

TERMS OF REFERENCE FOR A CONSULTANT TO ASSESS AND FORECAST HUMAN CAPITAL REQUIREMENTS IN RWANDA'S AGRICULTURAL SECTOR

A. Introduction

The Malabo declaration of 2014 was a recommitment by African Heads of State to the key principles and values that define the Comprehensive African Agriculture Development Programme (CAADP). Amongst these principles and values is the pursuit of agriculture-led growth as a main strategy to achieve targets on food and nutrition security, and shared prosperity on the continent. The Sustaining CAADP Momentum Results Framework (NEPAD 2014) asserts that to deliver on CAADP, increased human skills development and purpose-built capacity (quality and quantity) for innovation, science and technology would be imperative. Skills shortages can affect growth through their adverse effects on labor productivity and poor structural transformation.

Experiences over the last slightly-over-a-decade of CAADP indicate that lack of qualified technical staff for most countries is a key challenge to implementation. Moreover, a cursory review of the National Agriculture and Food Security Investment Plans (NAFSIPs) points to significant capacity deficits that will have to be addressed for the successful implementation of CAADP. Addressing such capacity deficits will require holistic needs assessments for all key commodities identified in the NAFSIPs and other national and regional food and nutrition security strategies.

Overall, there is need to identify existent, projected, and associated capacity gaps of the key areas of NAFSIPs, and the recently adopted Science Agenda for Agriculture in Africa (S3A). FARA, ASARECA and the other sub-regional organizations (SROs) have therefore joined hands with other operational partners with support from the European Union (EU), to implement "Africa Human Capital in Science, Technology and Agripreneurship for Food Security Framework (AHC-STAFF)". The purpose of AHC-STAFF is to develop and validate a framework for demand-led and holistic capacity strengthening in Africa that will contribute to the successful implementation of the CAADP-NAFSIPs. The expected results of AHC-STAFF are therefore: (1) Key skills and competencies required to implement the NAFSIPs and the Science agenda assessed. (2) Human resource pools for the targeted countries mapped for suitability to address market demands and to implement the ARD programmes for NAFSIPs and S3A. (3) A framework and strategies for human capital formation developed and validated.

To deliver on the three result areas of AHC-STAFF, a series of sector wide studies are being undertaken in different countries in Africa, to define the current human capacities and the gaps to achieve the desired human resource pool at sub regional and continental levels. These studies encompass "Interpreting the Existing Global Yield Gap Atlas Data to Determine Capacity Gaps"; "Assessment and Forecasting Human Capital Requirements in Agriculture"; Reviewing the National Agriculture and Food Security Investment Plans and determining

implementation capacity gaps; and Forecasting future human capital demands along selected value chains.

In partnership with FARA, ASARECA is seeking the services of a Consultant to undertake the study to forecast the likely demand for agricultural human capital requirements in terms of quality and quantity in Rwanda. The exercise is expected to inform educational and skills development in the agricultural sector.

B. Objective of the Assignment

This assignment seeks to forecast the agricultural human capital requirements in terms of quality and quantity in Rwanda needed to spur and sustain productivity growth in the country's agricultural sector.

C. Scope of Work

The study will employ an adapted version of the Parnes approach to assess current stock of and forecast future qualitative and quantitative human capital in the agricultural sector in Rwanda. This approach requires:

- a) Identification of sub-sectors of the Rwandan economy which employ agricultural skills in large numbers;
- b) Estimation of current total employment and its distribution by various agricultural skills in each sub-sector of the economy identified above;
- c) Assessing future growth in total employment in each sub-sector using a variety of quantitative methods such as trend analysis, targets set by development plans, etc. and supplemented by qualitative information gathered from Focus Group Discussions and expert opinion from agencies such as research institutions, industry associations, etc.;
- d) Breaking up the total employment in each sub-sector projected as in step c) by the agricultural qualifications identified in step b) modified if necessary on the basis of expert opinion and other qualitative inputs.
- e) This gives us the stocks of different agricultural qualifications required over the projected period 2015-2025. These stock projections would then be converted into flow projections which give an indication of the annual outputs required from educational and training institutions.¹
- f) In addition to the above quantitative forecasts, the consultancy will develop an industry competency model for agricultural education, for which information will be collected from various industries.

These steps are broken down in the following specific steps 1-VI to be undertaken by the Consultant as follows:

I. Preparatory tasks:

¹ The equation used is $F(t+1) = S(t+1) - S(t)*(1-k)$, where $F(t+1)$ is the required flow in the year $t+1$, $S(t)$ and $S(t+1)$ are the stock projections for the years t and $t+1$, and k is the annual rate of net attrition due to deaths, retirements and migration, etc.

The following preparatory tasks will be undertaken by the Consultant:

- Map the institutional arrangements in the agricultural sector in Rwanda including all ministries and agencies and allied offices handling development, research, education and training, extension, regulation, industry and private enterprise across horticulture, livestock, fisheries, forestry, animal husbandry, veterinary services, crop husbandry, agricultural processing, mechanization, biotechnology, etc
- Contact the highest offices in the sector and seek their cooperation and engagement in the proposed study
- Conduct intensive mining of existing national data sources including statistical reports, occasional research reports, web resources to unearth and assemble relevant information on various aspects of the economy and agricultural human resources. As applicable, customize the tools for surveys, key informant interviews and or focus group discussions to fill data gaps. A summary of likely data requirements is provided in Annex 1.
- Document the limitations of each data set including conceptual inadequacies, incomplete coverage, and out-dated nature of data as these will have a bearing on the quality and validity of the results and their interpretation.

II. Survey of Educational and Training Institutes:

The primary purpose of this survey is to obtain latest data on the annual out-turn of agriculturally qualified men and women at various levels – from certificate to doctorate. It will also be used to gather information on number of teachers/lecturers/instructors by qualification, competencies imparted, major areas of employment, transition ratios from one level to another, linkages with industry, etc. The Consultant is expected to undertake the following tasks:

- Compile the master list of all universities (with a focus on relevant faculties and departments), colleges and training institutions imparting education/training in agriculture and allied fields.²
- Devise a sampling design in consultation with a local statistician using either simple random sampling or stratified sampling for any of the three categories where the number of institutions exceeds 50
- Obtain the buy-in of University Registrars and or relevant Faculty heads or Principals of colleges and training institutions
- Adapt the continental-level questionnaire (to be shared by the client) to Rwanda's context
- Undertake the survey focusing on only students and faculty in agriculture and allied fields.

III. Survey of Establishments:

² The list should cover both public and private sector institutions and where applicable; all the various campuses/locations.

The purpose of the survey of establishments is to gather information on i) employment of agri-qualified human resources at present and future outlook; ii) Likely requirements over the forecast period (2020 and 2025); and iii) Industrial competencies required and skills gaps. The Consultant will be expected to undertake the following tasks:

- Compile the master list of all likely employment agencies in the agricultural sector including government ministries & agencies³ and their field offices; autonomous public agencies; research institutions; financial institutions; NGOs, industrial establishments⁴; other establishments such as those renting agricultural equipment, providing agricultural services such as soil testing, warehousing, logistics and distribution, etc.
- Devise a sampling design in consultation with a local statistician using either simple random sampling or stratified sampling
- Obtain the buy-in of establishment heads
- Adapt the continental-level questionnaire (to be shared by the client) to Rwanda’s context
- Undertake the survey focusing on establishments in agriculture and allied fields⁵.

IV. Focus Group Discussions:

Focus group discussions will be undertaken to gain insights into specific aspects of the study and to triangulate the information gathered from the surveys. The data, opinions and other information derived from various sources should be compared where possible and if there is any divergence, it needs to be reconciled through data verification, seeking expert opinion and other means of triangulation to arrive at a consistent set of conclusions. The Table below provides an indication of our understanding of the categories of focus groups that will be relevant and likely topics for discussion.

Group	Topics
Recently passed out alumni of agricultural colleges/universities/training institutions	<ol style="list-style-type: none"> 1. Employment areas and prospects, unemployment 2. Shortcomings in the education received
Food processing industries	<ol style="list-style-type: none"> 1. Past growth of the industry and future prospects of growth 2. Industrial competencies

³ Universities and other educational and training institutions are covered separately in the institutional questionnaire and need not be covered here again.

⁴ The industries most relevant for agricultural human resources are input industries like fertilizers, pesticides, seed, animal (including poultry) feed and breeding industry, fish seed and feed, fishing craft and equipment, manufacture of agricultural machinery and veterinary pharmaceuticals; and output industries like processing of various types of food (e.g. sugar and dairy products) and beverages (e.g. beer), paper, textiles, wood and other forest based industries.

⁵ Part B on information on industrial competencies is to be collected only from large food processing and input (seed, fertilizer, pesticide, etc.) industrial establishments. As a general criterion to identify large industrial establishments a threshold total employment size of 50 may be adopted.

Input industries (fertilizers, pesticides, agricultural machinery, etc.)	<ol style="list-style-type: none"> 1. Past growth of the industry and future prospects 2. Industrial competencies
Other employers: Government (Ministries of Agriculture and Education), financial institutions (banks), autonomous organizations and NGOs	<ol style="list-style-type: none"> 1. Employment of persons with agricultural qualifications/skills and prospects of growth 2. Skill gaps
Teachers of agricultural colleges	<ol style="list-style-type: none"> 1. Quality of agricultural education and its relevance to the market 2. Industry- institution linkages

The Consultant will be expected to undertake the following tasks:

- Based on experience with the data mining, literature search and surveys; review and identify groups for more insightful discussions
- Review the focus group discussion checklists developed at the Continental level (to be provided by the client) and adapt them for use by each category of focus group discussants as appropriate
- Secure appointments with each category of focus group discussants and undertake the exercise
- One of the FGDs planned should be used to get a consensus from employers of food processing and input industries the personal, industrial and occupational competencies desired by them in persons to man positions requiring qualifications in agricultural and allied fields.
- Prepare a synthesis report of the focus group discussions outlining key issues such as the sectors where qualified personnel find employment, present levels of employment and unemployment, likely rate of growth in employment into the future, skills and attributes expected by employers in agricultural personnel and the current gaps.

V. Industrial Competency Model:

Competency modeling for an industry involves identifying the different types of traits required in an employee to perform the job in a particular industry efficiently. Such competencies are grouped as personal competencies (such as academic qualifications, inter-personal skills, etc.), industry competencies (such as awareness about specific features of the industry, its relations with other industries, etc.) and occupational competencies (skills required in a specific occupation).

The Consultant will be expected to undertake the following:

- Based on the information collected from the establishment questionnaires and FGDs, develop an industry competencies model for a) Food Processing industries and b) other input industries. It should be presented in the following format and separately for input industries and food processing industries:

Industrial Competencies Model for Food Processing Industries

Position	Competencies required		
	Personal	Industrial sector	Occupational
1	1. 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2	1. 2 3 4 5	1. 2 3 4 5	1. 2 3 4 5
3			

VI. Analysis and Projections of Human Capital Needs in Agriculture:

The forecast horizon for human resource requirement in agriculture will be 2015 – 2025. Forecasts will be made for the demand side only as the supply has to be aligned with the emerging demand. Demand projections will be first made in terms of total stocks of agriculture-qualified human resources required to meet the needs of various sub-sectors of the economy for each year of the projection period. These stock projections will then be converted into annual flows required from the agriculture education and training systems, allowing for attrition of stocks due to retirements, deaths and migration. These annual flow requirements will then be compared with the current annual flows or annual flows that are likely if the educational system keeps on expanding at the current rate. This will give an idea about the scale of accelerated expansion that is likely to be needed to arrive at a supply-demand balance in terms of numbers.

The Consultant will be expected to undertake the analysis using the steps outlined in Chapter 7 in Agrawal (2015).

D. Outputs or Deliverables

The following outputs are expected from the national consultant:

1. Inception report by 15th December 2017
2. Relevant data sets by 15th January 2018
3. Draft analytical report of the human capital assessment and forecast for the Rwandan agricultural sector by 30th January 2018
4. Final report incorporating client and stakeholder comments by 15th February 2018

E. Duration of the Assignment

The human capital assessments and forecasts will be undertaken within two months, but the effective duration of the consultancies will vary as follows:

- 25 days (5 days to adapt the instruments, compile the master lists and map the institutional arrangements including obtaining stakeholder cooperation and buy-in; 12 days to implement the methodology and undertake analysis, 5 days to compile the draft report and 3 days to compile the final report.

F. Location of the Assignment

The consultant will be based in Rwanda.

G. Performance Criteria

The Consultant is expected to undertake the services with the highest standards of professional and ethical competence and integrity. They should be able to deliver the listed assignments in Section C in a most effective and efficient manner, within the period of the assignment stated in Section E.

H. Reporting

The consultant will report directly to ASARECA, specifically to the Policy, Markets and Institutional Arrangements Unit on the dates specified in Section D. The report format is as provided in Annex II.

I. Facilities to be provided by ASARECA

ASARECA will provide the following to the consultants (through the sub-regional organizations):

- The validated methodology as documented in Agrawal (2015)
- The reporting format
- AHCSTAFF reports on Rwanda
- Any other logistical support, as may be agreed, to facilitate execution of the field reviews

J. Qualification and Experience

The person to undertake this assignment should:

- a) Have a PhD degree in economics, applied statistics, agricultural economics, or development studies
- b) Have over 5 years professional or post-PhD experience, with evidence (publications or testimonials) of similar econometric studies undertaken
- c) Demonstrate nuanced knowledge of current African agricultural development agenda (e.g. the CAADP country processes) and the FARA Forum

- d) Be conversant with contemporary thinking on capacity development for agricultural innovation
- e) Be hands-on with quantitative techniques of (e.g. social) data analysis
- f) Have demonstrable ability to write concise technical papers and synthesis reports
- g) Having bilingual competency (i.e. English & French is an added advantage)

G. Applications

Interested individual consultants are required to send their CVs, technical and financial proposals via email to:

The Procurement and Contracting Officer

ASARECA Secretariat

P. O. Box 765, Entebbe

Uganda

Email: procurement@asareca.org with a copy to m.kyotalimye@asareca.org

For any further clarification, you may contact Miriam Kyotalimye on m.kyotalimye@asareca.org

Closing date: 5.00 PM 30th November 2017

ANNEXES

Annex 1

Data and information sources

Nature of data	Sources	Remarks if any
<ul style="list-style-type: none"> • Macro-economic data on output in the agricultural sector (agricultural GDP) and or growth rates of GDP for the past few years. Preferably disaggregated for crop, livestock, forestry, fisheries, agricultural services, veterinary services, various food processing industries, agricultural machinery, etc. • Expected planned rates of growth in agricultural GDP to 2025 	Bureau of Statistics or similar organization, through national accounts	To enable identification of trends for future projections
<ul style="list-style-type: none"> • Time series data on total employment in the different sub-sectors mentioned above • A break-up of total employment by agricultural qualifications (certificate, diploma, first degree, post-graduate degree and doctorate levels) for 2016 	Bureau of Statistics or similar organization, through censuses and periodic socio-economic surveys. These would generally be available with lesser frequency than output data	To enable identification of trends for future projections. In conjunction with output growth rates, these will enable estimation of employment elasticities
Lists of agricultural universities, colleges and training institutions, and research institutions	Ministry of Education; Ministry of Agriculture; AET Handbook; ASTI website; etc.	For sending relevant questionnaires on census or sample basis depending on the number
Data on admissions, enrolment and out-turn (pass-outs) from agricultural universities and colleges by qualification - certificate, diploma, first degree, post-graduate degree and doctorate for the last 5 years (2012-2016). Care should be taken to assemble data only for agriculture-related disciplines	Ministry of Education; Ministry of Agriculture; websites of individual universities and colleges and their Annual Reports	To study the supply position of agricultural human resources and trends.
Number of production units and the total employment in each of the sectors mentioned above disaggregated by agricultural qualification for 2016 (or the latest year available). Such data for a few	Bureau of Statistics, Industry Associations	For sampling establishments to administer questionnaires. For identifying the large establishments (50 employees and above) for studying industrial competencies

years would help in establishing trends. If possible, the data may be classified by employment size		
Proposed investments in different sectors and expected growth	Ministry/department of Planning, Agriculture, industry associations; national plan documents, industry reports	To form a basis for future projections
Any information on patterns of absorption of trained agricultural manpower in the economy in different sectors including self-employment	Tracer studies and past research reports by national and international bodies e.g. FARA. Can be accessed through Google information mining	Useful to gain relevant insights
Trends in retirements, deaths, migration etc. of agricultural skilled manpower	Any source, such as past studies	For estimating replacement demand

Source: Agrawal, 2015

ANNEX II: REPORTING FORMAT

All the country reports including that of Rwanda follow a broadly uniform pattern so as to facilitate synthesis of the country reports into a consolidated report at the regional and continental level. The consultant is free to bring out any additional feature about the agricultural human resource development that is special, interesting and of crucial importance to agricultural development in Rwanda. The agreed format that the Consultant is expected to use is as outlined below:

Introduction (1 Page)

The Introduction may briefly outline the background and purpose of this study; the scope and methodology adopted;

About the country (1 Page)

A brief account of the general economic situation in the country using GDP growth rates, importance of agriculture to the country's economy and the sector's contribution to national GDP; the country's governance and the administrative units (numbers of regions, districts, etc.); organization of the Report.

Agricultural scene (2 Pages)

Principal crops, trends in production and productivity, production trends in allied sectors like horticulture, fisheries, animal husbandry, forestry, agricultural and animal biotechnology, etc.; organizational set up for agricultural policies indicating the Ministries concerned and their field offices; programmes for development, autonomous organizations, institutions for agricultural research.

Agricultural education (2 Pages)

The system, universities, agricultural colleges, training institutes, agricultural education in schools, duration of courses, trends in admissions and out-turn (pass-out), participation of women in agricultural skill development and education process.

Current annual supply of agri-cultural human resources (3 Pages)

The total number of agricultural certificate, diploma, first degree, post-graduate degree holders and doctorate in the country during 2014-15, gender-wise and area of study. This should include data in respect of all educational and training institutions in the country. The data for this table should ideally come from the institutional questionnaire (ANNEXURE I). If sampling is adopted in the case of any institutions, the data should be appropriately estimated by inflating for sampling before adding to the data for institutions covered on a census basis. If any institution has not responded in spite of all possible efforts, an approximate has to be incorporated for that institution on the basis of latest data available from other sources. This section should also provide information on the ratios of transition from one level of education

to the next higher level (e.g. from graduate to post-graduate, or from diploma to degree, etc.). This section should also discuss the extent of migration of agricultural human resources to other countries and any conclusions on the nature and quality of agricultural education in the country based on available research studies, such as tracer studies already conducted by other scholars, and outcomes of FGDs of students and teachers on agricultural education.

Current deployment of qualified/trained agri-human resources (4 Pages)

This important section should present information on the total estimated number of qualified/trained agri-human resources employed in different sectors of the economy, such as government, research institutions, educational institutions, industries, NGOs, farmer organizations, financial institutions, etc in 2015. The source of information for this section would mainly be Establishment Questionnaire (ANNEXURE II), supplemented where necessary by other published/unpublished sources. As in the case of supply, necessary estimation should be done wherever sampling is adopted before adding the sample-based data to the complete enumeration data. Comments on the quality of data may be added here. This section should also present the distribution of this total employment by agri-educational and training qualifications on the basis of data collected through establishment questionnaires for different sectors.

Projected growth of employment in different sectors (4 Pages)

The alternative rates of growth of total employment over the projection period assumed for different sectors and the consequential projections of total employment should be discussed, with an indication and justification of the basis for the assumed growth; Break-up of this total employment in each sector by agri-qualifications and training should be presented.

Required stocks and flows (2 Pages)

The projections of total stock of human resources qualified at various levels in agriculture that would be needed in different years of the projection period (2015-25) would be presented; the requirements would then be presented in terms of annual flows at various levels required from educational and training institutions, taking into account the replacement demand also.

Required growth in capacity (1 Page)

The required flows for 2020 and 2025 would be compared with the current flows of 2015 to assess the additional capacity needs

Industry competencies model (2 Pages)

A model of competencies expected by the industry in agricultural human resources at various levels and at various functional positions would be presented in this section, indicating how they have been derived.

Summary and suggestions (2 Pages)

The main points emerging from the entire exercise will be summarized and suitable recommendations.