UN convention standards which define people aged 36 and above as old, most SLARI research scientists can, by this standard, could be regarded as old (UNDP, 2008). Over 36.5 per cent of the total number of research scientists in SLARI are in the age range of 51+ and are, therefore, nearing retirement. The implication of this age distribution is that in the next 10 years, this proportion of scientists will retire from active service and will no longer be available for effective agricultural research. This 10-year period will, therefore, be crucial in developing replacement research scientists to take over from the retiring ones. SLARI has more male research scientists than female. Since majority of small-scale farmers are

Table 1: Total and age distribution of research scientists and percentage time spent in research and management

Research Centre	Total no. of scientists	Age distribution and percentage of the total				
		21–30	31–40	41–50	51–60	61+
1 Njala Agricultural Research Centre	22 (34.9%)	2 (09.1%)	10 (45.4%)	4 (18.2%)	4 (18.2%)	2 (9.1%)
2 Rokupr Agricultural Research Centre	19 (30.1%)	3 (15.8%)	4 (21.1%)	4 (21.1%)	6 (31.5%)	2 (10.5%)
3 Kabala Horticultural Crops Research Centre	1 (0.02%)	0	0	0	1 (100%)	0
4 Teko Livestock Research Centre	4 (0.06%)	0	0	1 (25.0%)	2 (50.0%)	1 (25.0%)
5 Freetown Fisheries Research Centre	2 (0.03%)	0	0	1 (50.0%)	0	1 (50.0%)
6 Kenema Forestry and Tree Crops Research Centre	6 (0.09%)	1 (16.6%)	4 (66.8%)	0	0	1 (16.6%)
7 Mogbosi Land and Water Research Centre	5 (0.08%)	4 (80.0%)	0	0	0	1 (20.0%)
8 SLARI Headquarters	4 (0.06%)	0	1 (25.0%)	1 (25.0%)	2 (50.0%)	0
Total Institutional Research Scientists Complement	63 (100%)	10 (15.9%)	19 (30.1%)	11 (17.5%)	15 (23.8%)	8 (12.7%)
Percentage time spent in: Research		100%	90%	80%	30%	10%
Management		0%	10%	20%	70%	90%

women, the Institute may need to take deliberate steps to increase the number of female research scientists to at least 40 per cent of the total number.

Level of training of the Institute's research scientists

Table 2 shows the status of research scientists by centre and level of training in 2008. Of the total number of research scientists, 14.3, 73.0 and 12.7 per cent have acquired PhD, Masters and Bachelors level of training. The technical capacity/professionalism of a research institution is reflected by the number of highest degrees and the time they were acquired. In most developing countries, scientists in research institutes are professionally 'young' than those in universities. This reflects a different career pattern for researchers at the institutes who are often employed as research assistants with a Bachelor's degree before going back for higher degree training.

In an ideal situation the SLARI research scientists should cover a wide spectrum of disciplines that include plant breeding, livestock management, animal diseases, plant pathology, insect pest management, agronomy and soil science among others (Mukiibi & Youdeowe, 2005). However, by 2008 when SLARI's first strategic plan was developed, the institution was weak in social sciences, agricultural extension, animal breeding, agricultural engineering, food science and technology, weed science, forestry and agroforestry, biotechnology, biometrics, information technology, aquaculture and fisheries (SLARI, 2011c).

The current and projected need for human resources at the Institute

Analysis of distribution of the current and projected SLARI research scientists (Table 3) indicates that majority of them are clustered in the broad research disciplines of production, improvement, protection and disease control. Although this is not a very bad situation for SLARI yet, the trend should not be allowed to continue and should be corrected particularly considering the Institute's adoption of the APVCs approach to research for development within the framework of IAR4D that requires addressing of constraints along the whole product value continuum from production to consumption.

Levels of capacity development

In this paper, the authors have focused on both 'soft' and 'hard' capacity development interventions that are within the scope of the agricultural innovation system in Sierra Leone. Among others, the 'soft' capacity development intervention considered is training and organizational capacity development, while the 'hard' capacity development intervention discussed is infrastructural improvements which is considered as part of the enabling environment (UNDP, 2008). The nature of the capacity development interventions was based on a thorough needs assessment and on careful context monitoring.

Individual level capacity development

The focus at the individual level is on developing knowledge, skills and attitudes of the staff to work together within the rules and values of the organization and interact with a wide range of organizations involved in agricultural transformation. The individual level capacity assessment therefore considers the individual's capacity to function efficiently and effectively within the organization and within the broader environment.

The focus at the individual level is on developing knowledge, skills and attitudes of the organization's players (the staff) to play by the rules of the game (DFID, 2003). The findings on the status of the research scientists in terms of current complement, age and gender distribution, level of training and disciplinary mix paint a very gloomy

Table 2: Status of research scientists in 2008 by centre and level of training

Research Centres and SLARI Headquarters		Total no. of scientists	Highest qualification and percentage of total		
			PhD	MSc/MPhil	BSc/B
1	Njala Agricultural Research Centre	22 (34.9%)	2 (9.1%)	10 (90.9%)	0
2	Rokupr Agricultural Research Centre	19 (30.1%)	3 (15.8%)	9 (47.4%)	7 (36.8%)
3	Kabala Horticultural Crops Research Centre	1 (0.02%)	0	0	1 (100%)
4	Teko Livestock Research Centre	4 (0.06%)	1 (25.0%)	3 (75.0%)	0
5	Freetown Fisheries Research Centre	2 (0.03%)	0	2 (100.0%)	0
6	Kenema Forestry and Tree Crops Research Centre	6 (0.09%)	1 (16.6%)	5 (83.3%)	0
7	Mogbosi Land and Water Research Centre	5 (0.08%)	0	5 (100.0%)	0
8	SLARI Headquarters	4 (0.06%)	2 (50.0%)	2 (50.0%)	0
Total Institutional Research Scientists Complement		63 (100%)	9 (14.3%)	46 (73.0%)	8 (12.7%)

Table 3: Summary SLARI institutional current and optimal human resource requirement

S/No.	SLARI Research Centres and Headquarters	Total SLARI and Centre Staff Required by Cadres				
		Current number of scientists	Optimal number of scientists	Technical support staff	Administrative support staff	Total by Centre
1	Njala Agricultural Research Centre	22	54	108	216	400
2	Rokupr Agricultural Research Centre	19	49	98	196	362
3	Kabala Horticultural Crops Research Centre	1	32	64	128	225
4	Teko Livestock Research Centre	4	8	16	32	60
5	Freetown Fisheries Research Centre	2	17	34	68	121
6	Kenema Forestry and Tree Crops Research Centre	6	42	84	168	300
7	Magbosi Land and Water Research Centre	5	19	38	76	138
8	SLARI Headquarters	4	10	25	15	54
Total SLARI Staff Requirement		63	231	467	899	1660

picture for SLARI. Even the Njala and Rokupr centres (see Table 3) that are currently considered to be functional were operating at below half of the required research scientist complement at the time the first strategic plan was developed in 2008. Given this state of affairs, the second strategic plan (2012–2021) requires action in the following areas:

- Put in place at least half of the required staff complements for each research centre and headquarters if meaningful research is to be conducted. The recruitment of the required research scientists should be geared towards attracting highly qualified and competent staff that can be developed to assume higher research responsibility. SLARI has not achieved the goal of attracting highly qualified and competent staff, especially from outside Sierra Leone because of uncompetitive salaries and relatively poor working conditions. In this regard, SLARI placed a premium on recruiting primarily at the first degree level candidates with a minimum of Second Class Honours Upper Division and train upward to the Master's and PhD levels.
- The SLARI Strategic Plan for the period 2012–2021 has been designed to position the Institute strategically to play a critical role in the transformation of smallholder agriculture from subsistence to an innovative, commercially oriented and modern agricultural activity as envisaged in NSADP-Smallholder Commercialization Programme. This transformation is expected to be achieved through the adoption of APVC approach to research for development. In view of this, SLARI is currently putting in place research scientists in the right mix of age, gender and research disciplines or areas of specialization capable of addressing the challenges experienced along the whole APVC continuum. Some of the key disciplines or areas of specialization that are required include markets and marketing, processing and entrepreneurship, food science and technology, policy and policy analysis and rural sociology among others. A good number of socio-economist have been recruited and trained to fill these gaps in the various research centres of SLARI.
- The scientists-technical-administrative staff ratio of 1:2:4 can be applied on average bearing in mind that some programmes like socio-economic, policy and outreach may have smaller ratios while others may have higher ratios. The ratios have not, therefore, been applied uniformly but depending on each centre and the complexity of the programmes. In our recruitment process based on the projected staffing needs of SLARI, management has taken into account the current changes in the institution, agricultural sector and national development. Some of these changes and demands include the need for sustainable funding of agricultural research, technology transfer, application of new frontiers of science such as biotechnology, policy analysis and development as well as managing new programmes among others.
- In order to maintain up-to-date knowledge and skills of research scientists in their respective areas of specialization, SLARI has also developed and is implementing an appropriate short-term capacity development programme. The short-term training courses under this programme are offered to research scientists to enable them to acquire new knowledge, skills, techniques, methods and attitudes. The aim of the short-term training courses is to improve the research scientist productivity, job satisfaction, motivation and leadership as well as maintaining their scientific and professional competence. The short-term training courses are needs-based, specific and goal-oriented and they take a variety of forms ranging from structured courses to informal activities.

The available short-term modes of training recommended by Kilewe and Kirigua (2012) include (1) induction training; (2) on-the-job coaching and mentoring; (3) study tours, workshops and conferences; (4) technical short-term courses; (5) postdoctoral and research attachment fellowships; (6) agricultural research management training; and (7) long-term postgraduate training. Of the seven modes of training, Kilewe and Kirigua (2012) observed that agricultural research management is the least mode of training undertaken in developing countries' national agricultural research institutes (NARIs). As a result of this, many NARIs with adequate financial, physical and human

resources have ended up being ineffective and less productive in technology generation and transfer.

Kilewe and Kirigua (2012) further observed that training of research scientists is a very expensive undertaking and recommended that SLARI emphasize local training of its staff so as to ensure cost-effectiveness and sustainability. This approach requires the creation and maintenance of a local pool of trainers within the Institute to foster human resource development on a continuous basis through short-term courses and workshops. This would require training of trainers through the following six steps process:

1. Identification of priority areas in which SLARI needs to train trainers.
2. Identification of suitable individuals to be trained as trainers in each of the identified priority area of training.
3. Identification of suitable external trainers from local and overseas institutions to train the selected trainers.
4. Bringing together the identified external trainers to develop course content, prepare training materials and train the selected local trainers.
5. Utilization of the trained local trainers to conduct similar training courses to other members of staff.
6. Utilization of the external trainers to evaluate the performance of the trained local trainers.

Organizational level capacity development

At the organizational level the focus is in developing organizational capacity to be able to play by the rules of the game set at the enabling environment (North, 1990). In order to make an assessment of the organizational level capacity of SLARI, the following eight capacity development strategic areas of focus that are most commonly encountered in performance-focused agricultural research organizations were analyzed. These are (1) Research programming and management; (2) Human resource development and management; (3) Financial resource mobilization and management; (4) Physical infrastructure development and management; (5) Organizational leadership and management; (6) Corporate governance and process management; (7) Organizational governing and operating/management structure; and (8) Organizational performance assessment and management. While all the strategic areas are important with varying degree of strengths and weaknesses, the focus of SLARI in the first phase of the strategic plan (2012–2016) is on human resource training and physical infrastructure development and management. In this regard, we have had short term training in the following areas:

1. Performance management training for all SLARI staff.
2. Procurement procedures.
3. Accounting procedures especially in the area of requesting and retiring funds for research work.
4. Value chain analysis and how to integrate value chain into the research process.
5. Project management including proposal writing, managing research funds, and property rights.
6. Training on the use of innovation platforms.
7. Data entry, management and analysis using SAS and SPSS.

Enabling environment level capacity development

At the enabling environment level, the focus is in putting in place the rules and values that will drive organizational capacity development. The enabling environment level represents the broad national context within which agricultural research for development operates. It is concerned with policy at the highest levels in government, the socioeconomic conditions that enable or constrain agricultural research for development. This level can have immense influence over what happens at the lower levels (Kilewe & Kirigua, 2012).

The enabling environment level is often given insufficient attention during most capacity assessment studies because it is seen as too difficult and diffuse to address. This was the same case in this study. Following the cessation of civil unrest in Sierra Leone, the country embarked on various initiatives aimed at creating enabling environment needed to spur economic growth and poverty reduction. This road to economic growth and poverty reduction for Sierra Leone saw the development of various development plans and strategies that included (1) Interim Poverty Reduction Strategy Paper; (2) National Recovery Strategy; (3) Sierra Leone Vision 2025; (4) Second Poverty Reduction Strategy Paper: The Agenda for Change; and (5) National Sustainable Agricultural Development Plan among others. As a continuation at the institutional level, SLARI during the second operational plan has contributed to creating an enabling environment by;

1. Developing research policy.
2. Developing the Agricultural Extension Policy.
3. Revising the SLARI Act and developing the regulations to enhance its implementation.
4. Developing accounting and procurement manuals.

Lessons and challenges

The prospects for capacity development and the lessons learnt of a post-war country as we experienced in Sierra Leone are several.

- During the crises period the West and Central African Council for Agricultural Research and Development provided modest support for development activities to encourage and/or retain staff in 'safe' areas.
- Much support was also provided to civil society organizations including non-governmental organizations active in agriculture, farmer based organizations, and agribusinesses.
- International centres for agricultural research such as the International Institute of Tropical Agriculture and the International Centre for Research in Agro-forestry provided support for genetic resource conservation and seed production and facilitated information and knowledge sharing using practical tools.
- Our postgraduate studies focused on the long term priority areas including plant breeding & biotechnology, food science, environment and natural resources management.
- Post conflict development and innovation showed the need for participatory and bottom-up planning. Hence our short term research interventions shifted away from supply led activities to demand driven research for service delivery. As of now, farmers are represented in the research management cycle through innovation platforms to verify and monitor the relevance of the research interventions.
- Increased agriculture productivity and production leading to food and nutritional security although most of the gains made over time were recently lost to the Ebola pandemic which devastated and wrecked the farming communities.
- Processing, value addition, and marketing of agricultural products along the value chain has created opportunities for off-farm employment and livelihoods for both men and women. SLARI's research programmes will continue with value addition and marketing to help in developing the private sector.
- Dependence on foreign interventions during the war created a dependency syndrome which Sierra Leone is currently dealing with. Investments in agricultural development and innovation must be conceived with a minimum of sustainability. The relevance of local knowledge is often underestimated by local authorities who yearn for foreign experts under the disguise of consultants.
- Agricultural advisory services are expected to play multiple roles, from organizing farmer groups, facilitating linkages, training on agricultural, nutrition and health

issues under different situations. This requires a new human resource capacity development program.

Some of the challenges faced in post war Sierra Leone are:

- Low investment in agriculture, poor road network, weak extension system, lack of access to finance for agricultural production, and the lack of adequate capacity to implement programs.
- Low involvement of the private sector in agriculture sector.
- Reluctance of financial institutions in lending agriculture.
- Difficulty to retain trained staff as a result of poor salaries and incentive packages provided by the research institution.
- Weak linkages and coordination between agriculture education-research-extension.
- Revitalizing the shattered economy requires macroeconomic management reform, as well as efforts to fight corruption and mismanagement.
- The ultimate challenging task is to penetrate the regional market with high value-added products.

Conclusion

This paper has examined how the SLARI used training and development to build capacity for innovation in agricultural research following the country's civil war which ended in 2002. The Institute's training for innovation addressed different APVCs within the framework of the IAR4D approach, which recognizes the need for collective action by involving a broad range of stakeholders and multiple knowledge sources that can be used to address complex development challenges along value chains.

The innovative features of the training scheme were:

1. Training was demand driven based on the specific needs of staff at various levels of the APVCs.
2. Priority was given to local context training to minimize cost, except in situations where such skills were not locally available, when personnel were sent to universities within the West Africa sub-region.
3. Training involved a broad spectrum of stakeholders including farmers, extension workers, fabricators, processors, input suppliers and other stakeholders along the APVC.

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