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Country: Tanzania

Country project: TZ92

Host: Sokoine Agricultural University

Venue: Farmer to Farmer Program

Audience: Administration and Faculty at Sokoine Agricultural University

Number of people: Approximately 25 people

Date: February 28, 2017



Background to Report

This report is a collective effort of Ron Taskey and Warren Dick. It was prepared after interviews with administration, faculty and staff of Sokoine Agricultural University and the Department of Soil Science and Geological Sciences. Information was also gleaned from the final report of the iAGRI project that was made to the USAID officer on February 23, 2017 at Sokoine Agricultural University, Morogoro.

1. Assignment Objectives as in SOW

1. Improve efficiency of the current Department of Soil and Geological Sciences laboratory for teaching, research, and consultancy.
2. Develop and conduct a technician-training program in laboratory procedures, maintenance, and protocols.
3. Develop a program for commercial soil-analytical services (would also include water, plant, compost, manure, etc.)

3. Recommendations to the host with regards to the assignment

Outline of Report

- I. Goal of our volunteer assignment
- II. Laboratory constraints towards progress/change
- III. Recommendations – tied to constraints

I. Goal of Volunteer Program

- A. Evaluate the laboratory managed by the Department of Soil Science and Geological Sciences
- B. Make recommendations as to how to improve the use of this laboratory for teaching, research and commercial uses.

I. Constraints Towards Change/Progress

A. Competing Interests

1. Teaching
2. Research/Extension
3. Commercial

These competing interests often cause conflicts so that it is difficult to develop quality in any one of the three competing interests.

I. Constraints Towards Change/Progress

A. Competing Interests

Teaching is given priority because students need to complete their coursework to graduate. This makes it difficult to serve research projects and outside clientele.

I. Constraints Towards Change/Progress

B. Capacity

1. We heard stories of researchers waiting more than a year for sample analyses results and that was for a foreign researcher who was constantly checking on progress. The capacity of the laboratory is constrained because of the competing interests for the laboratory.

I. Constraints Towards Change/Progress

B. Capacity

2. Teaching needs often require traditional methods, including wet chemistry currently used in the laboratory.
3. Capacity for commercial use is limited because of too much dependence on wet chemistry that was commonly used before more modern analytical chemistry methods were developed.

I. Constraints Towards Change/Progress

C. Quality of Data

1. The data obtained from the laboratory by researchers was reported to sometimes be of poor quality and suspect.
2. Creation of good data is impeded by poor sample flow monitoring, improper use and calibration of equipment and sometimes unavailability of proper standards

I. Constraints Towards Change/Progress

C. Quality of Data

3. Dependence on multiple and manual (i.e. paper and pen) steps for data collection, reporting and archiving is a source of easily introduced errors.

I. Constraints Towards Change/Progress

D. Management Constraints

1. Need for maintenance technician to regularly check on performance of instrumentation.
2. Sample management and flow (pencil and paper generates errors)
3. Need for university computer server space to support the laboratory.

I. Constraints Towards Change/Progress

D. Management Constraints

4. Need for inventory of equipment, equipment manuals, space, and reagents.
5. General cleanup is needed to create more laboratory space.
6. Need to make sure all standard operating procedures are up-to-date and posted on the university computer server.

I. Constraints Towards Change/Progress

D. Management Constraints

7. Need for an effective business manager for day-to-day tasks such as receiving of samples, ordering reagents, invoicing, etc.
8. Need for electricity stability, high quality and reagent grade water, and climate controlled rooms.
9. Need for a place to archive data, invoices, etc.

I. Constraints Towards Change/Progress

E. Financial Stability

1. Need for a proper review of fee structure. Are some analyses being underfunded and others overfunded. This will require an audit of all reagents, technician time and overhead expenses related to each analyses offered by the laboratory.

I. Constraints Towards Change/Progress

F. Certification

1. ISO certification is a worthy goal, but the laboratory first needs to resolve other issues so that consistent, good quality data can be obtained.

I. Constraints Towards Change/Progress

G. Outreach

1. Effort needs to be made to create a brand (i.e. independent entity) that can be used to create general awareness of the laboratory and for future promotion.

3. Recommendations to the host with regards to the assignment

A. Competing Interests

1. Separate the laboratory space into two components. One will be used to support the teaching needs of the university and the other for research and commercial use.
2. Graduate student research/independent study projects by undergraduates could be incorporated into the commercial research interests of the laboratory.

3. Recommendations to the host with regards to the assignment

A. Competing Interests

3. Accounting for the different uses should be tracked separately. This will provide a better understanding of resources needed to improve/support teaching activities and those related to research and commercial interests.

3. Recommendations to the host with regards to the assignment

B. Capacity

1. There is a need to introduce new technologies into the laboratory that is robust and not relying on so much high tech instrumentation (i.e. ICP instrument). This could involve use of IR (Infrared instrumentation) and microchip/fluidice devices. SoilCares uses IR analyses in other parts of Africa and seems to be a successful model to emulate.

3. Recommendations to the host with regards to the assignment

C. Quality of Data/Timeliness of Data

1. Hire someone who can set up, service and calibrate equipment
2. Have the above technician shared across laboratories at Sokoine Agricultural University as we have learned other laboratories have similar issues. For example, it is more effective for one person to become expert that each laboratory trying to do maintenance.

3. Recommendations to the host with regards to the assignment

C. Quality of Data/Timeliness of Data

3. Make sure proper standards are available for each type of equipment and analyses. These should include both certified standards and internal sample standards.

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

1. Update sample flow procedures. A sample submission form is attached as a separate file that could be used as a template for development of such a form.
2. Purchase electricity leveling equipment to interface with sensitive equipment

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

3. Conduct an inventory of equipment, equipment manuals, space and reagents. Post this inventory on the university server. Information of reagents should be tied to MSDS sheets to provide information about proper storage, hazards, disposal, transport, etc.

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

4. Conduct a general laboratory clean-up to create more laboratory space. Samples should only be stored for one month after results are submitted to a client. If reruns are needed, the one-month limit is extended for a second month. Storage should only be for samples to be analyzed by the laboratory.

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

5. Make sure all standard operating procedures (SOPs) are up-to-date. These should then be posted on the university computer server. These SOPs should be based on peer reviewed methodologies and the citations included with the SOPs so that researchers can site these methods in publications

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

6. Hire a business manager to help run the laboratory. This person would be responsible for the financial aspect of the laboratory (and probably have other responsibilities as well) and work closely with the overall laboratory manager to make sure the laboratory functions efficiently.

3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

7. Create a way to record data with as few paper and pencil steps as possible. Archive data on the computer server. Tie the data to the original sample submission form in case any issues arise about the analyses of the samples.

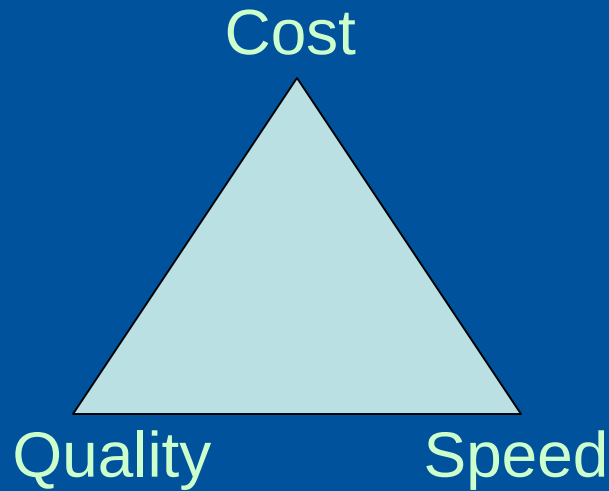
3. Recommendations to the host with regards to the assignment

D. Managerial Constraints

8. Create a way to record data with as few paper and pencil steps as possible. Archive data on the computer server. Tie the data to the original sample submission form in case any issues arise about the analyses of the samples.

3. Recommendations to the host with regards to the assignment

E. Financial Stability



1. Conduct an audit of the fee structure

3. Recommendations to the host with regards to the assignment

E. Financial Stability

2. Fees should be reasonable based upon reagent cost, technician time, instrument use and overhead cost.
3. Fee structures could be flexible with one for students to support teaching, one for university research and one for commercial use.

3. Recommendations to the host with regards to the assignment

E. Financial Stability

4. Have a fee that is reduced for volume of samples. For example submitting 200 samples should result in a lower fee than submitting only two samples.
5. Have an increased fee for priority analyses, e.g. a 72-hour turn around time.

3. Recommendations to the host with regards to the assignment

E. Financial Stability

6. Income to SUA from the laboratory should be based on a set percentage (~5-10% of total profit to the laboratory).
7. Charge a fee for research sample preparation – primarily for drying and grinding of samples. This is a labor-intensive effort and students/individual research projects could prepare their own samples.

3. Recommendations to the host with regards to the assignment

F. Certification

1. Certification (ISO standards) should be the goal of the laboratory. We recommend working slowly and systematically towards that goal. For example, putting into place small steps that lead to certification. Also initially focus on individual methods (i.e. soil pH) where certification may be easier to achieve than for other methods.

3. Recommendations to the host with regards to the assignment

G. Outreach

1. Develop a name for the laboratory to give it an identity – naming competition
2. Create a web page on SUA server that contains a list of services provided along with the fee structure.
3. The sample submission form should be included on the laboratory web page along with other relevant information.

3. Recommendations to the host with regards to the assignment

G. Outreach

1. Develop a name for the laboratory to give it an identity – naming competition
2. Create a web page on SUA server that contains a list of services provided along with the fee structure.
3. The sample submission form should be included on the laboratory web page along with other relevant information.

3. Recommendations to the host with regards to the assignment

G. Outreach

4. Advertise in appropriate places and at the appropriate time like having a link to the laboratory on the Soil Science Society of East Africa web page. Advertise in other appropriate places and these often do not require paying any fee.

3. Recommendations to the host with regards to the assignment

H. Other

1. Make use of students doing practicums to help with the following:
 - Creating inventories
 - Helping to create proper storage
 - Web design
 - Etc.

3. Recommendations to the host with regards to the assignment

H. Other

2. Develop safety training for all technicians and other users of the laboratory
3. Create a plan for disposal of reagents and the reduce the health and safety hazard currently present in the laboratory reagent storage area. This could be a project that obtains funding from outside sources to accomplish.

3. Recommendations to the host with regards to the assignment

H. Other

4. Many recommendations made by Cheryl Wick for the CRS project related to the Food Safety Laboratory at SUA also apply to the soils laboratory
5. Have a competition for developing a portable incineration that can be used to eliminate old, toxic, hazardous chemicals at SUA and throughout East Africa.

4. Anticipated Impact

- Probably the greatest impact will be the linkages we make to act as resources for transforming the laboratory.
- The emphasis on strong and visionary leadership may produce change that is needed to transform the laboratory.

4. Anticipated Impact

- The separation of teaching functions from research/commercial functions should help move both forward in beneficial ways.
- Inventory of reagents, equipment, equipment manuals, and space will provide the necessary background to develop a more detailed plan for the laboratory.

4. Anticipated Impact

- Cleaning up the reagent storage area will improve occupational safety and health. Accomplishing this task alone would have great impact.
- Hiring a business manager and equipment support/repair technician to help organize and put the laboratory on a commercial footing will be a great step forward.

4. Anticipated Impact

- Obtaining space on the university computer server so that important information can be accessed by more than one person and to provide a means to support sample flow and data reporting/archiving will help move the laboratory towards ISO certification.

5. Recommended future volunteer Assistance

- Ron Taskey and Craig Stubler would be willing to come back to Tanzania for follow-up and technician training
- Ron Taskey and Warren Dick would be willing to serve as long-distance resources (via email, skype, etc) to deal with issues that come up with the laboratory.

6. Recommendations to other non-host stakeholders

- Sokoine Agricultural University has become the major player in the agricultural arena. The development of this laboratory could serve as a model for other universities in Tanzania and possible other countries in Africa.

Action plan for host recommendations

Recommendation	Specific Action	Responsible person	By when
1. Inventory the laboratory - reagents, equipment, space	Have one person put in charge with student help.	Current Laboratory Manager who delegates this task	End of 2017
2. Hire a laboratory business manager	This person should have a business degree and some knowledge of agriculture. Create a business plan to provide information on the expected number of samples from large farmers, NGOs, research, government, etc. and amount of expected income.	Current Laboratory Manager	End of 2017
3. Request and obtain server space on SUA's university server	Initiate action to obtain server space and resources to support the IT functions of the laboratory. Integrate work flow through the central server.	IT people at SUA working with soils laboratory people	September, 2017
4. Separate the teaching functions of the laboratory from the research/commercial functions	Work with faculty and administration to identify space and leadership to get this done.	Appropriate vice principal of SUA along with department administration and laboratory manager	March, 2018

Action plan for host recommendations

Recommendation	Specific Action	Responsible person	By when
5. Develop a proper fee structure that can support the laboratory.	Do an audit of costs for each analyses based upon the use of equipment, reagents and space.	Laboratory Manager	End of 2017
6. Hire/train a technician whose responsibility is equipment calibration and maintenance.	This person should be hired to serve the entire campus. It should be shared technician that all laboratories can access. The person should be paid by the fees charged back to individual laboratories for the services rendered. This could save money because it avoids people coming from Dar es Salaam for minor equipment repairs.	Vice Principles and heads of the various laboratories.	September, 2017 (NOTE: This was identified as one of the most pressing needs of the laboratory.)

7. How can CRS improve future volunteer experience

- I was satisfied with my experience. CRS did a great job arranging the details of our trip to Tanzania. Once we arrived at Sokoine Agricultural University, we were pretty much left on our own as to how to proceed. There seemed to be little preparation regarding our arrival and our mission. That is not surprising and was not an overall hindrance to our work.

Thank You!