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REPORT OF CONSULTANCY
COMPUTER SYSTEMS ANALYST/PROGRAMMER
for
National Inputs Coordination Unit

Agricultural Secretariat, Bank of Uganda
Kampala, Uganda

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Under USAID CAAS Project
Contract No. 617-0111-C-00-9100-00

December, 1989

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The consultant worked for four weeks in the National Input Monitoring Unit (NICU), Agricultural Secretariat, Bank of Uganda teaching staff critical elements of computer database and spreadsheet programs, the designing of input monitoring systems, and preparing written instructions for computer users.

Three professionals of the NICU staff are now considered sufficiently well-trained to use spreadsheets and database systems as a regular part of their analytical work.

The consultant assisted the NICU staff in designing a computer-based system to be used to solicit and record data concerning agricultural input distribution by wholesalers in Uganda. Various types of report forms were then designed which would generate information in a format useful to policy makers in making decisions concerning the allocation of limited foreign exchange.

Recommendations were prepared concerning additional training for the NICU staff in the planning and execution of studies and surveys, as well as training in advance programming techniques.

A. Terms of Reference (as originally proposed by ACDI).

Work with the National Inputs Coordination Unit to:

- 1). Develop computer programmes utilizing software identified in the management information systems specialists report.
- 2). Develop written user instructions for the specific computer programmes when necessary.
- 3). Provide initial database and spreadsheet training for the NICU staff.
- 4). Identify additional training requirements for the NICU staff.
- 5). Prepare a brief written description of accomplishments.

B. Background of assignment:

The consultant was contacted on October 12, 1989 by Anne Whitlock, ACDI, Washington regarding a three month assignment as a computer systems analyst with the NICU, Agricultural Secretariat, Bank of Uganda. ACDI requested that the consultant do half an assignment in November-December concentrating on the training component and applications design. Recommendations were also to be made for additional consultant and training support to be furnished to NICU in 1990.

C. Accomplishments Toward Programme of Work

1). Develop computer programmes identified in the management information systems report. NICU is a new unit, only recently staffed, and is yet in the planning stages in deciding the types of data to be gathered and the means to obtain it. Also, very little relevant secondary data is even available due to the recent civil strife that has occurred in the country. Until such time as these decisions are made and data begins to be generated, there is little need for any sophisticated data management system.

The NICU staff and the consultant did, however, jointly develop a programme for agricultural input monitoring in Uganda. This involved the preparation of a 16 field database file, a categorization of input types to be entered on each field, and with many fields selected for emphasis in making subtotals. A number of numeric fields were also selected upon which calculations could be made for formal and informal reports. Quarterly reports generated from the database are intended to

fulfill the major objective of the NICU - that of monitoring national agricultural inputs and furnishing information needed for decision-making in the allocation of scarce foreign exchange.

2). Develop written instructions for computer users.

There is little in the way of reference materials available in the NICU on either the database or spreadsheet programmes. One must therefore, rely solely on information received from the programme help menu. In most cases this information is abbreviated to a point where it is often misunderstood even by those having English as their first language. Luckily, the consultant brought along two easy-to-understand reference manuals which were used to prepare lesson materials for hands-on training. The manuals will be left at NICU for the staff to use as reference.

There were eight "Information Documents" prepared for the staff members of NICU and concerned the use of Dbase IV for input monitoring. All of the presented information was accompanied by hands-on instruction. The document titles and emphasis were as follows:

Title -----	Remarks -----
Use of Wordstar Mailmerge	The Wordstar word processing program is that used by the NICU secretary. The mailmerge option can be used to send the same letter to many different addressees.
Designing a Database and Major Commands	This defines a database and discusses fieldtypes and computer commands. 44 different command types are presented for use in managing the database.
Use of Dbase Mailmerge Option	This is to be used in conjunction with the input supplier database file.
Performing Calculations	Explains how calculations can be included in report fields, in queries, and through direct inquiries from the database "dot prompt".
Calculated Fields and Printing Specific Fields in Queries.	This allows one to add or combine Printing Specific Fields numeric fields for reports and in queries.

 The Use of Memo Fields

 This field type is intended to store narrative information concerning input suppliers. It requires special treatment for information retrieval

Creating and Using Related Database files.

This allows a user to combine two database files for making reports

Monitoring an Agricultural Input Distribution System

Two options were provided for choice of data fields and entries within the fields. A draft questionnaire with instructions was also included. The document also included examples of formal and informal reports which could be generated from the system (see attachment no. 1 and 2).

3). The consultant provided database and spreadsheet training to the following staff members as indicated:

- a. Mr. Charles Tukacungurwa, Livestock Officer: He has had six weeks formal training in microcomputers and is familiar with basic concepts of DOS commands relating to disk handling.

He can handle Quattro (data organization and entry, formulas, graphs and printing). He had had some previous experience with spreadsheets while on the six week USDA/OICD Microcomputer course in 1989. He is able very quickly to decide which option he wants from the various menus. He can design, build spreadsheets, enter data, make calculations, do graphing, and print spreadsheets.

He would benefit from more advanced applications with Quattro; but he can readily use this program as a part of his every day analytic work.

He worked with Dbase IV in the early basic applications but was unable to continue his training due to the terminal illness and death of a family member. He would benefit from additional instruction at the computer terminal from his colleagues who were able to be present at all the training sessions.

His data entry and manipulation skills are slow due to inability to touch-type and lack of enough hands-on experience. Increasing typing skills would be a definite plus.

- b. John Kifuse-Mukoza, Agriculture Officer. He has had the same previous exposure to microcomputer basics as Charles Takagungurwa above. Like Mr. Takagungurwa he is quite familiar with basic Quattro and can readily use the program in everyday application.

During this consultancy he has had the most exposure and training in the use of databases. He can construct database structures, do sorts, searches, prepare templates with subtotals and calculated fields, print formatted reports, create custom forms, perform calculations from the dot prompt, manage a related database using a key field, and work from the dot prompt using basic Dbase commands. Dbase IV is a very complex program and he had the ability to progress through over 400 pages of "Understanding Dbase IV", by Alan Simpson, and to take the leading role in progressing through the eight information documents prepared during the consultancy.

If additional formal training is to be offered, he would be a good candidate. The training should be concerned with advanced computer data management and include areas such as programming, preparing data networks, and managing a central data library. He could increase his efficiency greatly by improving his typing skills.

- c. Ms. Rosern Rwampororo, Agricultural Economist. She has had three months of intensive microcomputer operation in the United Kingdom. She is "very much at home" in working with spreadsheets, and is rapidly learning how to function with Dbase IV. She is equally as good a candidate for additional training such as recommended for John Kifuse-Mukoza above.

She could also improve her efficiency by upgrading her typing skills

- d. Ms. Caroline Ongom, Assistant Agricultural Officer. Caroline had some exposure to spreadsheet and database programs but has not had the experience of the other staff members. Her other duties prevented her from attending some of the training offered. However, in the training she did receive she was quick to grasp the principles and did extremely well.

4). Increasing the speed of data entry and retrieval by NICU staff members.

While this was not specified as an objective in the terms of reference, the consultant was able to obtain a copy of a programme called "Typing Tutor" and install it on the NICU computer. The Director of NICU has agreed to allow each staff member the opportunity to practice typing skills for 15-20 minutes each day.

D. Identification of Additional Training for Staff:

It is difficult to recommend further training for NICU staff until the unit progresses further into the implementation of work programs based on the objectives set forth by the Agricultural Services Task Force. These objectives are:

1) Monitoring volumes and prices of inputs and their distribution in Uganda: This will require considerable work at the computer terminal by the NICU staff. Each member should continue to study and practice the applications which were covered during the consultancy, and to practice more advanced applications which are listed after page 400 in the Dbase IV reference manual.

2). The analysis of the costs and benefits of technical packages, benefit/cost analysis, opportunity costs of local input production, priority investments etc:

- a. Achieving this objective suggests the use of economic tools such as partial and break-even budgets, complete budgeting, agricultural project analysis (both financial and economic), and farm modeling. Economists such as Ms. Rwampororo and Mr. Kifuse-Mukoza who have progressed beyond the B.S.C. level have had training and experience in these areas. Spreadsheet programs are especially adapted to facilitating this type of analysis and the fact that three of the NICU staff are knowledgeable of Quattro and Lotus is a definite plus.

However, achieving the above objectives will also necessitate having skills in population sampling techniques, managing a survey, being able to translate objectives into quantifiable variables, and writing reports based on the survey findings. After examining some of the survey designs and work objective outlines by NICU staff, it is believed that additional training is needed in this area. This training could be accomplished one of two ways - either bring in another consultant to work with the staff in the actual design and completion of a survey, or - to send staff members to another short course emphasizing the teaching of these techniques.

In case a short-course approach is selected a good choice would be "Basic Agricultural Survey Statistics and Methods" (USDA TC 140-33). This is conducted each year by USDA/OICD in Washington, D.C. during September-October over a period of six weeks.

Another course having the same objectives is conducted each year at the ASEAN Economic Development Training Center, Bangkok, Thailand and is under the sponsorship of a number of Asian countries, however African participants have been accepted in the past. Participants actually plan, conduct, and write a report for a field survey of rice farmers. The course faculty is drawn from the Office of Agricultural Economics (OAE), Ministry of Agriculture, Bangkok, Thailand, and from the Department of Agricultural Economics, Kasetsart University, Bangkok (Bang Khen), Thailand. This writer was a guest lecturer for the course from 1982 to 1985 and recommends it for its very grass roots application, practicality, and low tuition and maintenance costs for participants. Inquiries might be directed to the Director General, OAE, Rajadamnern Avenue, Bangkok.

3). Within a year the NICU and other offices of the secretariat will be generating sufficient computer data which will require more sophisticated methods of management. Data sharing with other secretariat units would also be possible through maintenance of a centralized library. At least two experienced database users representing the secretariat itself should go for this advanced information management training which would cover programming techniques such as:

- a. Decision making with command files, looping, creating procedure and multiple files, and interfacing with other programs.
- b. Managing a data library.
- c. Management of a work station and computer room. Possibly this training can be done through a local or Nairobi-based firm. Another alternative is to hire a computer programmer consultant to conduct the training. It is preferred to do by the former if a qualified training institution can be identified.

E. Recommendations:

1). Spreadsheet applications: Both Mr. Kifuse-Mukoza and Mr. Tukacungurwa learned some excellent applications with Quattro spreadsheets during their training with Art Stocker at OSU last summer. They are the same applications that used for agriculture analysis while both he and the consultant were working on the same project in Thailand in the mid 1980's. The applications include farm modeling, partial budgeting, and the use of simple linear programming techniques.

Using the above methodology the staff should begin to construct some farm models representing the various ecological zones of Uganda. While the information might be very inaccurate it can be improved upon over time. Even when used on a trial basis the models could provide some basis for recommendations to the policy committee concerning requirements and opportunity costs of farm inputs.

2). Use of Laptop computers: The NICU might well do with two additional computers preferably lap tops equipped with Quattro, Dbase IV, and Word Perfect word processing programs.

The laptops can be used in conjunction with the existing NICU computer for use in data entry in Dbase IV, spreadsheet modeling, and to coalate and analyze data from farm production and marketing surveys. Present day models are virtually trouble-free and are ideal for use in the field and under conditions of inadequate electrical power supply.

3). Maintaining and Improvement of Computer Skills. NICU staff should take some time each day to upgrade and maintain skills in database and spreadsheet use, and word processing. At the present time, the NICU computer is not in use much of the time and it could be more efficiency utilized by staff in learning a new application, or becoming more proficient in an application learned during the period of the consultancy.

Attachments:

1. "Use of a Database for Monitoring an Agricultural Input Distribution System" (extractions from Info. Doc.No. 8, p. 5).

2. "A Second Option for Data Fields for Use in Monitoring Agricultural Inputs." (extractions from Memo to Director, NICU,

3. Copy of Minutes of Meeting at NICU to Review Inputs Monitoring.

(extracts from Info Document No. 8, NICU, 28 Nov 89)

The purpose of this document is to demonstrate the use of a simple application of Dbase IV for monitoring the distribution of agricultural inputs in Uganda.

What is a database? This is simply a way of organizing the collection of information such as lists of importers and addresses and collating survey results. The database provides a set of tools by which information can be added, deleted, sorted, and retrieved in different forms and formats. A database file contains a whole series of records (rows). Each record is further divided into fields (columns) on which organized information is provided about each record.

The proposed fields in the database are the following:

1. Code: Consisting of three numbers from 101 to 999 to designate a producer and/or importer of agricultural inputs. Another relational database will be maintained which lists the same codes but now includes the firm name, address, P. O. Box, and telephone number. A memo field might also be included which provides narrative information about the particular producer. More information will be shown later as to use of the relational database. The field can be subtotaled.

2. Codetype: This is to designate a particular producer such as a cooperative, a donor, government, or commercial. More designations can be added. Field can be subtotaled..

3. Arrival date: The date the input was moved into retail channels. Extractions can be made using this field for data records inclusive of a particular time period.. Summary information can then be calculated for a report.

4. Point of entry: At what point did the input enter the country (Busia, Entebbe, or Masaba). If the datafile is also to be used for locally inputs, then a fourth entry point LOCAL might be used to distinguish it from that obtained from foreign sources. More entry points can be added.

5. Category: The following input categories were used e. g. capital, crop, supplies, and veterinary. Capital inputs are those which are depreciated over time and constitute a fixed cost. Crop inputs are applied to a field e. g. fertilizer. Supplies are consumables and not depreciated. The veterinary option could be deleted and listed under government.

6. Sub-category: This could well be changed to major use. It would include item names such as farm machinery, building materials, trucks, farm tools, etc. It is very important that the entries into this field conform to a system, e. g. always calling fertilizer FERT. The reason for this is to facilitate searches and will be demonstrated later.

7. Subsubcategory: This further breaks down the subcategory to a specific use. Fertilizer for example in field 6 could be identified as POTASH in field 7.

8. Quantity: Total numbers of the input.

9. Quantity-Units: This breaks the shipment down into tons, liters, kegs, cc's, etc.

10. Total CIF: Includes initial cost of the commodity, freight and insurance.

11. Source of funds: Where foreign exchange obtained.

12. Total Excise : Government taxes..

13. Destination Cost: The cost of in country transport and handling costs.

14. Destination : Where it goes for consumption.

15. Wholesale: The cost to the retailer

16. Retail: Cost to the consumer at the retail outlet.

Information sources for data entry:

The Dbase Mailmerge option would be used to send letters of inquiry to importers and input producers once each quarter. Lists of these are to be obtained from Foreign Exchange Office, Bank of Uganda and other sources. Those not replying would be visited personally. A copy of the questionnaire and instructions is inclosed.

Quarterly Reporting:

Data for the quarter would be copied to a working file and summary reports made using index files and calculated fields. Some examples of summaries are attached hereto.

Attachments:

- 1a. Producer questionnaire and instructions for reporting.
- 1b. Category subtotals and calculated fields.
- 1c. Category subtotals and margin percentages.
- 1d. Point of entry subtotals and calculated fields.
- 1f. Importer type subtotals and calculated fields.
- 1g. "Search " examples for informal reporting

A Second Option for Data Fields For
Monitoring Agricultural Inputs

A Second Option for Data Fields to Monitor Agric. Inputs

The database fields would follow the priority classification as previously done by the Bank of Uganda. The database would have 16 fields listed as code, date, POE, producer, sector, subsector, item, quantity, unit, CIF, Excise, destination cost, wholesale cost, destination, retail value.

The database would be very much like the original database except there is no breakdown between capital and variable costs. No areas either are included for construction items. Breakdowns for processing and transport equipment is added. Reports and queries would be very much like the original.

Code: A three letter code numbered from 101 to 999.

Date: When the input entered retail channels.

Point of entry: Entebbe, Busia, Malaba, or local

Producer: Divided into government, commercial, private
voluntary organization, donor organization.

Import category: Crop, animal, veterinary, forestry,
fisheries, processing.

Sector: Crop:

Subsector: Tools.

Item: Hoe, Axe, Panga, pruning, bicycle, spades,
seeders, wheelbarrow, raw material.

Subsector: Seedstock.

Item: Vegetable, pasture, barley, wheat, beans,
maize, sorghum, millet, sunflower, soybean,
simsim, groundnut, peas, potato, sweet potato,
yam, cassava, apple, pear, peach, apricot,
mango, pineapple, kiwi, raspberry, strawberry,
forest, ornamental.

Subsector: Mechanical.

Item: Machines, spares, pumps, tractor spares, tractor
implements, ox-plows

Subsector: Fertilizers/amendments.

Item: List the analysis, lime, gypsum, minor elements

Subsector: Packing materials.

Item: Bags, hessian cloth, twines.

Subsector: Pesticides.

Item: Furidan, dimecron, ambush, dieldrin, gramaxone,
dalapon, roundup, dressing, sprayer.

Sector: Animal

Subsector: Feeds and Supplements

Item: Vitamin premix, high energy feeds, salt, protein

Subsector: Equipment.

Item: Fencing, scales, buckets, strainers, cans,
tanks, mixers, grinders, hatchery, poultry.

Sector: Veterinary.

Subsector: Acaricides.

Item: Organophosphorus compounds, tick grease.

Subsector: Trypanocidals.

Subsector: Biological.

Item: Bactericals, viral, antigens.

Subsector: Anthelminics.

Item: compounds, tablets, powder.

Subsector: Antibiotics.

Item: penicillin, tetracycline, furazolone,

Subsector: Miscellaneous.

Item: Anesthetics, ointments, antibiotic sprays,

Subsector: Equipment.

Item: syringe, needles, thermometers, pumps, sutures,

Sector: Forestry

Subsector: To be added.

Sector: Fisheries.

Subsector: To be added.

Sector: Marketing and Processing equipment

Subsector: Milling.

Item: oilseed, sugar, grain

Subsector: Cleaning and hulling.

Item: coffee, cotton, tea, dairy, tobacco, cocoa.

Subsector: Transport.

Item: Trucks, boats, trailer, spares.

Quantity: Total numbers of the item.

Unit: Character field and listed as each, ton, liter, etc.

Total CIF: Cost of the shipment delivered in country.

Source of funding: Where foreign exchange obtained.

Total Excise: Import taxes charged.

Destination Cost: Estimated cost to move to point of consumption.

Wholesale value: Total cost to the retailer

Retail value: Estimated total retail value of the item