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**Rwanda  
Agricultural Survey and Policy Analysis Project  
(696-0126)**

**Final Evaluation**

**Presented to:**

**United States Agency for International Development  
Kigali, Rwanda**

**Presented by:**

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**October 21, 1992**

RWANDA  
AGRICULTURAL SURVEYS AND POLICY ANALYSIS PROJECT

FINAL EVALUATION

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## ABBREVIATIONS AND ACRONYMS

<b>ADO</b>	<b>Agricultural Development Office</b>
<b>AID</b>	<b>Agency for International Development (Washington)</b>
<b>ASAP</b>	<b>Agricultural Survey and Analysis Project</b>
<b>ASPAP</b>	<b>Agricultural Surveys and Policy Analysis Project</b>
<b>BNR</b>	<b>Rwandan Central Bank</b>
<b>BU</b>	<b>Boston University</b>
<b>CIAT</b>	<b>International Center of Tropical Agriculture</b>
<b>CIC/RD</b>	<b>Inter-ministerial Coordinating Committee for Rural Development</b>
<b>CIP</b>	<b>International Potato Center</b>
<b>CPSP</b>	<b>Country Program Strategy Plan</b>
<b>CRED</b>	<b>Center for Research in Economic Development</b>
<b>DAI</b>	<b>Development Alternatives, Inc.</b>
<b>DEP</b>	<b>Direction of Studies and Planning</b>
<b>DSA</b>	<b>Agricultural Statistics Division</b>
<b>EEC</b>	<b>European Economic Community</b>
<b>ENA</b>	<b>National Agricultural Survey</b>
<b>ENCB</b>	<b>National Household Budget and Consumption Survey</b>
<b>EOPS</b>	<b>End of Project Indicators</b>
<b>ERS</b>	<b>Economic Research Service of Department of Agriculture</b>
<b>FAO</b>	<b>United Nations Food and Agriculture Organization</b>
<b>FRw</b>	<b>Rwandan francs</b>
<b>FS2</b>	<b>Food Security II</b>
<b>FSR/E</b>	<b>Farming Systems Research and Extension Project</b>
<b>GDP</b>	<b>Gross National Product</b>
<b>GIS</b>	<b>Geographic Information System</b>
<b>GOR</b>	<b>Government of Rwanda</b>
<b>IAMSEA</b>	<b>African and Malagasy Institute of Applied Statistical Study</b>
<b>IBRD</b>	<b>International Bank for Reconstruction and Development (World Bank)</b>
<b>IG/I</b>	<b>Inspector General Investigation Branch</b>
<b>IITA</b>	<b>International Institute of Tropical Agriculture</b>
<b>ISAR</b>	<b>Rwandan Institute for Scientific Agriculture</b>
<b>ISPC</b>	<b>International Statistics Processing Center</b>
<b>LTTA</b>	<b>Long-term technical assistance</b>
<b>MACS</b>	<b>Management Accounting and Control System</b>
<b>MIMITRAPE</b>	<b>Ministry of Public Works</b>
<b>MINAGRI</b>	<b>Ministry of Agriculture, Livestock and Forestry</b>
<b>MINETO</b>	<b>Ministry of Environment and Tourism</b>
<b>MINIFIN</b>	<b>Ministry of Finance</b>
<b>MINIFINECO</b>	<b>former Ministry of Finance and Economy</b>
<b>MINIPLAN</b>	<b>Ministry of Planning</b>
<b>Monagri</b>	<b>Local MINAGRI agents</b>
<b>MS</b>	<b>Masters of Science Degree</b>
<b>MSE</b>	<b>Medium and Small Enterprises</b>
<b>MSU</b>	<b>Michigan State University</b>
<b>NCAT</b>	<b>North Carolina Agricultural &amp; Technical College</b>
<b>OCIR</b>	<b>Office of Industrial Crops</b>
<b>ONAPO</b>	<b>National Office of Population</b>

<b>OPRVIA</b>	<b>Office of Food Provision</b>
<b>PACD</b>	<b>Project Activity Completion Date</b>
<b>PES</b>	<b>Project Evaluation Summary</b>
<b>PIL</b>	<b>Project Implementation Letter</b>
<b>pm</b>	<b>Person Month</b>
<b>PP</b>	<b>Project Paper</b>
<b>Pro-Ag</b>	<b>Project Grant Agreement</b>
<b>PSU</b>	<b>Primary Sampling Unit</b>
<b>PTG</b>	<b>Project Technical Group</b>
<b>PVO</b>	<b>Private Voluntary Organization</b>
<b>REDSO/ESA</b>	<b>Regional Economic Development Support Office, East and Southern Africa</b>
<b>RTI</b>	<b>Research Triangle Institute</b>
<b>SAP</b>	<b>Structural Adjustment Plan</b>
<b>SESA</b>	<b>Studies and Agricultural Statistics Service</b>
<b>SPSS/PC</b>	<b>Statistical Package for the Social Sciences, PC Version</b>
<b>STTA</b>	<b>Short-term technical assistance</b>
<b>TA</b>	<b>Technical assistance</b>
<b>UNFPA</b>	<b>United Nations Fund for Population Activity</b>
<b>UNICEF</b>	<b>United Nations Children's Fund</b>
<b>UNR</b>	<b>National University of Rwanda</b>
<b>USAID</b>	<b>United States Agency for International Development (field offices)</b>
<b>USDA</b>	<b>United States Department of Agriculture</b>

## PREFACE

This report presents the findings and recommendations of an evaluation team under contract 696-0126-C-00-2069-00 between the U. S. Agency for International Development and Checchi and Company Consulting, Inc. This is the final evaluation of the Rwanda Agricultural Surveys and Policy Analysis Project (ASPAP). The team consisted of Donald G. Brown, team leader, agricultural economist; and Suha Satana, agricultural statistics specialist. The evaluation took place between 21 September and 21 October 1992.

The team's work has been facilitated by support of USAID and Rwandan government officials. We want to acknowledge our grateful appreciation for the cooperation of USAID/Kigali and the Agricultural Statistic Division (DSA) of the Ministry of Agriculture, Forestry and Livestock. Everyone has been most helpful. We especially want to thank Anastase Murekezi, Chief, DSA as well as David Tardif-Douglin, DAI Contractor Representative and Dan Clay, Michigan State University for their extraordinarily generous time during a particularly hectic time at DSA. We would also like to thank Damascene Ngaboyimanzi USAID/Kigali for his support on getting documents and meetings. Finally, we would like to acknowledge the guidance and direction given to this evaluation by Kurt Fuller, ADO USAID/Kigali and Dirk Dijkerman, Acting Mission Director.

This report was prepared over a period of 26 workdays. Approximately 17 workdays were devoted to gathering information and writing the first draft of the report. Nine workdays were spent on logistics and preparation of the final document in French and English.

## I. SUMMARY AND RECOMMENDATIONS

The Agricultural Survey and Policy Analysis Project (ASPAP) is the second major effort by USAID in data collection and analysis to take place in Rwanda. This project followed the successful Agricultural Survey and Analysis Project (ASAP), which ran from May 1981 to September 1987. ASAP began the creation of an effective, sample-based agricultural data collection and analysis system in Rwanda. ASPAP carried on the further development and refinement of this system. ASPAP was created to expand the system's analytical capability and to establish linkages of this data to policy and program formation in support of agriculture and rural sector of the country.

The project is a successful one. ASPAP has been able to develop in the Division des Statistiques Agricoles (DSA) a data collection and analyze organization that, by African standards, is excellent. The project also, however, had some implementation difficulties. Programs at MINIPLAN and MINIFINECO, the two other participating agencies in the project, were not successful. The project was also plagued by difficulties with local cost funds and, to a more limited extent, with commodity procurement. Implementation in the last years of the project were also hampered by internal disruption within the country. Despite these difficulties, project objectives were substantially met.

The project purpose was to develop institutional capacity to collect and analysis data on the rural economy which, in turn, would impact on improved policy and program formulation in the country. The data collection capability built by the project is well recognized, although there are still areas for refinement. This evaluation also found substantial evidence of positive impact of the project-generated data on a host of policy and program issues that support the rural economy. While impressive, the evaluation contends that more could be done in linking ASPAP's data to policy making.

Three general lessons were learned from the project: 1- adequate staff is necessary for proper management of USAID's project portfolio, 2- policy oriented projects must be considered within the political process, 3- institution building requires long and patient support with particular attention to operational details. Cases may arise where it is in the donor's best interest to sustain an institution that a host government may not yet be able to afford.

### Recommendations

Recommendations of the evaluation can be grouped under three categories: 1) expanding impact on policy issues, 2) reinforcing technical operations, and 3) reinforcing operational and organizational structures.

#### Expand Impact on Policy

- 1- DSA should take a marketing point of view in distribution of its data and analysis. This involves taking account of the potential audience for its publications and tailoring the presentation of data to cater to the needs of this audience, i.e. differentiating among the various markets for information and analyses and targeting them through publications and seminars.

- 2- DSA needs to improve its presentation capability of information through increased use of desk-top publishing, graphics, thematic maps, etc.
- 3- DSA should develop a catalog of data parameters in its data bases to enable potential users to better appreciate what DSA has to offer.
- 4- DSA needs to review its document distribution system to improve its effectiveness, and monitor the process more closely.

#### Reinforce Technical Operations

- 1- DSA should reinforce its understanding of the farming systems found in Rwanda to make its survey techniques more accurate and reflective of the rural sector. Of special interest is attribution of areas to crops.
- 2- DSA should provide more sophisticated and better field equipment to its staff to increase accuracy and efficiency in its survey work.
- 3- DSA should establish systems to improve its data management for more efficient data retrieval and verification.
- 4- MINAGRI should establish an arbitration process between the data collected by the monagris and those collected by DSA as a means to facilitate both efforts.

#### Reinforcing Operational and Organizational Structures

- 1- DSA should appoint a person able to support the Division in the absence of the Chief of DSA and to act as a production manager and coordinator of DSA's published outputs.
- 2- An Action Plan should be developed by DSA to speed up production of yet unpublished reports of routine data efforts.
- 3- DSA needs to set clear priorities on its work with a reasonable separation of effort between routine and special studies. All special studies should be closely linked to DSA's overall research objectives.
- 4- It is the impression of this evaluation team that special studies cannot be relied upon for institutional financial viability of DSA. USAID and possibly other donors should develop a long-term plan for the financial support of DSA.
- 5- Primes are strongly recommended to be continued at DSA as part of a general program to support staffing capability of the organization.

## II. A BRIEF HISTORY OF THE PROJECT

The Agricultural Survey and Policy Analysis Project (ASPAP) is the second major effort by USAID in data collection and analysis to take place in Rwanda. This project followed the successful Agricultural Survey and Analysis Project (ASAP), which ran from May 1981 to September 1987. ASAP began the creation of an effective, sample-based, agricultural data collection and analysis system in Rwanda. ASPAP carried on the refinement of this system. ASPAP was created to expand the system's analytical ability and to establish linkage of this data to policy and program formation in support of the agriculture and rural sector of the country.

An excellent and detailed description of the project's activities from its inception in August 30, 1986 to June 1989 is found in the mid-term evaluation done by Steedman and Elias. Given the availability of the mid-term evaluation, this report will only summarize the description of the project during this early project period.

The initial year of the project was spent in selecting a contractor. The contract was awarded to Development Alternatives, Inc. (DAI) in mid-July 1987. In early 1988 ASPAP was formally established. The project was divided among three ministries of the Government of Rwanda (GOR) -- the Ministry of Agriculture, Livestock and Forestry (MINAGRI), the Ministry of Planning (MINIPLAN) and the Ministry of Finance and Economy (MINIFINECO). Within MINAGRI, the project activities were focused on the Services des Enquetes et des Statistiques Agricoles (SESA). SESA had been created by the former ASAP. In MINIPLAN, the project support was directed to working with the National Household Budget and Consumption Survey (ENCB); while in MINIFINECO, the project's work centered around cleaning up, tabulating and analyzing the Recurrent Cost of Communal Infrastructure Survey. All three ministries received vehicles, commodities, training and short-term technical assistance. MINAGRI and MINIPLAN also received long-term technical assistance. SESA was the lead institution in the project.

The mid-term evaluation identified five areas of concern that had occurred in the project's initial three years: 1) harmonization of the data system within MINAGRI between the traditional census-like data collection done at the commune level by "monagris" (local MINAGRI agricultural agents) and the scientific sample-based system used by SESA; 2) the lack of counterparts for the long-term technical assistant (LTTA) at MINIPLAN and the low level of use by MINIPLAN of the skills of this PhD economist; 3) local cost funding. This issue had two parts. First, poor monitoring and delayed reimbursement by USAID of local cost created hardship in both budgeting and implementation of the project. Second, the GOR contribution towards local cost funding for the project was extremely limited due to major budget constraints within the government; 4) the limited dissemination of data and products of SESA. This in turn limited the policy impact of the project's efforts, and finally; 5) the general level of management of the project by USAID.

Several important events also occurred during the project's initial three years. In early 1989 SESA was recognized by the GOR as an integral part of MINAGRI, not just as being a "project." Organizationally SESA was upgraded from being a Service to a Division and was retitled the Division des Statistiques Agricoles (DSA). Another important event that occurred at the same time was the dissolving of MINIFINECO and the transfer of the unit the project

was working with in MINIFINECO to MINIPLAN. Finally, in April, 1989, the project was able to put on its first national level agricultural policy seminar in which a number of papers representing the project's work were presented to policy makers.

The mid-term evaluation in June 1989 found a project that was well on its way to successfully building a competent agricultural data collection and analysis office within the GOR. The evaluation also noted some management issues, particularly with USAID and with local currency. Finally, the evaluation recommended that the project focus more on dissemination of its data and publication to a wider audience of policy makers in the country.

In the later half of the project, the TA team focused its attention on refining, expanding and improving efficiency in DSA's data collection systems. Their initial efforts were with the continuous, "routine" data collection operation. In addition, the TA team also worked to improve the ability of DSA to do specific special studies that were contracted for by various donors and governmental agencies. By 1989, DSA was collecting routine data in six areas - crop production, area planted, yields, demographic characteristics, livestock inventory, and animal product production. In 1990 continual income and expenditure data collection began. Nutritional data of mothers and children under six was added to the routine data collection system in 1992. In addition to expanding the amount of data collected in the routine data collection system, a number of refinements were introduced to improve the efficiency of the data collection and analysis process. Among these was the use of intensive/extensive data collection (weekly collection of routine data from 1248 households and bi-monthly collection from additional 1248 households for special studies), more effective field sampling and measurement, and more accurate crop density data. These improvements were initially put into place in October 1989 and have been refined continually since then.

As the routine data collection system began working more smoothly, the TA team began to focus more and more on improving the ability of DSA to do policy-oriented special studies with a quick turn-around. These studies were generally requested and funded outside of normal day-to-day data collection operations. Funding usually came from donors or USAID. By the time of the mid-term evaluation, DSA had completed five of these types of studies. Two of these were carry-overs from the ASAP. In August, 1990 the project reported that DSA was working on six special studies:

1. Study on Mineral Fertilizer and Pesticides in Rwanda (USAID/IBRD);
2. The Role of Women in Rwandan Agriculture (USAID);
3. Wood Use Study (MINITRAPE);
4. Income and Expenditures Survey;
5. Survey of Attitudes of Rwandan Coffee Producers (IBRD/OCIR-Cafe);
6. Agro-forestry and Land Degradation Study (MINAGRI/Forets).

The addition of these studies to the work the DSA was already doing in routine data collection proved to be difficult. These special studies required more intensive staff support, both expatriate and local, than the continual surveys. The project found it was short of staff due to so many people being away at training in the U.S. and elsewhere and the limited number of LTTA. Over time, however, the situation improved. Local staff began to return from training; two additional LTTA joined DSA (see below); and, the procedures and systems to

support the special studies became more integrated into DSA. As the project comes to an end, DSA is undertaking an additional five more special studies.

Questions related to local costs was a continuing problem for the project. A number of local cost issues were noted in the mid-term evaluation. Those issues continue to plague the project (see Section IV.B. below). The payment of salary supplements (primes) to local staff was held up for some months pending approval from AID/Washington. There were cost overrun, particularly at MINIPLAN. There were also disputes on reimbursements between DSA and MINIPLAN. Compounding the issue was the lack of payment by the GOR of its contribution to local cost of the project. Without funds for local costs, the project's operations were sharply curtailed. USAID responded to the lack of local cost funding by shifting funds from unused budget lines, such as contracting for aerial photographs, to the local cost line item in the budget. By mid-1990, budgetary conditions of the government became so difficult that GOR contributions to the project fell below the 25% level mandated under the Foreign Assistance Act. A special waiver on GOR contributions had to be requested from AID/Washington to keep the project going. In June 1991 the Pro-Ag and Project Authorization were amended putting an additional \$900,000 into the project. The GOR contribution to local cost was reduced by \$1,936,000 and AID's contribution to local cost was increased by \$687,000.

Further compounding the local cost issue were problems in accounting of the local cost funds given the project. On recommendation of the mid-term evaluation, a new accountant was hired for the project. In early 1991 evidence began to appear that this accountant was not doing his job and in March, 1991 he was fired for embezzlement and incompetency. In August 1991 the first full audit of local cost funds was done by the project. The results were startling. Over 76% of the funds reimbursed by USAID to cover local cost of the project were found to not have available supporting documentation. The accounting system of the project was in complete disarray. Enough evidence of fraud by the recently fired accountant was found that an IG/I investigation was requested resulted in criminal charges filed against him.

Upon recommendation of the audit, a new and competent accounting system has been installed in the project for local cost. But local cost problems still remain. The dispute between MINAGRI/DSA and MINIPLAN over reimbursement has yet to be resolved. More importantly, an IG recommendation for the Mission to serve the GOR with a bill of collection for some \$679,000 for the questionable and unsupported reimbursements of local costs is still outstanding.

Another issue raised by the mid-term evaluation was the project's activity with MINIPLAN. When the project started, it was working with three ministries -- MINAGRI, MINIPLAN and MINIFINECO. In March 1989 the GOR decided to transfer the unit the project was working with in MINIFINECO to MINIPLAN. The move did not go smoothly. Problems of budgets between the two parts of the projects, for example, still remain. The activity of the project at MINIPLAN itself was also hampered by lack of counterparts and support for the LTТА assigned there. The problems at MINIPLAN appear to be more than just with the project. Staffing turnover in the ministry is large due to poor pay and advancement possibilities for a staff that have other alternatives by possessing skills that are in demand in the private sector and other organizations. In addition, the LTТА of the project in MINIPLAN while highly competent did not aggressively seek the support he needed. By early 1991 the

LTTA had completed the tabulation and analysis of the survey he had been working on since his arrival in November 1988. Efforts by USAID to better utilize the skills of the LTTA by MINIPLAN were not successful and in August 1991 he was transferred from MINIPLAN to DSA. In October 1991 a final seminar was held at MINIPLAN on the results of the study worked on by the LTTA. By November 1991 all activities of the project at MINIPLAN were ended.

The amount of technical assistance, both long-term and short-term, proposed for the project fluctuated throughout the course of the project. The original project agreement indicated that the project would have 156 persons months (pm) of LTTA and 40 pm of STTA. As noted in the mid-term evaluation, the Project Technical Group (PTG) modified this TA drastically, cutting LTTA to 84 pm and increasing STTA to 112 pm. The initial contract with DAI included the 84 pm of LTTA filled by two people -- an agricultural economist and a macro-economist. The contract, however, had only 62 pm of STTA. According to the mid-term evaluation, after some confusion on REDSO/ESA part, the contract was eventually amended so that the TA levels met those requested by the PTG.

At the beginning of the project it was believed that "all technical assistance will be supervised and coordinated by the participating agencies and the PTG." (DAI Contract) Because of this, no "team leader" or "chief of party" position was established. One of the LTTA was designated "Contractor's Representative" to handle what was assumed to be minor administrative issues related to the contractor's staff in the project. In reality, implementing the project required significant administrative support by the Contractor. The Contractor's Representative, the agricultural economist assigned to DSA, spent the vast majority of his time an administrative detail to the detriment of his work as a technical advisor to the project. Finally in March 1991 a new LTTA position was created for a Policy Analysis/Special Studies Coordinator. This position provided additional support for the agricultural economist/Contractor's Representative at DSA in technical areas as well as well as taking over some of the administrative detail related to the special studies. In June 1991 the DAI contract was amended reducing STTA to 81 pm and increasing LTTA to 115 pm. The LTTA included 12 additional pm for the agricultural economist and 19 pm for the policy analysis.

At the same time this position was being created, the ADO office was looking at a way to create a "bridging" mechanism between the present project and a possible follow-on project (see below). In May 1991 the Project Authorization was amended adding \$900,000 to cover local cost needs (noted above), extending the PACD of the project to September 30, 1992, and adding 12 more person months of LTTA for the agricultural economist/Contractor's Representative.

Under increasing pressure by USAID to reinforce the analytical capability of DSA to support policy dialogue, it was agreed to increase the time of the LTTA macro-economist transferred from MINIPLAN to DSA by 10.3 pm to work as a econometrician/policy analyst. In November 1991 a final amendment of the DAI contract was made increasing the contract to \$5 million, creating the econometrician position, extending the time of the agricultural economist, and increasing STTA. The final technical assistance amounts were 125.3 pm LTTA and 93 pm STTA.

During the course of the project, USAID also experienced differing viewpoints and policies that, in turn, reflected on the project. During the project's design and initial start up AID/Washington was approving projects that fell under the so called four pillars. Two of these pillars were institution building and policy dialogue -- important attributes of ASPAP. Soon after the project began operation, the four pillars were reduced to the two main themes of policy dialogue and private sector support. During the life of the project AID/Washington policies and programs have moved increasingly against support for public sector institutions and more recently against activities related to traditional agricultural production. Issues having growing support in recent years in AID/Washington, in addition to support to the private sector, include democracy and open societies, accountability of AID funds, and the need to focus and concentrate the various USAIDs' activities in view of AID's increasingly limited funds and staff. USAID/Rwanda's attitude toward the project mirrored the changing structures of policies in AID/Washington.

In the first half of the project USAID used DSA to support its own policy dialogue. This support took the form of using SESA/DSA to do studies for both USAID (Women in Development) and IBRD (studies in support of the Bank's Agricultural Sector Assessment). The general consensus at the time was that the project was worthwhile and should be continued. The PACD for the project was extended twice -- first in April 1990 and again in May 1991. The latter extension was accompanied by an increase of \$900,000 in AID support for the project. It was largely felt by the project that this last extension and additional funding was to bridge the project into a follow-on activity. In reality, there was a strong feeling, particularly at senior levels in the Mission, that the project was a success and should be allowed to continue on its own without external support. On March 18, 1992, a letter was sent to MINAGRI from USAID indicating the project would not be continued after September 30, 1992.

In late 1991, USAID began working on a new Country Program Strategy Plan (CPSP). This plan was a major departure from previous similar documents. The CPSP indicated that the Mission's efforts would be directed towards three major areas: 1) increase the use of modern contraceptives in the country, 2) increase accountability of governmental political systems, and 3) increase commercial outputs of medium and small scale enterprises (MSE). The document indicates that the Mission will no longer work on direct agricultural production-related projects, although marketing and processing via private sector MSEs of agricultural products would be considered. ASPAP is judged by the CPSP to be the only successful activity undertaken by USAID in recent years in the agricultural sector.

USAID changed its views concerning extension of the project for several reasons. First, in developing the CPSP the Mission became increasingly aware of the need for data to monitor and support the CPSP objectives. In addition, there is a growing need for the Mission, other donors and the GOR to monitor the impact of the macro-economic changes put into place by the Structural Adjustment Program (SAP) in the country. The SAP was established by the GOR with assistance of the World Bank in November 1990. More than 90% of Rwanda's population is in the rural sector and DSA is the only competent organization in the country that can collect and tabulate data from this sector.

Second, many of the problems of local cost accounting and management were beginning to be resolved. DSA had put into place a good accounting structure and the system

was working much better. Third, the Mission may have become aware of the important role the ASPAP plays in indirectly and directly influencing policy and program formulation in the agricultural and rural sector. In early September the PACD for the project was extended yet a third time to September 30, 1993. A buy-in to the centrally-funded Food Security II project has been undertaken from uncommitted project funds to support the project during this additional year.

Finally, this brief history of ASPAP would not be complete without noting the significant events that took place in Rwanda that directly influenced the implementation and impact of the project. One of the most important event that has occurred during the life of the project has been the growing democratization of the political systems and society in Rwanda. The government formally announced the movement toward multi-party democracy in October 1990. From that point on, political dogma of a single party is slowly being replaced by multiple voices and opinions. Many of these views are based on data. As the political society becomes more open, the importance of accurate data and competent policy analysis increases. Activities like ASPAP become critical to this process. The possibility of impact on policy formation becomes both easier and more important.

A much less positive event has been the deteriorating economic conditions in Rwanda. Since the early 1980's per-capita food production has been falling. This is the result of one of the fastest growing populations in Africa trying to produce crops on a land base that can no longer be expanded. In addition, the past five years has seen world market prices of coffee, the country's major foreign exchange source, plummet to near all-time lows. Consequently, the government can no longer afford many of its programs. We have seen above the devastating effect on the project this lack of GOR funds have caused.

A major blow to the project occurred on October 1, 1990, when the country was invaded by rebels from Uganda. In Kigali and throughout the country, military curfews, travel restrictions and shortened work hours were imposed. On October 2nd., in the tension of the invasion, two of the senior staff of DSA (one of them the Director) were arrested in a martial law dragnet. They were not released until March 1991. Under voluntary evacuation orders the USAID ADO left the country and the Contractor's Representative took extended vacation. During this period of disruption, most work of the project was delayed or postponed. The 1991A seasonal data was partially unusable due to management problems caused by disruption in the country as a result of the invasion. The problem was further compounded by the Gulf war that started in January 1991 that imposed world wide travel restriction that held up the arrival of STTA long after the Rwandan situation had become more stable.

### III. ACCOMPLISHMENTS OF THE PROJECT

#### A. Validity of Project Purpose and Assumptions

The mid-term evaluation spent a considerable amount of time pondering this issue. The problem is that the project purpose is not quite as clear and unambiguous as it would appear at first glance. In the project paper the purpose was stated as simply *"to improve policy formulation for the rural economy."* In the Pro-Ag, the document that legally defines the

project, the project purpose was expanded by defining how improved policy formulation was to be achieved. This was to be done by *"improving the quality and increasing the quantity of the information base from which policy is formulated and by strengthening the institutions responsible for provision of such information."* Is the purpose of the project primarily to improve policy formulation or to improve the data base? The mid-term evaluation tended to dismiss the policy side because it felt that it was unclear what the major policy issues were to address in the rural economy. The evaluation seems to indicate that the emphasis on policy in ASPAP was due primarily to the fact that at the time of the design of the project "'policy' had become a fashionable buzzword ... and it seemed only logical to proceed from data collection and analysis to using the results for informing policy decisions." (mid-term evaluation P. 16)

Upon reexamination of this issue the following observations can be made. First, the belief of the mid-term evaluation team that there were no obvious policy issues in the rural economy may well have been due to the fact that there were such major policy issues in the macro-economic side (overvalued exchange rate for the FRw, artificially low interest rates, subsidies on major items such as fuel, etc.) that the rural sector policy was eclipsed and hence seemed insignificant. Yet at the same time, given the overwhelming role that agriculture plays in the economy, it is difficult to imagine that there were no policy changes needed in the sector. In any case, since the mid-term evaluation much has changed in the economic policy area. With the introduction of the Structural Adjustment Program (SAP), most of the macro policy issues are being dealt with. The secondary policy issues in the rural and agricultural sector have now become more important.

Second, the observation in the mid-term evaluation of the lack of understanding, demonstrated in project documentation, of how policy is formulated in the country is still valid. The project paper seems to indicate that the Inter-ministerial Coordinating Committee for Rural Development (CIC/DR) would be the link between the project's activities and policy formulation in the government. In reality, the CIC/DR never did this. In hindsight, it appears unlikely that the CIC/DR would have ever played this role.

Finally, the project purpose, as defined in the Pro-Ag, is based on an unstated but definitely implied assumption. It seems clear that the purpose of the project, as stated, is to improve data collection and analysis structures which in turn, by assumption, will improve policy formulation for the rural economy. While there appears to be some confusion on the issues, it is the opinion of this evaluation team that the principal focus of the project's purpose is on improving the data base and not on improving policy formulation. Under this hypothesis, the task of this evaluation is two-fold: 1) verify if the information, together with the system to collect and analyze data, created by the project has been improved, and 2) verify the assumption that better information resulted in better policy and program formulation for the rural economy. As can be seen in Section IV. B and C below, the answer to both of these questions appears to be positive.

## B. Project Inputs and Outputs

### 1. Project Budget and expenditures

The configuration and attribution of project inputs has changed over the course of the project. These changes are reflected in the changing budget authorizations for the project. In Table 1, Project Budget, we see both the budget lines according to the original project agreement signed August 30, 1986 and Pro-Ag amendment #4 that added \$900,000 to the project and made major modifications in these budget line items. Most notable of these changes was the reduction of \$2.3 million in GOR contributions. Additional USAID funding went to increasing the institutional contract, training and local costs. The reason for these modification was the deteriorating financial situation of the GOR and its inability to provide funds to the project as originally envisioned.

Table 1. Project Budget

Budget Line	Original Pro-AG 8/30/86			Pro- Ag Amend. #4 08/17/91			Totals		
	USAID	GOR	Total	USAID	GOR	Total	USAID	GOR	Total
Institutional Contract	4,750		4,750	250		250	5,000		5,000
Technical Services	250	1,600	1,850	(51)	(435)	(486)	199	1,415	1,614
Construction	100		100	(23)		(23)	77		77
Comrnodities	1,000		1,000	(68)		(68)	932	464	1,396
Local Costs	900	1,500	2,400	687	(1936)	(1249)	1,587		1,587
Training				105		105	105		105
<b>Total</b>	<b>7,000</b>	<b>3,100</b>	<b>10,100</b>	<b>900</b>	<b>(2371)</b>	<b>(1471)</b>	<b>7,900</b>	<b>1,879</b>	<b>9,779</b>

Disbursement and use of project funds is seen in Table 2, Summary of Project Dollar Financial Report. Data for this table came from the latest MACS printout. As can be seen, as of early September 1992, the project still had a significant pipeline. Much of these funds are going to be used to fund a buy-in into the centrally-funded Food Security II (FS2) Project managed by Michigan State University. FS2 will be taking over the support of DSA after the DAI contract has ended.

**Table 2. Summary of Project Dollar Financial Report by Project Elements**  
**As of August 31, 1992**  
**\$(000)**

Project Element:	Obligations	Commitments	Expenditures	Pipeline	Pipeline as % of Oblg.
Institutional Contract	5,000	5,000	4,171	830	(17%)
Technical Services	199	123	84	115	(58%)
Construction	77	77	77	0	(0)
Commodities	932	855	716	216	(23%)
Local Cost	1,587	1,490	1,039	547	(34%)
Training	105	109	66	39	(37%)
<b>Total</b>	<b>7,900</b>	<b>7,653</b>	<b>6,152</b>	<b>1,747</b>	<b>(22%)</b>

## 2. Project Inputs

In Table 3, Summary of ASPAP Inputs, a listing of project inputs is given. Original amounts are those in the Project Paper (PP), while the revised amount are those in the final contract with DAI. Actual amounts are taken from contractors reports.

One of the most notable elements in this table is the large amount of short-term training that was provided, particularly at DSA. Over six and a half times the amount of planned short-term training was completed.

One of the strengths of the project has been the long term continuity of the TA staff. The Contractor's Representative / agricultural economist arrived soon after the contract was signed in mid-1987 and stayed with the project until the spring of 1992. The macro-economist worked with the project even longer than the agricultural economist. The same continuity was also seen in the short-term technical assistance staff. Three short-term consultants provided the bulk of the STTA. One of these has been with the previous ASAP and will remain with the ASPAP through the buy-in with the Food Security II Project. This continuity has enabled the contractor to maintain a coherent long-term TA program which is essential to the institutional building effort the project was undertaking.

While there was continuity in the contractor's personnel, the project suffered high turnover in GOR personnel and at USAID. The problems with lack of counterparts and local staff at MINIPLAN have been noted earlier. In addition, as the Contractor's Representative noted, in four and a half years of the project there were six ASPAP chiefs rotated among four individuals. On the USAID side, as a hardship post with a single two year tour, the project has had five ADO's, five project managers, at least seven regional contract officers, and four mission directors. Changing USAID staff made it difficult for the project to keep in tune with AID. Some of the management problems on commodity procurement and local cost funds, as well as USAID's changing view of the project, may be partly attributed to these staff turnovers.

**Table 3. Summary of ASPAP Inputs**

Inputs	Original Amount	Revised Amount	Actual Amount	Actual % of Revised
Long-term TA (pm)				
SESA/DSA	120	89.3	89.3	100%
MINIPLAN	36	36.0	36.0	100%
LT TA Total (pm)	156	125.3	125.3	100%
Short-term TA (pm)				
SESA/DSA	16	61.8	61.8	100%
MINIPLAN	12	31.2	31.2	100%
MINIFINECO	12			
STTA Total (pm)	40	93.0	93.0	100%
LT Training (pm)				
SESA/DSA (4 MS)	96	96	96	100%
MINIPLAN (2 MS)	48	48	48	100%
MINIFINECO (2 MS)	48	48	48	100%
LT Training Total (8 MS)	192	192	192	100%
ST Training (pm)				
SESA/DSA	15	15	99.6	664%
MINIPLAN	15	35	39.6	113%
MINIFINECO	20			
ST Training Total (pm)	50	50	139.2	278%
Vehicles (number)				
SESA/DSA	8	8		
MINIPLAN	4	6		
MINIFINECO	2			
Vehicles Total (number)	14	14	15	107%
Motorcycles (number)				
SESA/DSA	20	20	31	
Motorcycles Total (number)	20	20	31	155%
Computers(\$000)				
SESA/DSA	62	62		
MINIPLAN	51	51		
MINIFINECO	33	33		
Computers Total (\$000)	146	146	145	99%
Construction(\$000)	100	77	77	100%

Table 4, Long-Term Training, seen below, gives a more detailed analysis of the training program undertaken. Dates of training taken, area of training concentration, and present employment of the participant are indicated in the table. Several observations are noteworthy from the table. First, one participant did not return and is seeking political asylum in the United States. This is being contested by the project and the government. Three of the four participants who were to work at MINIPLAN have left that organization. One works with DSA and the other two are in the private sector. As noted above, working conditions at MINIPLAN make it difficult to keep staff. What is also notable in this table is the large percentage of returned participants still working at DSA or are involved indirectly with DSA activities such as the individual at UNICEF. In addition, it should be noted that two of the short-term participants actually received a year of training at the International Statistics Program Center (ISPC) run by the U. S. Bureau of the Census. One of these ISPC participants received a scholarship for two years of additional training at Penn State in policy analysis. These two individuals are also still working at DSA.

Table 4. Long-term Training

Name	School/degree/prog.	Start	End	Comments
<b>SESA/DSA</b>				
1. Rwamasirabo	MSU /MS/Ag Econ	06/87	05/90	At UNICEF Nutrition Study
2. Kampayana	MSU /MS/Rural Soc	08/88	08/90	At DSA
3. Ngarambe	NCAT/MS/Ag Econ	08/89		Did not return
4. Ngirumwami	MSU /MS/Ag Econ	08/90	08/92	At DSA
<b>MINIPLAN</b>				
5. Munyaneza	MSU /MS/Statistics	08/89	01/92	Left MINIPLAN, now at DSA
6. Nsengimana	ISPC/Data Proces	08/89	08/90	At MINIPLAN
<b>ex-MINIFINECO</b>				
7. Uwizeye	BU /MS/Econ	08/89	01/90	Left MINIPLAN, now at CARE
8. Mugeesera	BU /MS/Econ	08/89	08/91	Left MINIPLAN for private bank

A good proxy to judge the quality of training is the capacity of the local staff to do their job after the training. As we see below, this capacity seems to be very good. There were few major issues with long-term training in addition to the common problem of finding qualified participants able to handle MS level courses at a good university in the United States. One long-term training position had to be shifted from an MS to a certificate program in data processing at ISPC because no AO (approximate bachelor level) candidate could be found. Much of the short-term training was done in Rwanda in French. The short-term training done outside of Rwanda was primarily done at ISPC with the Bureau of the Census although some training in the French language was done at the University of Pittsburgh (management) and two courses given in third-countries.

### 3. Project Outputs

The Project Paper listed five project outputs but the terms of reference for the evaluation condensed these into three. The evaluation team looked at each of these outputs and noted the following accomplishments under each:

*(1) Rwandan staff trained in data collection and analysis, having the capacity to do rapid surveys on key policy issues and present results in ways that will enable decision makers to determine the impact of their decisions.*

As noted above, the project supported training for seven MS degree programs. Three participants received year long training at ISPC, and extensive (almost triple the original project planned amount) short-term training was given to the Rwandan staff. Most of the trained staff remains at DSA while MINIPLAN was unable to adequately use and retain its staff trained by the project.

Interviews with a range of donors, international organizations and other governmental offices indicated that DSA's staff is viewed as the only group in the country who have competence in broad-based data collection and analysis of the rural sector. It is generally perceived as one of the few reliable organizations for data collection and tabulation of basic agricultural production and economic data within this part of Africa. Our own evaluation of the data collection and analysis capability of DSA (see section IV C below) confirms much of this high regard for DSA.

ASPAP is still far from perfect. There are a number of recommendations and comments to improve and refine the capabilities of the organization. These improvements and refinements, however, build upon what (within an African context) is already an excellent structure. The principal weakness in DSA's capability is to present data in an easily accessible manner to policy makers. Details on this are noted below in Section IV B.

*(2) Increased capability to produce in a timely manner analyses and publications based on periodic surveys and special studies, which respond to the questions and information needs of policy makers*

Over the course of the project, the DSA has completed or is in the process of completing some 15 special studies. They range in subject from marketing of beans and sorghum, to development of non-agricultural strategies to improve the welfare of the rural population. As of late June, 1992, DSA has published more than 35 publications related to these special studies. In addition, DSA has published 8 documents related to their continual routine data collection and results from the 1984 National Agricultural Survey (ENA). They have also published 10 documents on methodology use at DSA, 4 summary documents and reprinted 6 documents prepared by DSA staff or consultants or related to Rwanda's agriculture. As noted in Section IV B below, a number of these documents have had a direct and significant impact on policy and program formulation in Rwanda's rural sector.

In addition to the work done at DSA, the project helped support the publication of results from the National Household Budget and Consumption Survey by MINIPLAN as well as results from the Survey on Recurrent Cost of Communal Infrastructure started at MINIFINECO and later moved to MINIPLAN. Without project support these surveys would have never been analyzed and made useful for national policy makers. These documents also had relevant policy impact.

*(3) Increased capacity in the DSA to provide expert consultant services to data users and other statistical services of GOR agencies on survey design, sampling techniques, data processing and analysis.*

DSA has been able to provide its services to a fairly impressive group of governmental organizations. The following are some examples of this support:

DSA has worked with scientists at ISAR to carry out a detailed study of the constraints on tuber production. With only 5 people in the tuber section of ISAR they were unable to carry out a national level survey. Working with DSA allowed them to undertake this important effort.

OPROVIA found that much of the information they were using to make management decisions for their strategic stocks and marketing plans was false. They were able to obtain support from DSA to have more reliable data to improve the general operation of their programs.

ONAPO wanted to develop an analysis of the cost-benefits of family planning programs in Rwanda based on a model developed by Research Triangle Institute (RTI). They looked to DSA to provide data on the agriculture sector and basic hypothesis on future trends in basic agricultural indicator for the model. This support was critical to the success of this analysis.

The whole process of 'harmonization' has been directed to upgrading the data collection and analysis ability of the monagri system of data collection of MINAGRI. DSA had made a number of proposals to do this. Lack of funds have prevented implementation of these proposals.

DSA has provided technical support to a number of projects in the country. In addition, a wide range of other governmental agencies have benefitted from workshops, seminars and short courses given by the project or put on by DSA.

### **C. End of Project Indicators**

#### *(1) Improved agricultural policies and project intervention;*

There have been a number of examples of the project's improving agricultural policy or program activity (see Section IV B) in Rwanda. Among those that we can cite here are: 1) a DSA study on bean trade helped stop the GOR from fixing bean prices once it became evident that much of the product on the market was imported, 2) a nutrition study which showed that malnutrition was not always related to food availability, will have an impact on improved program to counter malnutrition, 3) DSA confirmed research assertions about adoptions of improved crops, hence reinforcing GOR commitment to doing more and better research, 4) a study on land tenure laid the groundwork for a re-examination of land tenure policy in the country, and 5) a soil degradation study indicated much higher losses from erosion than anticipated added new support to more aggressive soil conservation activities.

Generally, this particular category in the End of Project Indicators (EOPS) can be considered to have been satisfied.

*(2) An increased demand of policy makers for information and analysis on the rural economy*

There has been an increased demand for data and analysis on the rural economy. Part of the reason can be attributed to the project and part to miscellaneous exogenous factors. Because DSA has been able to provide a service of collection of data on the rural economy, in an efficient manner, an increasing number of donors and local organizations have been seeking information from this service. CIAT/ISAR, for example, wanted DSA to work with them to get basic data on the adoption of one of the bean varieties they had released. OPROVIA used DSA data to develop its marketing program and policy. New data on nutrition, as noted above, is being demanded to adjust policies and programs on food security.

The need for information has also been increased with the move by the government to adopt a Structural Adjustment Program (SAP). A number of donors and governmental agencies are now trying to gather data on the rural economy to better monitor the impact of SAP. Increasingly, the level of dialogue on the rural economy is becoming information based.

*(3) A stronger role of MINAGRI in agricultural policy formulation;*

As more and better information becomes available, MINAGRI has become able to increase the quality and quantity of its intervention in the policy arena to correct some problems characterizing the rural sector. The best example of this was MINAGRI's strong stand on the issue of reducing price setting on bean and sorghum. This stand was bolstered by the work done by DSA that indicated benefits of the existing price setting policy was not going to Rwandan farmers. By having a strong and increasingly respected data collection and analysis unit within its organization naturally increases MINAGRI's clout at the policy table.

*(4) Participating agencies have increased recognition of their ability to be responsive to the needs of policy makers;*

The only major participating agency in the project is DSA. As can be seen in the responses on the rest of these EOPS, DSA has had an increasing recognition of its ability to provide policy makers with accurate data and analysis. It is our opinion that this indicator pertaining to participating agencies is redundant, because success in achieving the other EOPS strongly suggests success in achieving this particular indicator.

*(5) An improved collaboration among the diverse institutions involved in the analysis and policy formulation for the rural sector;*

There are a number of studies by DSA in collaboration with other institutions interested in analysis and policy formulation. Among these are:

- The land tenure study done in 1987-88 with the World Bank
- The fertilizer study with the EEC in 1989
- The root crops study done with ISAR in 1991-92

- The nutrition study done in connection with UNICEF
- The pole bean study done with CIAT in 1992
- The study on soil degradation done in collaboration with the MSU Department of Geology
- The joint program to develop a GIS with MSU, UNR and MINETO

*(6) An on-going dialogue established between professionals of the Participating Agencies and members at the technical level;*

DSA at MINAGRI and MINIPLAN are the two remaining participating agencies from the project. Mixed technical group meetings have been held on a regular basis between these two groups. DSA has also provided technical help to a number of projects in the country including: PDAG (Projet de Developement Agricole de Gikongoro), DRB (Development Rural de Byumba), DANK (Development Agricole Nshili-Kivu), PAP (Projet Agro-pastoral Nyabisindu). This technical help consisted of training of enumerators and questionnaire development. Both MINIFIN and the BNR use the project documents to calculate various indexes. MINIPLAN used data from DSA in establishing part of its national accounts. Finally, DSA has provided a series of training programs in computer related areas to other agents in MINAGRI and MINIPLAN, particularly in word processing and use of statistical software.

*(7) A more informed GOR/USAID policy dialogue based on the information produced by Project-sponsored surveys and studies.*

USAID drew heavily on DSA studies and analysis in the development of its new Country Program Strategic Plan (CPSP). A recent income and expenditure survey (Loveridge) had a particular impact. It indicated that as much as 40% of rural income came from off-farm employment. This helped USAID to decide that it would shift from traditional agricultural production efforts to looking at means of increasing non-farm employment opportunities through small and medium sized enterprises. In addition, DSA is helping USAID to better monitor its activities to make the necessary adjustment in policy and programs to assure that USAID basic objectives are attained.

#### IV. PROJECT EVALUATION: IMPACT AND IMPLEMENTATION

##### A. Local Cost Funding

Local cost financing has been a major issue throughout the life of the project. There are three facets to this issue: 1) management of local cost funds by the project and USAID, 2) GOR contributions to local cost support for the project, and 3) alternate means of funding local cost for DSA.

##### Management of local cost funds

There have been some management problems of the local cost funds. The management problems of the project are noted in detail in the 1991 non-federal audit done by Kemp Chatteris which is a subsidiary of Deloitte and Touche. The audit had three major

recommendations: 1) determine the allocability and recover, as appropriate, some \$51,831 in questionable reimbursements and some \$626,856 in unsupported reimbursement made to the project, 2) develop a plan of action to improve the internal accounting of the project of local cost funds, and 3) develop a plan of action to control loans to project employees from the local cost account. The auditors indicated that they could not find supporting documents for reimbursements under PIL's 4, 5, 7, 9, 11, 14 or 15. USAID had reimbursed the project on these PILs but the documents could not be located even though they are known to exist. The IG is recommending a bill of collection be sent to the GOR for the undocumented and unsupported funds. USAID is contesting this recommendation. In addition, the auditors found that the project had no accounting system in place, was co-mingling AID, GOR and other donor funds, incurring major cost overruns in the budgets, and was also able to sustain for further investigation allegations of fraud against the former accountant to the project.

On the USAID side, there was an appearance of confusion. The Mission at the time was terribly short staffed. Accounting was split between Kigali and Nairobi. Vouchers were first sent to USAID/Kigali for certification and then to REDSO/ESA for final processing and payment. Against normal AID procedures, documentation was then returned to the project. REDSO/ESA appeared to have provided little support to USAID or to the project.

During the first half of the project, there were also delays in getting work plans approved. Under the reimbursement scheme used in the project, work plans had to be first approved before reimbursement could be made on costs incurred under the budget for the work plan. The project would often spend funds without close supervision on how the spending related to the approved work plan budget. MINIPLAN was particularly notorious in this action. DSA, however, has been made to hold the bag on MINIPLAN's overspending since it was the lead institution that was to monitor funds.

No one seemed to be overseeing the process. The contractor rightly claims that this was not its responsibility and consequently took no action. DSA, MINIPLAN and MINIFINECO appeared to be unaware of what was required of them in terms of accounting and controlling local cost funds. DSA, at least, had a computer-based accounting system but this was dismantled by the new accountant that was added to the project after the mid-term evaluation at USAID's insistence. Unfortunately this accountant was later found to be stealing project funds.

Subsequently, DSA has installed a competent accounting system and financial controls. USAID now has a controller in Kigali and much improved financial management of project resources.

#### GOR Contributions to the Project

The local cost funding issue was compounded by the inability of the GOR to contribute their proportion of local currency funding. The Pro-Ag indicated that "the GOR will assume an increasing larger share of local cost over the life of the project ... eventually assuming full responsibility for them." (Pro-Ag Page 9) The PP assumed that by 1991/92 GOR contribution to the project would be almost \$1,000,000 a year. This never occurred. In 1992 the GOR contribution was:

Salaries of GOR Staff in Project	\$146,328
Utilities for DSA	4,286
Imputed value of office space	23,000
<b>Total</b>	<b>\$173,614</b>

For reference, USAID contribution in local cost to the project in 1992 was \$325,888 for the nine-month period from January to September.

So what happened? Why was there such a shortfall in GOR contribution to the project? To begin with, the PP was grossly optimistic of the GOR's capability to contribute to the project. There are no analyses in the PP to indicate how or why the GOR would contribute to the project. The PP appears to have been worded to satisfy AID/Washington's desire for a sustainable project rather than to reflect the economic realities in Rwanda. In 1986, when the PP was being written, Rwanda's ratio of government revenue to GDP was 14%, compared to government expenditures of 22% of GDP. This gave a net budgetary deficit of almost 7 1/2% of GDP. By 1990, the budget deficit had almost doubled to 15% of GDP, official reserves were negative, and the GDP had fallen in three of the previous four years. Coffee exports are Rwanda's principal foreign exchange earner and one of its main sources of revenue. World market prices for coffee have plummeted in the last five years. In May 1992, world market price of coffee fell to a level not seen in over 20 years. The result is a government plagued with extremely difficult economic conditions. It is impossible that the GOR could have contributed the funding originally proposed for the project.

As noted earlier, once it was clear that the GOR could not meet its local cost contribution obligations, USAID began to respond by shifting unused funds into the local cost budget line item. By mid-1990 the situation had gotten so bad that GOR contributions fell below the 25% mandated by the FAA and a special waiver was sought and obtained for exempting the GOR from this legislative requirement.

#### Financing DSA's Local Costs

If the government cannot afford the project, how can DSA's financial existence be assured? Before this question can be dealt with, a more fundamental issue needs to be addressed -- should DSA be supported at all? Obviously, this issue is at the heart of this evaluation. In section IV B below, a number of examples are given of DSA's impact on policy and program formulation. But beyond these examples, there is an even more paramount reason for supporting DSA. Rwanda is a country with a number of unique characteristics. Among these are: 1) one of the highest population density in Africa, 2) one of the world's fastest population growth rate, and 3) a limited (almost fully cultivated) land base. The country flutters on the brink of a Malthusian disaster. Yet, on the other side of this conundrum, Rwanda also has: 1) a dynamic population, and 2) enough rainfall to produce two crops a year. Economic and agricultural events in the country happen quickly and often with dramatic results. In order for both the public and private sector to be able to make the required appropriate decisions on policies and programs in this volatile environment, accurate and timely information is essential. At the present time, DSA is one of the few, if not the only, organization in the country able to provide this information.

The analysis in Appendix C indicates that DSA's financial needs (excluding the GOR contribution) are about \$300,000 to 400,000 a year. This amount would support DSA in both its routine data collection and in doing punctual studies. Given the importance of good data in Rwanda, this amount seems very well justified.

There are three ways DSA can be financed: 1) GOR contribution through its normal budget process, 2) continual donor support and 3) through selling of its services. The first option is not a realistic one in the near term, although it still remains as the ultimate solution. The second option will be dealt with later. Here, we will focus on the third option, selling DSA's services.

In looking at the selling of DSA's services, four questions arise. 1) What does DSA have to sell? 2) What unique advantage does DSA have over any other study office? 3) Within DSA's operations, what aspects are market oriented and what aspects are not?, and 4) What is the effective market demand for DSA's services?

DSA has two unique advantages that cannot be matched by other study offices in Rwanda. The first is the long-term longitudinal data series DSA has on the basic features of the rural economy. Since the National Agricultural Survey in 1984, DSA has continually collected and maintained a data series on production, area planted, yields, and livestock production. More recently, DSA has added income and expenditure and nutritional data to the series. This is a unique and extremely valuable data base.

The second unique advantage DSA has is its in-place system of selected household samples and a trained cadre of enumerators and supervisors taking often weekly data from the 1248 households in the sample throughout the country. In addition, DSA has a trained staff to tabulate, clean and process this data. Finally, DSA has an increasingly sophisticated policy analysis capable to use this data and develop policy recommendations. Other study offices may have the policy analysts but not the in-place data collection system of DSA.

DSA's operation produces both private (market) and public (non-market) goods. DSA's basic public good is its long-term data set. While this data can serve both public and private purposes, its integrity depends on the fact that it is collected for the public as contrasted to the private domain. As a public good this basic data set should be publicly supported. DSA's private goods are those generated through their client-funded punctual studies and analysis. These studies complement and expand the basic data pool but also are geared to specific client-directed use.

While all of this may seem obvious, it is easy to forget that there may be a major potential conflict between these two operations of DSA. With limited access to funds, there is a great temptation for DSA to focus more on its client-supported special studies at the expense of supporting the routine data collection and analysis supporting the long-term data series. There already are some signs that this is happening. For example, we were able to find some 35 documents published by DSA related to special studies. But we could only find 6 documents reporting on the continual data series and 4 of these were from the 1984 National Agricultural Survey. Neglecting the long-term series would be a fatal mistake for DSA. This series is DSA's principle unique advantage in the marketplace. Neglecting it would be a form of economic hara-kiri.

This leads to the next question -- what is the market demand for DSA's services? As part of the evaluation, we questioned a variety of donors, government organizations, and individuals on whether they would use DSA's services to help them with economic and other studies that support their activities. While this straw-vote type of survey is neither comprehensive or precise, a general view of the market became evident. There appears to be considerable interest in using DSA to help support a wide range of development activity in the country, but there also appears to be very limited resources to finance such work. Donors are the major source of funding for this type of activity. (Although it should be noted that, due to a lack of time, we did not question private sector organizations such as the commercial banks, soap companies, breweries, etc. on their potential demand for DSA work.) Of the donors we saw, the World Bank, UNICEF and possibly the Belgium Aid program were the most positive. It appears unlikely, however, that these donors would be able to support the \$300,000 a year needed by DSA. A typical response we found was that of ISAR's where there was a strong appreciation and desire to use DSA to support their program, but no funds to do so.

The reality of the situation is that DSA should continue to get requests for special studies, particularly as its reputation increases, but these studies are unlikely to ever provide enough funds to cover the full cost of doing the studies (see Appendix C), let alone the general operation of the organization.

In the end, we see few alternatives in the near term to DSA being supported to a great extent by donor funds. As noted earlier, about half of DSA's work is in support of a public good -- the long-term data series. Given Rwanda's current and projected economic problems, donors will have to serve as the surrogate financier of the public sector. In many ways, as far as DSA is concerned, this is both fair and equitable. Donors are the major users of DSA services and data in their efforts to improve allocation of funds to the GOR. They have both the mandate and the resources to use data in their planning and policy development. This is a capacity that is lacking, at this time, in most of the GOR institutions. Continual donor support seems like a very rational course of action in this situation.

## **B. Project's Impact on Policy Formulation**

One of the principal questions asked in this evaluation has been whether or not the project has had an impact on policy or program formulation in Rwanda. As will be recalled from Section III. A., Validity of Project Purpose and Assumptions, the primary working hypotheses of the project is that better data would have a positive impact on policy formulation. Did it? Below is a list of examples, some of them anecdotal, indicating that the project has had a direct impact on policy and program formulation in the country. Although several are quite significant, individually none of the examples is overwhelming. But, taken as a whole, the overall impact is impressive.

### Changing price fixing policy at OPROVIA

A DSA study on Rural Transactions in Bean and Sorghum done in 1986 was instrumental in changing the policy on fixing floor prices on beans by DPROVIA and helped to open the door on general price liberalization that took place in 1989-90. The general assumption by Rwanda's policy makers had been that

the country was self-sufficient in bean production. The 1986 study showed, however, that Rwanda was more of an importer than an exporter of beans. A seminar was set up in 1987 to show these results to policy makers in MINAGRI, OPROVIA, MINIFIN and MINIPLAN. The initial results of the study came too late to have an impact on the policy but it set the stage for negotiations between the parties. MINAGRI and MINIPLAN were against the price fixing ideas but MINIFIN continued to support it. MINIFIN believed the price fixing program was essential to support Rwandan farmers' bean production. Once the DSA data had become final, however, MINAGRI and MINIPLAN were able to carry the day since DSA data indicated that traders and farmers in neighboring countries were more likely to be the important benefactors in the price fixing policy than Rwandan farmers.

#### MINIFINECO's Recurrent Cost Study and Communal Cost Recovery Program

Although not an entirely successful experience, the project worked for several years on analysis and publication of a French Aid sponsored study of Recurrent Costs of Communal Infrastructure at MINIFINECO and then later at MINIPLAN. One of the findings of this study was that local people were willing to pay for services if they found them of value. Local medicine men, for example, were found to charge more than the local modern clinic and people were willing to pay for it. People also valued water at a higher rate than they were being charged for. As a result of this study a more comprehensive cost recovery program at the commune level was put into place. This is a policy issue that is still being discussed. But without the project doing the work to get the results of the study into the hands of policy makers, the information in the study would have never been available.

#### Nutrition Study with UNICEF

This is a relatively recent study and initial results are just now becoming available. Even though full results are not in, significant policy issues are being raised. The DSA study is confirming some of the conventional wisdom about malnutrition in Rwanda, but it is also challenging some others. One of the most important of these is the evidence that malnutrition is not directly related to local food availability. Up to now, most efforts to deal with malnutrition have been directed towards moving food into deficit regions. The nutrition study indicated that food security in terms of food quantity does not necessarily mean food security in terms of nutrition. More subtle issues of who gets the food and how they get it needs to be considered. This should have a significant impact on how food security programs are planned to more directly affect malnutrition.

#### CIAT's Use of DSA to Look at Adoption of Bean Varieties

Several years ago, ISAR with CIAT introduced a new variety of pole bean for Rwanda that appeared to have a major genetic potential over existing varieties. The variety was pushed through the various "agricultural projects" in the

country and results seem to indicate a wide acceptance by the population. CIAT wanted to know if the variety was having any significant impact on the country as a whole and not only in localized highly supported and subsidized project areas. The problem was that CIAT and ISAR did not have the capability to do a nation-wide survey. DSA was approached to use their in-place household sample to gather this nation-wide data. Special training programs were set up with CIAT/ISAR to make the enumerators aware of bean varieties and to identify the new variety. The survey went well and initial results are being tabulated. The policy impact of this survey will be important. If it is found that the variety is widely used and successful it will challenge the myth that Rwanda does not have the necessary technology to improve agriculture production. If, as others believe, the variety only works where it is supported by a major outside support system seen only in the project areas, then appropriateness of the research system will be questioned. Given the critical role of technology in the country, this type of monitoring is essential for proper research policy and program formulation.

#### ONAPO's Cost Benefit Analysis for Family Planning

ONAPO with assistance from UNFPA wanted to develop a model to show policy makers the benefits to the economy of an aggressive family planning program. The model they were using was developed by Research Triangle Institute (RTI) with USAID funding. The model had three parts -- agriculture, health, and education. Various population scenarios would be used in the model and their impact on these three sectors looked at in graphic form. For the agriculture part of the model, ONAPO turned to DSA. DSA provided the data for the model and also a set of hypotheses on the trend of various component parts of the model relating to agriculture such as production, yield and area. The model was shown to a wide range of policy makers and provided a powerful argument for more aggressive family planning in the country. ONAPO was very pleased with its collaboration with DSA and indicated that they would like to update the model with more current information and hypotheses.

#### Data Used to Improve OPROVIA's Operation

OPROVIA manages the strategic food stock in the country. It is also responsible for supporting marketing of food. Several years ago, it discovered that the data it was using to make essential management decisions for its operation was false. They were able to obtain a more accurate data set from DSA to better formulate their overall management program. According to OPROVIA officials DSA's data is the "bible" on which their management decisions are based.

#### World Banks Agricultural Assessment

In 1989 the World Bank carried out a comprehensive agriculture assessment for Rwanda. DSA was one of the primary sources for information the Bank

used in preparing this document. As part of the study, they commissioned a special study of farmer attitudes in the coffee sector from DSA. This document played a major role in determining the Bank's agriculture program in the country.

#### USAID's Country Program Strategic Plan (CPSP)

In late 1991, USAID began the development of a new CPSP. DSA documents and data played an important role in forming this new strategic plan and are referenced on a number of occasions in the document. One DSA study in particular on income and expenditures played a significant role in pointing out the important role non-farm employment plays in supporting the welfare of the rural population. This information helped redirect USAID development program in the country. In addition, USAID found that DSA is the only organization in the country capable of providing the needed information on the rural sector to monitor progress in implementing the CPSP.

#### Study of Gender Issues

Women related concerns were dealt with in two studies done by DSA (Role of Women in Rwandan Agriculture, and Nutritional Study), gender disaggregation of heads of farm households (the principal sample unit in DSA's methodology), and in sensitizing enumerators on the role of woman within the farm household. On this latter point, it was noted that women are the principal labor on the farm and control important parts of the farming activities but are often overlooked in surveys because the males do much of the talking. Enumerators are trained to seek out the true situation in the farm household and often this means bringing the women into the response to the questionnaire.

These examples give an idea of some of the impact DSA and the project have had on policy and program formulation among a wide spectrum of organizations in Rwanda. As for the question of whether more can or could have been done? The answer is yes.

Policy makers look for four attributes when using data or information systems to help them do their job -- accuracy, relevance, timeliness, and accessibility. Below is a discussion of how DSA measures up to these criteria.

#### Accuracy

There is general agreement among the people we interviewed that DSA's data was accurate. There were a few skeptics but they tended to be individuals who did not understand sampling techniques or had other agendas. A disconcerting point was that no one we talked to had examined DSA methodology to make an informed judgement on the accuracy of the work they were doing. As part of the evaluation (see Section IV C) we looked at this issue and found the methodology to be generally good. There were, however, still some possibilities of errors particularly on the statistics of areas for perennial crops. In sum, DSA gets good marks for accuracy.

### Relevance

With the addition of income and expenditure and nutrition data to the basic long-term data set of DSA, almost all basic data needs for the rural sector are covered. By adding the ability to do specific punctual studies using this general data base, any policy issue related to the rural sector can now be undertaken.

### Timeliness

This issue is more difficult to answer. While no one raised it as a serious issue, we did get a general feeling that people would like to have had the data sooner particularly for the punctual studies. On the other hand, there appears to be a major issue in terms of publishing data from the routine data collection effort. As noted earlier, only six documents have been produced in this area and four of these are for the 1984 survey. There is a document on the 1989 data set and no document for 1990, 1991 let alone 1992. The war in the country is partly to blame for these delays. Nevertheless, lack of publication of the long-term data set undermines its usefulness to potential policy makers. A more timely preparation and release of these documents should be a high priority for DSA.

### Accessibility

This issue has two parts: 1) being able to physically get hold of the data set and analyses, and 2) being able to understand the data and analysis once they are available. This issue is the most serious failure for DSA. A recurrent theme in our interviews was a lack of knowledge or unavailability of documents from DSA. Although DSA has a long distribution list and claims that a number of documents are sent out, somehow people are not getting the documents. Physical accessibility to DSA documents needs to improve.

To date, DSA has not really looked at the market for its information and means to respond to that market. From our brief visit, we have ascertained that there are at least three markets for DSA data and analyses. Only one of these has been even partially responded to and that is the scientific community. DSA documents tend to be pretty forbidding. There are few, if any, graphics, and the text is often dry and difficult to read. For a scientific audience this may be considered appropriate, but even that seems questionable. For a government policy maker such documents can be infuriating. There is a need for DSA to begin to differentiate among the various markets for its data. As an example of what this will mean, let's look at the three markets we tentatively identified.

#### 1) Scientific

This includes ISAR, UNR, donor economists and a few other selected people with a high degree of training in statistics and economics. The DSA documents are suited to this audience, but even here they could be lightened up a bit with better graphics, fonts and layout. With the necessary computer equipment and software being available at DSA this should not be technically difficult to do.

## **2) Government (Kigali)**

This includes the bulk of the policy makers in the country. These are educated individuals who work in government offices, donor agencies and in the private sector. They are unlikely to have a strong statistical background. Like many executives, they are busy and need information to be packaged in a manner that is easy and quick to comprehend. The use of bullets, graphs, summaries, tables and diagrams are important. Writing needs to be clear and direct. It is useful to lay out the implications and policy options related to the data.

## **3) Government (Prefecture)**

This audience includes the government officials and individuals outside Kigali. The level of education and sophistication is generally lower than officials in Kigali. Information needs to be presented in short, well packaged bundles with an emphasis on graphs, diagrams and bulletinized messages. It would be useful if the information was in Kinyarwanda as well as French.

DSA appears to not have made its best efforts to provide data to these latter two markets, but they should. When a study is completed several documents could be prepared addressing these different audiences. A great deal more can be done with computers and desk top publishing equipment to make DSA documents more accessible. Graphing software can be easily added to the SPSS statistical package DSA is using to quickly make high quality graphs. More importantly, use of a rudimentary geographic information system (GIS) such as MapInfo can also be added into SPSS to make thematic maps of data. With this type of software there is no need for a separate graphics department. Most computer literate people can be trained to do this work fairly easily.

An emphasis has been made in some documents for DSA to have more seminars. We think general large seminars have limited return except where a major policy issue is to be dealt with and/of an internationally known speaker would be the focus of the discussion. The use of targeted meetings, however, with select groups directly affected by a study or policy issue is a very good idea. DSA also needs to re-look at its distribution system for documents to see why so many people claim not to have seen them.

Finally, outside the whole question of distribution of information in an appropriate way lies an even more fundamental issue that has not been directly addressed by the project. This issue is defining what role DSA should and could play in policy formulation. Throughout the project documents there is an assumption that DSA would play a role in policy formulation but how this is to be achieved is never fully described. How policy is made in the country has also never been defined. While it is nice to think of policy being made through a series of committees and policy councils, it seldom happens that way. The reality of the matter is that, policy is made through politics. The more difficult and important the policy decision the more intricate the politics become. Politics mean power brokers, political parties, and a whole host of formal and informal political actors. Does this mean that DSA should become involved in politics? The answer is no. If DSA entered into politics it could destroy its objectivity and integrity which are its greatest assets for the process of policy formulation. DSA has to play

the very difficult dual role of being both separate from the political process while at the same time having linkages to that process.

It needs to be realized that DSA is only a Division, within a Directorate, under a Ministry that is itself a weak member in the political policy making forum. To have an impact on policy, DSA needs to attract the policy makers who can use the data and analysis of DSA to carry forward their own policy agenda in the political process. To do this, it is essential that DSA's data and analysis become more accessible to the policy makers across the spectrum of the government and political arena. We have seen examples where this impact has occurred. With efforts on the recommendations noted above, we think even greater impact is possible.

### **C. Quality of data collection and analysis at DSA**

#### **1. Organizational and Managerial Aspects**

Organization of statistical data collection in agriculture is a colossal feat, particularly in countries with limited infrastructure and resources. The process of data gathering and analysis are similar to constructing a complex structure where all the components are so interdependent that one significant step missed may cause the loss of a whole reporting period. Data processing which follows collection is a less critical step in terms of its sensitivity to timing of field operations but it is critical in another sense: reports must be published in time. Otherwise, there is little rationale for collecting the data and hence no justification for an agency involved in data collection.

DSA has met both challenges well. It has collected data and has been able to publish - albeit with some delays for some reports. Its data collection system is probably one of the best in existence in francophone Africa. This has been repeatedly confirmed by many persons interviewed by this evaluation team.

DSA has a lean staff -- in fact understaffed at certain levels -- who are reasonably well organized and managed to produce the physical outputs which the project was expected to produce. Had it not been for this highly focused technical orientation -- which constituted ASPAP's raison d'être initially -- the project probably would have never got off the ground. It is useful to note that in addition to competent technical input and perseverance on the part of the project's staff (both Rwandan and expatriate), ASPAP has also been generously favored by the physical environment in Rwanda. These are mostly related to the manageable country size, reliable infrastructure and communications facilities and the relatively uniform farming systems which facilitate the data collection process.

On the management side, DSA's institutional viability has been favored and reinforced by the selection of appropriate and highly competent contractors for the implementation of the first as well as the second phase of the project. Effective leadership, good technical guidance, adequate staff training, sufficiency of funding, close supervision and motivation have also been critical to the success of the DSA system. These are the areas where the contractor, USAID and GOR collaborated to produce a successful project despite the myriad

of implementation problems that surrounded the project for many years and which constitute the weaker record of the project.

In order to maintain staff motivation and job satisfaction, salaries must always be assured. Indeed, non-payment of salaries is one of the most serious demoralizing factors that guarantees the demise of a project regardless of how good the design was. This has been the case with many African countries facing the so called "crise" that set in the mid-1980's. In Rwanda, records show that staff salaries have always been paid. GOR deserves credit for living up to this portion of its pledges despite the many austerity measures that necessitated budget cuts in many other areas as evidenced in reduced GOR contribution to ASPAP.

Another important favorable phenomenon which contributed to ASPAP's success is the absence of any evidence of incongruent personalities, ego fights and turf battles among resident long-term technical assistance and between the host government staff which, for obvious reasons, are detrimental to project implementation. This is a perennial problem that characterized many failed projects. Careful selection of TA and a high degree of commitment to the career have certainly played a role in maintaining a harmonious team in the field. Here both the principal and the sub-contractor should be highly praised.

DSA is involved in two types of studies: routine surveys and special surveys. In the case of specialized studies, the turnaround time for running a survey in Rwanda may be as short as 12 weeks: 6 weeks for the collection and 6 weeks for data verification, entry, cleaning and tabulation. Time requirements for the analysis of data are quite variable and may depend on the level of sophistication of the intended use.

The analysis of routine data -- which constitutes the core of DSA's data collection activities -- is much slower due to the greater amount of work involved. Until recently, the delays caused by the sheer volume of work, have also been compounded by understaffing at the DSA head office in Kigali. For instance, after the 1984 Agricultural Survey (Resultats de L'Enquete Nationale Agricole), which was published toward the middle of 1986 under ASAP, the follow-on ASPAP project was not able to produce annual routine statistical reports until 1991 -- at which time the report for 1989 appeared under the title: Enquete Nationale Agricole 1989, Production, Supercifie, Rendement, Elevage et Leur Evolution 1984-1989. This gap of coverage for each year may have caused some users to look for alternate data sources that are not nearly as reliable, such as the national compilations of the Monagri reports. In fact, the Direction des Etudes et Planification publishes these Monagri results (with technical assistance from Belgium), thus acting as another source of information while more scientific data await publication at the DSA.

DSA should consider a very quick version of its basic annual statistical report. To realize this task, each prefecture should hand compute the mean values for the basic parameters (say production for the most important 7 or 8 crops, areas, yields, animal counts, animal production and basic demographics) which can be extrapolated by using the number of households for each prefecture, thus bypassing the computer based data processing and complicated sampling weights etc. If the results are too far off from the last years results, investigations will be conducted to find out the reasons. The results obtained would be published in a ten-page booklet within a few months after the end of the season, i.e., say November or December of each year. These results would be made available to users under

a title such as "provisional summary survey results". Meanwhile computer based data processing will continue and final results will be published when the necessary tabulations and interpretations are ready, preferably within 6 to 8 months.

It is desirable to have DSA routinely compile, computerize and provide quick tabulations of the Monagri data while alerting the user to the method of collection in order to prevent other sources from picking up the slack. In fact, it is our contention that it may even be an option for DSA to consider arbitration of the Monagri data with the 10 Agronomes Prefecturales in Rwanda so that for the parameters where data collection overlap -- such as production, yields and areas -- national estimates are consistent with the DSA findings obtained from the scientifically based sample. As a precondition to the data arbitration process, DSA should insist that its prefectural totals be respected (the lowest level of significance assured by DSA) while distribution within these prefectures are to be arbitrated down to the commune level as proposed by the these Agronomes Prefectural who get their information from some 2000 extension agents scattered throughout the country. The arbitration meetings could be organized once a year in Kigali under DSA's leadership. This is the least cost harmonization scheme that one may visualize at this time given the obvious incompatibility of the DSA and Monagri data sets. In the future, when more resources become available, other schemes may be considered.

An aggregate data base having the general form of an agricultural census can be constructed using both the commune level data provided by the Monagri and the DSA survey data. The methods of incorporating other information into survey data constitutes the objective of the proposed arbitration process. In many countries, sample based surveys are complemented to constitute the basis for a global data base although these surveys are usually agreed to be the principal sources of information.

Data arbitration meetings in the prefectures will help the local agricultural offices (headed by an agronome de commune) improve the quality of their statistics as they start using the DSA results (which they don't now) in producing their own statistics. The increased interaction between the prefectural agricultural offices and DSA will generate an overall improvement in the quality of annual statistics.

DSA's record of success should not distract us from what possibilities may exist for further improvements and refinements in the system. Below is a focused discussion of DSA's procurement, staffing and survey administration systems with due regard their strengths and weaknesses.

## Procurement of Materials and Equipment

### 1. Office Materials and Equipment

ASPAP's procurement lead time has usually been long due to the many problems encountered in the management of local funds. Since the use of these funds will be placed under the contractors' responsibility for the next phase of Food Security II project, it is envisioned that procurement lead times will be considerably shortened as the lengthier USAID procedures, which must be respected in the case of direct USAID procurement, will mostly be bypassed.

DSA maintains excellent records of available documents both for those produced in-house as well as procured from outside. It is desirable to have the basic references displayed on open shelves to facilitate their use. There appears to be a shortage of scientific references at DSA. The documentation office within DSA should be expanded to include books and scientific references for which a budget of some \$30,000 may be allocated in addition to the procurement of computer software and the accompanying literature. Some in-country or third country short-term training can be considered for the librarian/documentalist.

## 2. Field Equipment

There usually is a set of equipment designated for each survey undertaken by DSA. Provision and maintenance of this equipment is vital to the execution of field work. Sufficient back-up of equipment must be available for replacements when needed and this is an area where occasional problems are encountered. There also appear to be problems in furnishing and replacing the equipment where needed: DSA has not been able to regularly replace consumed stationery, worn out measuring tapes, defective, damaged or lost items. It is important to note that reliable equipment is essential for enumerators' morale as well as their efficacy.

Field supervisors and enumerators currently use the following equipment: motorcycles, document bags, programmable calculators, graduated buckets, measuring tapes, angle boards, specialized measuring tools (such as UNICEF survey's), hand balances and miscellaneous stationery.

The evaluation team thinks that some of the existing DSA field equipment could be replaced with higher precision and faster ones. The bulky angle boards could be replaced by sighting compasses, self made sighting sticks should be replaced by collapsible metallic rods (like camera tripods) together with colored plastic ribbon to facilitate viewing and measuring tapes should be replaced by range finders (devices for measuring distances by sighting alone). Acquisition of these equipment will cost more money, but they will surely help reinforce the field operations and reduce the time and burden involved in taking measurements. The equipment recommended above can be located easily in survey engineering equipment catalogs and mail ordered in the USA.

It is recommended that the following standard equipment be procured regularly for DSA's field personnel: prefectural supervisors, enumerators and equip mobile members, and replaced when needed.

Equipment	Pre.Sup.	Enumerator	Equipe Mobil
motorcycles	X		X
document bags	X	X	X
bicycles		X	
progr.calculators	X	X	X
sighting compasses	X	X	
clinometers	X	X	
measuring tapes(*)	X	X	
hand scales	X	X	
rangers	X	X	
metal rods	X	X	
color ribbons	X		
boots	X	X	X
raincoats	X	X	X
stationery	X	X	X
counters		X	X

(\*) For use at very steep slopes where range finders cannot be used.

Justification for the equipment is provided under the discussion of technical matters in this report.

### Staffing

The project is implemented by 30 professional and support staff in Kigali and 98 field staff. Of the field staff 78 are enumerators at the district de recencement level, ten are prefectural supervisors and another ten are members of the so-called equipe mobile assembled in 1990 to conduct rapid rural surveys with or without the permanent DSA sample farmers. Since urban Kigali is excluded from the survey, there is no supervisor for the city of Kigali.

The office staff consists of:

#### 1. Technical Staff

MUREKEZI Anastase, Division Chief  
 RWALINDA Pierre, Analyst  
 KAMPANYANA Theobald, Analyst (MS)  
 FABIOLA Hyacinthe, Analyst  
 SHINGIRO Emmanuel, Computer Specialist  
 KARANGWA Justin, Computer Specialist  
 NGIRUMWAMI Jean-Leonard, Analyst (MS)  
 MUDACUMURA Gedeon, Analyst  
 HATEGIKAMAR Vincent, Analyst (Ph.D)  
 SIBOMANA Jean-Bosco, National Supervisor  
 MUNYANEZA Samuel, Statistician (MS)

## 2. Support Staff

4 accountants  
7 key-punch operators  
4 data verifiers  
3 drivers

Over time, some of the existing office and field staff left DSA. This attrition is compensated by new recruits who must pass an aptitude test. After being employed, new personnel are proposed to the MINAGRI to be included on the government payroll. Since, MINAGRI does not take immediate action for the inclusion of new staff on the payroll, DSA picks up the salaries of these personnel until they are properly put under government coverage. Consequently, at any given time there are at least ten enumerators who are paid directly by the project.

Although the current staff is generally sufficient to operate DSA with its present work load (with the exception of bottleneck periods where several studies must be finished concurrently), it may be useful to investigate if the addition of another 10 assistant data verifiers in the prefectures would help free up more of the supervisor's time for supervision responsibility. Currently, field supervisors spend about a third of their time reading questionnaires and making/requesting corrections where warranted. The marginal cost of this action will be around FRw 15000 per person per month, or roughly \$13000 per year in salaries plus office equipment and stationery. It is expected that MINAGRI will provide office space for the added personnel. Another possibility for doing this is by using the slack time of the equipe mobil members during slow periods. However, an investigation would still be called for to determine which course action would be more appropriate and action would need to be taken.

Mr. Anastase Murekezi oversees DSA operations in his capacity of Division Chief and ASPAP Coordinator. At this time, there is no deputy Division Chief at the DSA and decisions are suspended in his absence. It is recommended that a Deputy Chief be assigned to ensure project's representation at all times. This person can also play the role of the senior production manager/coordinator for the many studies which DSA undertakes and which cause planning problems as is acknowledged in some of the contractor's semi-annual reports.

### Administration of DSA Surveys:

#### 1. Place of DSA in Overall Data Collection

Collection of Agricultural Statistics is a DSA activity which is under the Directorate of Planning, Studies and Follow-up (Direction de Planification, Etude et Suivi - DPES) of MINAGRI. Almost all of the MINAGRI directorates have some sort of data collection and reporting activity for their own activities. But, DSA under DEP is the sole entity that collects agricultural data nationwide using scientific methods and covering a vast number of variables.

According to the presidential decree numbered 18/77 of July 26, 1977, all statistical data collection activities for the entire territory of Rwanda -- demographic, economic, social and cultural information gathering as well as their extrapolation -- are put under the exclusive

jurisdiction of the MINIPLAN. According to this decree, specific studies undertaken by other national and international, public and private agencies are allowed contingent upon the fact that their methodologies are approved by MINIPLAN. Thus, it appears that DSA can legally undertake special studies but not national surveys. There is utility in passing new legislation where DSA will be recognized as an entity with a full mandate for collection of data in the rural areas where MINIPLAN retains the mandate for the coverage of the urban sector and activities beyond DSA capabilities, such as the population census. Although, this division of labor has already been in effect for a long time, establishment of the legal basis by passing the needed enabling legislation will help ensure DSA's long-term institutional integrity. Some concern has been expressed by the MSU team about the danger of DSA's conversion into an office of special studies alone. A reinforced legal basis of existence for DSA may help circumvent it from becoming a so-called bureau d'etudes conducting special studies upon clients' request.

Ironically, DSA has larger staff, resources and apparent mandate than the DPES under which it operates. Organizationally, it would be more appropriate to elevate DSA once again and turn it into a directorate. In addition to more equitable legislation, this organizational redefinition of the DSA will be a further hedge against the possibility of DSA's disintegration or degeneration in the future, which may be more due to success than failure. Once the directorate is formed, as a further reorganizational measure, it will be useful to separate the core data collection system, i.e., the routine data collection system, from the irregular studies by instituting two distinct services. The computer system would be yet another service to be instituted thus bringing the total number of services to three under the prospective Direction des Statistiques Agricoles (DSA). Hence, the three services under the new DSA will be: Service d'Informatique (SIN), Service de Statistiques Courantes (SEC) and Service des Etudes Speciales (SES), each of which will have a Chef de Service. This option should be weighed against the risk of introduction of different status to staff which, in turn, would require different pay scales.

It is the evaluation team's belief that taking the legislative step involving the recognition of the DSA in its actual capacity -- in addition to MINIPLAN -- and redefinition of its organizational level and structure will help establish a permanent and secure haven for the DSA within the MINAGRI.

## 2. DSA's Surveys

DSA divides its surveys in two categories: base surveys and irregular surveys. The number of irregular surveys is variable at any given time. Currently, DSA undertakes, 8 base surveys and 5 irregular surveys. This load corresponds to almost full capacity at DSA.

We will first examine DSA's base survey coverage. The most basic data needs in Africa usually require uninterrupted series on the following set of variables where DSA's coverage is marked by an asterisk:

### 1) Basic Rural Demographics

Number of persons (\*) by sex (\*), relationship (\*), age (\*), marital status (\*), literacy (\*), education (\*), ethnic origin, profession (\*), births, fertility, deaths, disease incidence and migration.

### 2) Basic Agricultural Parameters

Number of rural households, total population, active population, salaried labor (\*), areas farmed (\*), land use (\*), land valuation, crop and mixed crop areas (\*), age of trees, cultural practices, tools, cattle (\*), production by crop (\*), yields, densities (\*), production of animal products (\*), inventories of large and small livestock (\*), births(\*), animal purchases(\*), animal sales (\*) and animal deaths (\*).

### 3) Micro Household Behavior: Budgets and Consumption

Structure of household budget (\*), sources of income (\*), farm gate prices for crops(\*) and animal products (\*).

The 1993 agricultural season has just started. DSA's season A activities -- running from September to the end of February -- involve data collection in the following eight areas. The farm income and expenditure survey is a very intensive one involving 6 different modules.

- Field and block charts (for measurement of areas)
- Crop densities
- Crop production (20 crops)
- Livestock inventory
- Production and areas for climbing beans
- Animal production
- Farm income and expenditure
  - Sale of crops and animal products
  - Purchase of crops and animal products
  - Sale of animals
  - Hired labor
  - Off-farm income
  - Gifts and other income received
- Demographic characteristics

With the exception of the production and areas for climbing beans, which is about a 10-question add-on to the survey under a current CIAT contract, the rest of the data collection effort pertains to basic agricultural data effected by the 78 enumerators. There has been an addition to the basic data set as a result of the UNICEF contract which involves nutrition data gathering. The UNICEF-funded data collection effort is expected to last about five years, and given the conditions in Rwanda, nutrition related data can be considered to be an integral part of base data. Nutrition data is now collected by the mobile team as the equipment proved to be too cumbersome for the sector-based enumerators to carry around.

The most important public service provided by the DSA is the maintenance of the basic statistical series. Basic statistics are always needed but are unlikely to be financed by outside DSA clients. As mentioned, the UNICEF sponsored nutrition survey is the only exception to this so far.

An analysis of the 1989 questionnaire set reveals that DSA planned to make crop projections for the harvest, but no analysis of the data has been encountered. This method has subsequently been discontinued. There is no crop projection questionnaire in the 1993 set.

As for irregular special studies (enquetes ponctuelles) between 1989 and 1992, there have been ten major studies five of which are still in progress. These studies are listed below:

Border trade (1989); Birunga corn (1989); fertilizer study financed by the EC (1990); coffee sponsored by MINIPLAN and the World Bank (1991); agro-forestry and soil degradation (1991), tuber crops commissioned by ISAR, CIP and IITA; climbing beans (see routine surveys above) for CIAT and; soil degradation. The DSA special studies portfolio is a very diversified one ranging from the collection of basic data (not actually gathered by DSA) to very specialized ones such as distinguishing between different crop varieties etc. For instance, the CIAT study requires that the enumerators distinguish between local and improved climbing bean varieties and state the name of the dominant variety to be used for agronomic research purposes. Since, DSA's in-house technical capacity is heavily biased in favor of agricultural economics, it would be advisable to remain within the realm of economics.

### 3. Choice and Training of Enumerators

A simple intelligence test covering arithmetic, memory, ability to follow directions is administered as the first screening tool for applicants. Training for the new recruits is usually provided by the senior office staff in Kigali and prefectural supervisors in the field.

The manuals which are used for enumerator training date back from 1984 which are updated by the addition of loose leaflets. Since survey questionnaires change over time, it would be useful to completely rewrite the current manual. As opposed to the initial phase of the project, less emphasis is placed on enumerator training as they become more experienced with the surveys. These training sessions are organized in four sites with Kigali as a permanent site. Due to shortage of funds, these training sessions which normally should take place at the beginning of every season and each time a new questionnaire is launched, have been getting fewer and shorter.

DSA does not use institutionalized training programs such the one offered by IAMSEA in Kigali. In order to effectively institutionalize DSA in the long term, and particularly when donor financing comes to an end, the project should consider using an agency such as IAMSEA for its professional training higher than the enumerator. Closer cooperation between DSA and IAMSEA will help define the parameters and nature of the training which a national statistical system will need in Rwanda.

#### 4. Some Suggestions for Marketing DSA Results

One of the possible ways of enhancing the use of DSA's data may be through the sale or transmission of unprocessed data sets prepared upon a client's request. Data sets are subsets of a given data base or a combination of parts from different data bases. This should be considered only for clients that will maintain data integrity (not release it for resale etc., and use it strictly for analysis etc). These data sets should not contain any information about the respondents identity. To a certain extent, this is already being done by DSA as is the case with the IITA study.

A catalog of parameters is a further marketing tool to encourage the use of agricultural data. DSA may like to consider making an exhaustive listing of all the parameters (data elements, characteristics, variables etc) it has in its data bases -- together with coverage (location) and dates for the series -- and put in the form of a catalog arranged by alphabetical order. LOTUS 1-2-3 can be used to make this catalog by running a sort on the parameter. The necessary parameters (data elements) can effectively be extracted from questionnaires, old and new alike, and referenced to the computer files on the hard disk. This guide should contain reduced size copies of the most important questionnaires. Inventorying all data is important because certain data are only collected but never analyzed. For instance, a potential user of land slopes for agricultural fields will not be able to see any reference to slopes in the DSA publications of routine data (with the possible exception of DSA/DAI Report No: 192. Fighting an Uphill Battle: Demographic Pressure, the Structure of Landholding and Land Degradation in Rwanda, page 17).

#### **2. Methodological Aspects**

Methodological aspects of statistical data collection systems refer to survey design which includes the sample design together with the questionnaire and the method of obtaining the information from the sample or more generally, the method of measurement. Thus, the survey design includes the plans for all the parts of the survey except the statement of the objectives. The most important components of survey design includes:

- (1) The questionnaires
- (2) Decision on method of observation or interview
- (3) Sample design

Below is an evaluation of the first two components for DSA. For a critical discussion of sample design, the reader is referred to Appendix E3 due to the technical nature of the exposition.

#### Questionnaires as Data Collection and Processing Tools

DSA uses many questionnaires. Certain surveys require more than one questionnaire (modules) while others may have just one. Naturally, for every type of survey there is a different questionnaire. These are listed in the section titled: DSA Surveys.

DSA's questionnaires have been modified a number of times. Naturally, as these questionnaires change new training sessions are needed country-wide for supervisors and enumerators. There is one manual intended for both the enumerators and the supervisors which has not been updated for the last 8 years. It was first issued in 1984. The project now uses supplementary loose leaflets to conduct its training sessions. These leaflets are kept in ring binders by the enumerators provided by DSA. Ideally, enumerator and supervisor manuals should be separated. Those of the enumerators' should be profusely illustrated.

To avoid frequently changing questionnaires, it is recommended that DSA conduct a reassessment of the basic questionnaire set with technicians from ISAR, MINAGRI Direction de Production, IAMSEA, donors and other concerned parties and decide on contents and format which will not change for the next five years. Then, it may consider printing and binding all of its basic questionnaires in one booklet which will be accompanied by an updated and improved enumerators manual. Short term technical assistance may be needed for this effort for up to three person months.

None of the routine studies questionnaires in current use is coded (as distinct from the concept of precoding which involves the presentation of an exhaustive list out of which the response should be selected) to facilitate entry of collected data in the computer. Instead, DSA uses data entry templates which are essentially computer screen replicas of the questionnaire. Both coding and use of on-screen templates will help minimize transcription errors (key-punch errors) in addition to facilitating reference to the questionnaires at a later stage. Therefore, the evaluation team recommends that all of the questions on the questionnaires be coded, i.e., prenumbered to facilitate computer entry, retrieval, sorting and preparation of special data sets (joining of data from different questionnaires or making subsets from the same source) for analysis as well as verification when needed. Short term TA may be needed for a reassessment of the basic questionnaire set for up to 2 person months.

For this scheme to work, some sort of an internal statistical accounting system at DSA needs to be developed in order to relate the questionnaires to the data bases and data bases to the questionnaires in an unambiguous manner, duly keeping track of the time factor. For instance, the following statistical chart of accounts may be considered as a rough starting point for a possible DSA chart:

- 001 to 020 survey identification variables
- 021 to 040 demographics
- 041 to 100 land use
- 101 to 200 livestock
- 201 to 300 animal production and sale
- 301 to 400 inputs use and prices
- 401 to 500 labor use (hired and own)
- 501 to 600 fields measured and plant counts
- 601 to 700 crop production and sale
- 701 to 800 farm budgets and consumption
- etc..

The same coding needs to be done for special studies. To do a full fledged and professional job in data management, as suggested above, DSA may like to use short term TA for up to three months in agricultural data base management. Possible source of expertise is the USDA or ERS. Original project design had provision for long-term computer specialist for interventions of this sort, but the position was deleted in the Pro-Ag.

### Decisions on Method of Observation or Interview

#### 1. Field Measurement to Compute Areas

To measure crop fields the enumerators make charts of blocks which may contain more than an individual field, and then proceed with the measurement of the fields under crops as early as possible in the season. This is the most arduous task for the enumerator and it takes anywhere between 50 to 80 percent of their time. The job is rendered particularly toilsome if it is done during or just after the rain. This is the highest marginal cost data element when one considers the fact that everything else gets collected in the remaining time which is less than half of the total time worked by the enumerators for conducting all of the JSA routine surveys. This is partly due the DSA decision for the inclusion all the cultivated fields in the survey (previously DSA measured fields for only a half of the sample) as well as the choice of the surveying equipment consisting of angle boards and 20 meter measuring tapes.

In order to measure a field, the enumerator lays down the field on paper and measures the sides and the internal angles for the resulting geometrical figure, say a polygon. The angle board, which measures the internal angles of the polygon, is locally made and is very low cost (about FRw 1000 apiece) but makes sighting difficult as well as, perhaps, inaccurate. To compute the areas, the data are entered in a hand-held programmable calculator by the supervisor. The questionnaire would be returned to the enumerator if the allowable error (5 percent) is exceeded.

The tape is 20 meters and for sides longer than 20 meters the amount of work is increased because the tape has to be used repeatedly on the same side of the field. Longer tapes (30 to 60 meters) or range finders are recommended to reduce the labor involved in the measurements of field sides. One person cannot do the job of measuring the sides of a field. In many countries teams of two enumerators are assigned to the task. Similarly, DSA enumerators reported that they must pay someone to help them with these measurements, sometimes as much as FRw 10 per field measured. Hence, there is utility in reducing the labor involved in measuring the sides of a field by procuring equipment to facilitate the task. The range finder is a simple device and relatively inexpensive for what it does (under \$70). To operate it one has to sight like in a camera and make focus adjustments until double image disappears for the object which is being sighted (i.e., a metal rod bearing a red ribbon).

The project argues that measuring the internal angles has an intuitive appeal and errors would be more readily discerned, if any. The hand held sighting compass, which the evaluation team recommends, measures angles as deviations from the north (i.e., bearing angles) and cannot be matched with anything one normally uses in everyday life. Furthermore, the compass is deviated if the enumerator wears rings or anything metallic. Finally, it is

difficult to measure bearing angles on steep slopes because the compass must be maintained in horizontal position.

There is a merit to each one of the above arguments. Yet the evaluation team still believes that it would be more advisable to replace the angle boards with sighting compasses. In addition to being bulky and cumbersome, the principal difficulty with the angle board is that there are two sightings needed, one for each arm of the angle board. The angle board is often inconvenient to plant and takes time to get it firmly attached on the ground. Moving one arm usually tilts the board and requires remeasurement on the other arm. One needs to plant two sticks in order to use the angle board, and this in itself is time consuming. The sighting compass, on the other hand, requires only one sighting and only one stick planted at a time. On a very steep slope of 20 degrees, a 1.70 m enumerator can sight a distance of about 5 meters on the slope and there are methods of using a compass efficiently under these circumstances.

If there are errors in the field measurement, and there often are, remeasurements must be taken. These errors are detected by the supervisors when they enter field measurement data into their hand-held calculators. The evaluation recommends that each enumerator be given a programmable calculator to enable him to test himself directly on the spot, thereby eliminating the need to revisit the field for remeasurements.

Presently, enumerators make their own sighting sticks by cutting branches etc., using a machete (not provided by project). To further facilitate the task of field measurement, each enumerator would need a metal rod to stick in the ground (like javelins) before sighting with his compass. These rods would have pointed tips to ease penetration in the soil and would leave clearer marks on the soil for repeat measurements. Metal rods can be procured locally. They should be as light as possible. Ideally, they should be collapsible.

If enumerator time can be freed up, then they can be relied upon more heavily to conduct the remaining routine and special studies with greater precision and enthusiasm.

A further possibility for consideration involves going back to the project practice of measuring the fields for only half of the sample. This would be based on a study of dispersion (variances) of field areas for each crop. It is quite likely that half of the sample would give very good estimates for the areas. The next sampling specialist may like to investigate this matter, because the decision for the expansion of the activity was not based on any study.

## 2. Measurement of Crop Areas

If there is only one crop in a field, the problem of finding the crop area is a very trivial one. If the field is occupied by more than one crop (inter-cropping, mixed cropping, associated culture), the problem of finding the crop area is a non-trivial one. In fact, it is a very complicated process to which there still exists no clear answer.

As is the case with most of the traditional subsistence farming systems in Africa, mono-cropping in Rwanda is rare with some variability by agro-ecological zone and crop. Hence, most of the agricultural production originates from mixed crop fields whose areas must be mathematically (or somehow) apportioned to individual crops. In fact, this phenomenon

essentially precludes the option of satellite imagery (as distinct from aerial photography needed for maps etc.) for many African countries where shades of green cannot be objectively differentiated for attributions to different crops.

In addition to reporting on the most important crop mixes, which the project does not do at this time, mixed crop areas have to be translated into mono-crop areas using some systematic approach. Generally, the process of apportioning mixed crop to individual crop areas constitutes a major problem. Although there is no recognition of it, the method currently used by the Project closely resembles the "attributed area" method advocated by FAO which employs observed and theoretical plant densities as a weighing device in attributing areas to different crops contained in a given field. When each crop in a mixture is assigned a relative percentage density, these are then normalized to find the percent areas for each crop. Appendix E1 includes a discussion of how one can compute crop areas in accordance with the norms of trade established by FAO, and adopted and used by many statisticians in Africa.

Until the end of the 1988 production season, the project did not have a method for separating mixed crops. It was collecting data on the most important two crops in the case of any mixture, thereby ignoring the remaining crops present in the field. As of 1989, DSA has been utilizing an innovative approach whereby field enumerators make subjective estimates of the relative densities of the mixed crops in the field, (i.e., they are trained to have a good idea of about the theoretical pure stand densities for all the twenty crops in the survey for their region and translate observed mixed crops to relative densities subjectively) in order to assign percentage land occupation rates for each crop in a mixture. This requires that they subjectively arrive at the ratio for each crop which would be obtained by dividing the actual measured density by the pure stand, or reference density for each field that contains mixed crops. To our knowledge there has been no empirical comparison of this technique with the classical technique which involves actual plant counts in a random square laid in the field. It would be very useful if such a comparison could be made. On the other hand, it must be acknowledged that the present method does relieve the enumerators from the more labor intensive and costly approach of laying down density squares in the field since the subjective relative density estimation takes about five minutes for each field, does not need tools (cords and counters) and may in fact be quite accurate. It is the recommendation of the evaluation team that this be validated by an experiment involving a random sample of farmers. If the differences are found to be significant, then DSA should adopt the classical technique of laying down density squares and doing plant counts. The source of the reference pure stand crop densities will in all likelihood be the national research organization, ISAR. If density squares are to be done, knotted cords, hand counters and special random number charts will be needed as added equipment.

As for the use of these densities, they are normalized to obtain percent occupation of each crop in the field. This is almost akin to FAO's attributed area concept, but it should be applied only for seasonal crops because biases will result if biannual or perennial crops are considered together with annuals during the area attribution process. Hence, it is recommended that DSA not make partial area attribution to biannual or perennial crops (cassava, coffee, bananas and tea) if these are mixed with seasonal annual crops. Area attribution should be made only among annuals or seasonal crops. In effect, biannual and perennial crops should be assigned areas according to the so called "developed area" concept of the FAO (Annex E1). The principle is very simple. If, for instance, cassava is mixed with

beans on a one hectare field, both crops should be considered to have occupied one hectare (and not .50 hectare each) because once the bean crop is harvested we will still have one hectare of land under cassava, and the presence of cassava in the field has little or no effect on the bean production as the plants are very small. One gets into very messy statistical accounting problems because of one hectare getting into two hectares due to mixed cropping. It is possible to overcome this problem by separating the areas under grains, vegetables and annual root crops from the areas occupied by biannuals (cassava) and other tree crops and developing some formulas for the overlaps due to mixed cropping. Appendix E2 contains some suggestions as to the creation of added crop categories in order to facilitate the accounting of biannual and perennial crop areas. For this effort STTA may be needed in farming system research, if the project deems it important.

### 3. Measurement of Crop Production

DSA uses graduated buckets to measure the amount of crops grown for the sample farmers for the estimation of national production. This is a very good method and is applied with success.

The project is actually conducting an experiment with the production data collection system. Data are being collected from two different samples of 1248 households with weekly data being collected from the first sample while monthly data are collected from the second sample. The object of the effort is to estimate if there are significant differences between the two types of collection in order to estimate household crop production. Dr. Clay has found that the monthly collection system underestimates production due to loss of some information. The experiment will be continued until such time that a correction factor can be developed to scale up the estimates from the monthly data collection system. The evaluation believes that this is a very good approach toward reducing the intensity of the survey, making it less costly and more sustainable for future considerations.

### 4. Estimation of Yields

DSA does not collect data directly pertaining to yields. Therefore, all yield data at DSA are derived using estimates for production and areas measured, attributed etc. Hence, it is possible to state that DSA's yield data are as good as its crops area data in light of the suggestions and possible improvements mentioned above. It is possible to conduct an experiment to compare measured yields (by crop cutting) with derived yields as a further device for assessing the reliability of the area estimates obtained by DSA. This could be added to the terms of reference of the STTA in farming systems research recommended above.

## V. LESSONS LEARNED

There are three lessons learned from this evaluation that have implication beyond this project. These concern USAID management, policy directed projects and institution building.

### USAID Management

For a number of years AID has been working under a management motto of doing "more with less". This project demonstrates the fallacy of this managerial approach. While USAID/Kigali's portfolio increased rapidly over the period of ASPAP's existence, its staff to manage that portfolio did not increase proportionally. The result was an overworked staff that was unable to give proper attention to the operational details of the projects that were being managed. This can be witnessed in the problems of local cost funding, delays in commodity procurement and the general low level attention given to providing guidance and direction to project activities. The problems mostly remain unresolved even with changes in personnel which indicate that these are problems of the institution and not of individuals. In the past few years, AID has shifted its management motto to "doing fewer things better." This change has been accompanied by an exercise to focus and concentrate its portfolio. The Mission is making an effort to improve the situation. However, it is too early to tell if this shift in emphasis will have a major impact on the USAID ability to manage its program. Transferring a greater part of the management responsibility of the project to the contractor (as is the case with the follow-on FS2 project) may also help the problem provided that the contractor is also given the resources to do this additional work.

### Policy Oriented Projects

There are three points to be learned from this project with regard to policy oriented projects: 1) policy is made inherently by a political process, 2) there can be conflict between the basic objectives of USAID and its project policy institution, and 3) in a policy project success can lead to failure.

As we have evidenced in this project, policies are developed through a political process. In the bean price setting example, MINIFIN wanted to continue the existing policy while MINAGRI wanted it changed. MINIPLAN started in favor of MINIFIN, but as DSA data became available, the former shifted its position to support the MINAGRI view. This is a rather classical case of give and take between political elements. It is as much political as it is personal. AID documentation for this project seems to be oblivious of the political nature of policy making. The project paper was criticized for not laying out what policies the project was to deal with. The only reference of how policy was to be affected makes mentions of a committee that never really functioned in the manner the project designers anticipated. Throughout the project paper and terms of reference of this evaluation, reference is repeatedly made to policy makers but these are never defined. By removing politics from policy making, one creates a condition that would be impossible for a project to fulfill.

In a policy project there are real possibilities, as we have seen here, of conflict between basic AID objectives and the institution it is working with. AID wants a policy agenda that is often within its own particular policy orientation. At the same time, the host country institution (DSA, in the case of this project) is looking to increase its technical

capability to do its particular task of data collection and analysis. Although each institution is in a symbiotic relationship with the other to reach its own ends, the inherent conflict is still there. It may well be that the local institution is aware of the political realm in which policy making is done in the country and is rightly wary of getting too involved in it.

This leads to the final point where we assert that success in the policy making by an AID supported institution can lead to its failure. In the world of business and politics, information is power. Businesses use that power to gain advantage over its competition in the marketplace. In politics, information is used to gain advantage over your political rivals. Public good is not always the prime consideration. A data collection and analysis organization that can provide telling points to one side or the other of a political debate on a policy issue may be a momentary success, but also makes itself liable to potential dismemberment or abandonment if the opposition to that policy should gain political control at some future date. In the volatile political climate of a country moving into multi-party democracy this liability can be a real source of concern.

### Institution Building

This project represents, in many ways, a successful example of institution building. Lessons can be learned from what such a successful venture requires. Among these lessons are: 1) the institution was supported over a long-term (over 11 years in this case), 2) activities undertaken by the institution started small and were expanded incrementally as the institution gained capability and trained staff, 3) there was a long-term continuity in technical assistance, 4) the staff of the institution remained small and lean, focusing on specific tasks and issues, and 5) the local staff is adequately supported both by the government (even though GOR contribution were small, they always paid salaries) and the donor in terms of compensation, equipment and training. The result is a dedicated staff qualified to produce the basic information essential for both public and private sector planning and policy to expand economic growth in the rural sector. An absence of any of these essential ingredients would have precluded the project's success.

There is one down side in this institutional development effort. Countries with limited resources like Rwanda and others in Africa cannot afford good institutions. Yet without certain basic public institutions these countries cannot expect to have the necessary economic growth to break the bond of poverty they are presently in. In an age of expanding democracy and movement to the marketplace, information becomes one of the essential needs of the country. In such a situation, donors must face the hard fact that they have become the de-facto public financier of these basic public institutions. It is, in fact, a sound decision for the donor from both economic and development perspectives. It is the donors who are the major users of this information to fine tune their programs to have a more direct impact on the economic development of the country. Since they are the main users, they should share in the cost. Additionally, the cost is small (for DSA \$300,000 to \$400,000 a year) compared to consequences of a potential another famine in the center of Africa. Finally, institutions like DSA provide the basic services needed for Rwanda to attain a level of economic growth that it can eventually finance its own institutions. This is the desire of everybody.

## Appendix A. List of Persons Contacted

**BARTHOLOMEW, Paul** - ADO Office, USAID/ Rwanda

**BROEKE, Anton** - Agricultural Representative, Belgium AID

**BUTARE, Innocent** - Director, OPROVIA

**BIZIMUNGU, Francois** - DSA Enumerator

**CANTELL, Claudia** - Project Development Officer, USAID/Rwanda

**CLAY, Dan** - STTA Survey Specialist (MSU), ASPAP

**CUNARD, Alexander** - Agronomist, Evaluation Team FSR/E Project

**DIJKERMAN, Dirk** - Acting Mission Director, USAID/Rwanda

**DOUEM** - Consultant Direction of Planning and Statistics, MINAGRI

**FAYD'HERBE, Jean-Claude** - Resident Representative, World Bank

**FULLER, Kurt** - Agricultural Development Officer, USAID/Rwanda

**GADBOIS, Millie** - Agricultural Economist, Evaluation Team FSR/E Project

**HEMPHILL, Greg** - Controller, USAID/Rwanda

**KAMPAYANA, Theobald** - Analyst, DSA

**KAREMERA, Emmanuel** - Controller's Office, USAID/Rwanda

**KRASOVEC, Katherine** - Administrator, Nutrition Program, UNICEF

**LAJOT, Rene** - Consultant, OPROVIA

**MUHAWENIMANA, Aloys** - Head of the Faculty of Agronomy, UNR

**MULIGO, Theodomir** - Director of Statistical Studies, MINIPLAN

**MUNYANEZA, Samuel** - Statistician, DSA

**MUREKEZI, Anastase** - Project Coordinator ASPAP, Chief of Division Statistiques Agricoles (DSA), MINAGRI

**MUZIRAKUGISHA, Jean-Damaciene** - Director Planning and Statistics, MINAGRI

**N'ZAMUAMBAHO, Frederic** - Minister of Agriculture, GOR

**NDAMAGE, George** - Head of Tuber Research Section, ISAR

**NGABOYIMANZI, Damascene** - ASPAP Project Manager, USAID/Rwanda

**NGAISITSINZE, Emmanuel**, DSA Enumerator

**NIRINGIYIMANA, Jean Baptise** - DSA Enumerator

**NIYOI, Gustave** - Division Prevision, MINIPLAN

**NSENGUMUREMYI, Jean Damascene** - DSA Enumerator Supervisor

**NTAMITONDERO, Alphonse** - Head of Study Programs, OPROVIA

**REARDON, Thomas** - Associate Professor, Department of Ag. Economics, MSU

**RUZIBIZA, Jean Claude** - Head Accountant, DSA

**RWAMASIRABO, Serge** - Agricultural Economist, UNICEF

**RWASANGABO, Bonaventure** - Head, Economic Department, IAMSEA

**SHAFER, James** - Professor, Department of Ag. Economics, MSU

**SHINGIRO, Emmanuel** - Computer Programmer, DSA

**SIBOMANA, Jean-Bosco** - National Field Supervisor, DSA

**SPERLING, Louise** - Anthropologist, Regional Bean Project, CIAT

**TALLON, Fabrice** - Expert in Charge, Assistance to ONAPO, UNFPA

**TARDIF-DOUGLIN, Catherine** - STTA Rural Sociologist, ASPAP

**TARDIF-DOUGLIN, David** - Contractor Representative DAI, ASPAP

**WEBER, Michael** - Director Food Security II Project, MSU

## Appendix B. Follow-up of Mid-term Evaluation

Between May 17 and June 9, 1989, a three person team composed of Charles Steedman and Christine Ellas of the Center for Research on Economic Development (CRED) of the University of Michigan and Dr. Pierre Nyabyenda of the Intitue des Science Agronomique du Rwanda (ISAR) evaluated the Agricultural Survey and Policy Analysis Project (ASPAP). The Project Evaluation Summary (PES) of this evaluation contains nineteen recommendations. Following are details of action taken by USAID, the project or the GOR in response to these recommendations and a brief assessment of whether or not these actions improved project performance.

### ***1. Create a distribution list and take steps to expand the distribution of SESA/DSA studies and production data.***

Even while the evaluation team was in country the contractor and DSA staff began preparing a distribution list of some 350 GOR officials, donors and other members of the development community. A bibliography of current documents was also prepared. In late June, 1989 this list was sent to all potential clients on the mailing list. Since 1991, reports have been sent to a list of 160 GOR officials, donors, and other members of the development community. A distribution system has been standardized including reports, updated bibliographies and order forms for additional purchases.

Timely distribution of studies is hampered by 6-12 month delays in getting official MINAGRI approval to distribute final printed documents. The project tries to get around this problem with a limited distribution of "draft working papers." For a while the project was hampered by a lack of a photocopy machine to duplicate out of print documents.

### ***2. Prepare near- and long-term work plans aimed at setting research priorities, taking into account SESA/DSA's research strengths and available resources.***

Detailed yearly work plans have been prepared for 1991 and 1992. These plans have tried to lay out the research priorities for DSA. The work plans have been useful management tools for the project.

### ***3. Propose to the Minister a limited pilot study to determine the feasibility of harmonization of data collection between MINAGRI's monagris and the project.***

A report (Proposition sur la Collect des Statistiques Agricoles en Utilisant les Monagris dan les Zone des Projets: Sommaire d'une Approche sur DSA) was prepared by short-term consultant Tom Zalla and then DSA Director Serge Rwamasirabo to try to harmonize the data collection systems of MINAGRI. This report was given to MINAGRI in September 1989. MINAGRI accepted this proposal and planned to implement it. Lack of MINAGRI funding to date, however, have kept this proposal from being put into place.

### ***4. Review the need for low-level aerial photography.***

Although the proposal to use low level aerial photographs was made several times to MINAGRI by the contractor the proposal was always rejected. The main reason for the

rejection was the perceived complexity of the procedure, the inability of the procedure to differentiate some crops grown in mixed associated cropping patterns, and a strong bias towards the present enumerator or monagri-based system. In a joint GOR/USAID meeting on January 11, 1990 to discuss recommendations of the mid-term evaluation, this proposal was formally rejected. USAID reallocated fund to be used for the aerial photography into local cost in PIL #13 dated May 5, 1990.

**5. Propose to the Minister of Plan that the technical advisor of MINIPLAN be transferred from the Direction General of Statistics to the Direction General Conjoncture et Revision Socio-economique (DGCRS).**

After some delay, negotiation was undertaken with MINIPLAN to transfer the technical advisor to DGCRS. This arrangement was formalized in PIL #18 dated July 15, 1990 which revised the "Detail Project Description" of the Pro-Ag.

**6. Revise the terms of reference for the MINIPLAN advisor.**

A revised terms of reference for the MINIPLAN advisor was developed but continue lack of counterparts and support at MINIPLAN eventually lead to his removal from MINIPLAN and transfer to DSA.

**7. Combine the remaining resources from the ex-MINIFINECO unit of ASPAP with those available for the MINIPLAN unit and use these resources to strengthen the Economic Unit of MINIPLAN.**

This recommendation was completed with the issuance of PIL #18 dated July 15, 1990.

**8. Recruit a new USAID Project Officer to assume project management responsibility for ASPAP.**

In September 1989 Damascene Ngaboyimanzi was hired to be the USAID Project Manager for ASPAP.

**9. Organize semi-annual project implementation meetings, to be attended by the Mission Director, the Rwandan project director, a MINIPLAN representative, the USAID project officer, and the contractor representative.**

Project implementation meeting were held quarterly but these meeting were only for internal USAID staff. Project and GOR representative did not attend. The reports from these meetings (PIR) were usually given to project staff for review and comment.

**10. Organize bimonthly meetings of the Groupe Technique Mixte.**

The Groupe Technique Mixte meet on a regular basis after the mid-term evaluation but meeting became more and more infrequent as the project began to close out its activities at MINIPLAN. No meeting have taken place in the last year.

**11. Develop terms of reference for a Management Committee which will include GOR data users to help establish ASPAP's research agenda and program.**

It is unclear whether this recommendation was ever implemented. Work plans with research agenda's were developed but without a Management Committee.

**12. Approve the 1989 Work Plan/Local Cost PIL. This PIL will modify the Project's financial procedure to establish a system of advances, rather than reimbursements, as the basis for financing local costs.**

This recommendation was implemented with PIL #8 and PIL #9 dated July 12, 1989.

**13. Recruit a financial manager/controller to work under the direction of the SESA/DSA director.**

This recommendation was caught up in the maelstrom of the fraud and incompetence of the accountant hired by the project under suggestion of USAID. Financial management at DSA did not improve until after the audit were these problems were found. A new and competent accounting system is now in place.

**14. Review project's local cost accounting system with the objective of improving its informativeness for both SESA/DSA and USAID.**

See the above recommendation.

**15. Incorporate non-recurrent cost (i.e. salaries) into the calculation of the GOR contribution via a PIL.**

This was implemented, although it is unclear if it was done by a PIL.

**16. Detail the GOR contribution to the project in terms of non-recurrent cost.**

GOR contributions to the project consist of salaries for MINAGRI employees working on the project, water and electricity and office space. The value of this contribution is about \$160,000 a year.

**17. Detail GOR estimated recurrent cost needs over the remaining life of project, and establish a basis for gradual increase in GOR coverage of recurrent costs.**

The GOR contributions to the recurrent cost of the project continue to deteriorate from the date of the mid-term evaluation. In May 1990 PIL #13 realigned the Project's budget using fund allocated for aerial photography to be used to cover local cost. In August 1990, the Acting assistant Administrator of the Africa Bureau waived the requirement for the GOR to contribute at least 25% of the project cost.

**18. Request the Assistant Administrator for Africa Bureau to make an exception in the case of ASPAP to be able to pay salary supplement "primes".**

A request was made for an exception on Primes from AID/Washington. Primes were allowed for the project up to PACD of September 30, 1992. After that date primes are no longer allowed.

**19. Translate the mid-term evaluation into French.**

Translation was completed and transmitted to the GOR in September 1989.

### **Appendix C. Analysis of the Financial Needs of the *Division des Statistcs Agricole***

One of the requested elements of the terms of reference for this evaluation was an analysis of the financial needs of the *Division des Statistcs Agricole* (DSA) in order to judge the magnitude of financial support needed to "keep essential activities" going. As can be imagined, this is a difficult task that depends on definitions and assumptions on what essential activities and costs are for DSA. In the limited amount of time available, the analysis seen in the table below has been prepared to try to establish a rough guideline on DSA's financial needs. The assumptions and definitions underlining the figures in the table are noted below. The table was made by using a simple Lotus spreadsheet which could be adjusted with alternative assumptions as appropriate.

The first assumption made in the development of the attached financial table is that DSA is a mature organization. It is anticipated that there will be no major changes, either positive or negative, in staff size or resources. The table does not include funding for depreciation or replacement of capital assets (building, vehicles, computers), assuming that these would be replaced by a donor grant. Further, the budget does not contain any direct support for expatriate personnel. Here again, the assumption is that their cost would be covered by their donor sponsor.

Budget line items and amounts are estimated for a 12 month period. The line items were taken from DSA's 1992 budget. Since the approved budget for DSA covered only the nine month period from January to September, adjustments were made by going back to the original twelve month budget that had been prepared for the project. In addition, since "primes" are a potential contentious issue, they were removed from the line item for Direct Hire MINAGRI and added to the separate Salary Supplement line item.

As can be seen from the table, the total cost of running DSA for a year is 73,964,000 FRw. Using an exchange rate of 140 FRw to a dollar, this amounts to \$528,000. The GOR has contributed over the last few years the salary cost of MINAGRI personnel, both under contract and direct hire, as well as electricity and water for DSA's headquarters. This amount comes to about 20,456,000 FRw (\$146,000). Subtracting this from the total cost of DSA gives a gross financial need of 53,508,000 FRw (\$382,000).

This number, however, represents only a partial view of DSA's financial needs. DSA's operations are divided into two major tasks: 1) collection, analysis and maintenance of a long-term data base of the rural sector (routine studies), and 2) specific client-supported studies of selected subjects (punctual studies). The first of these tasks creates an essential public good that appropriately should be funded by public means either by the government or donors. The second task should appropriately be fully funded by the client. The question is how one should divide costs within DSA between these two tasks?

DSA's budgets have responded to this question by allocating a percentage of time to each activity then dividing the total budget by that percentage to get cost total for that activity. A review of several past budgets indicates that those activities that represent work on routine studies (production, area, livestock, income and expenditure and nutrition) are

about 45% of the work done by the division. The remaining 55% can be allocated to punctual studies. Using these percentages to divide total cost we arrive at the total cost of routine studies of 33,284,000 FRw (\$238,000) and of punctual studies of 40,680,000 FRw (\$291,000).

These figures, however, are misleading. One could not, for example, carry out the routine studies for \$238,000. The reason is that resource use at DSA is not divided unambiguously between the two tasks of routine and punctual studies. There are significant overlaps in activities. Most punctual studies represent added work for the enumerators to be conducted with their same household set. The principal advantage DSA has in data collection is that it has an extensive system of enumerators in place who are working with a statistically selected sample household. This system is used for both routine and punctual studies. Much of the personnel and resources of the division have to be in place to do the routine studies. The direct cost of the punctual studies are mostly for variable items such as office supplies, gas, some supervision, publications, and training of enumerators on modifications of the questionnaires.

Column 3 of the table includes an estimate of the percentage of each line item of the budget that are used to carry out the routine studies. Column 4 contains the budget category summaries for the routine cost estimates of the budget line items. Column 5, then, represents the remaining cost that could be attributed directly to punctual studies. The estimates on the percentage of each line item is a "best-guess" and is certainly open to debate and modification. Yet, it is doubtful that the final figures would differ significantly from the figures shown in the table.

Results of these calculations indicate that the total cost of doing routine studies is 62,008,000 FRw (\$443,000) while the cost directly attributed to do the punctual studies is 11,956,000 FRw (\$85,000). If one subtracts the GOR contributions from the cost of doing routine studies, the financial need to be supplied by other donors or sources to support DSA's basic work amounts to 41,552,000 FRw (\$297,000). These figures, however, do not fully represent DSA's cost structure between routine and punctual studies. The missing element is the cost of shared resource use in the punctual studies involving people and equipment originally destined to routine studies. This is an overhead cost that could and should, to a certain extent, be covered by the clients of the punctual studies. Assuming the same division of labor (45/55) between routine and punctual studies noted earlier, the overhead figure is the difference between the \$291,000 estimated part of the total DSA budget for the punctual studies and the \$85,000 attributed to direct cost of the punctual studies. This overhead figure comes to 28,724,000 FRw (\$206,000). But, a strong note of caution needs to be made here. The \$206,000 in overhead is only a part of the \$297,000 needed to cover DSA's basic data collection work. Even if clients paid their full overhead share, which is extremely unlikely, and the government paid its whole \$150,000 contribution, there would still be a need for additional outside support to DSA of 12,828,000 FRw or almost \$92,000.

What all of this boils down to is that DSA needs an additional \$300,000 a year to carry out its basic data collection, analysis and publication activity (assuming continual GOR contribution for government salaries and utilities of about \$150,000). Any special punctual studies will add cost to DSA's operation but, if the study is client funded and properly priced, offers an opportunity to recover some of DSA's cost through joint use of resources.

One final point needs to be noted. The budget used in this analysis includes salary supplement. These supplements add an additional 2,648,000 FRw (\$19,000) to the budget. This represents about 9% of personnel costs and about 3.5% of the total cost. To use a folkism, not paying salary supplements would be a classic example of being "penny wise and pound foolish." The quality of DSA's personnel is its paramount advantage over other organizations in the country. The disarray and low moral of MINIPLAN's personnel is a prime example of what happens when personnel support issues are neglected. We strongly recommend that DSA continue to pay salary supplement. They could be paid for out of client-generated funds if donor resources are not available.

**Estimated Budget and Cost Allocations  
for the  
Division des Statistiques Agricole**

Budget Category	12 Months ('000 FRw)	% Cost of Routine	Cost Routine	Cost Punctual
<b>Office Materials</b>	<b>14,376</b>		<b>10,026</b>	<b>4,350</b>
Office Supplies	10,876	60%		
Office Maintenance	1,500	100%		
Insurance	2,000	100%		
<b>Logistics</b>	<b>7,534</b>		<b>7,308</b>	<b>226</b>
Gas	4,517	95%		
Vehicle Maintenance	2,160	100%		
Insurance	857	100%		
<b>Survey Supervision</b>	<b>12,226</b>		<b>10,363</b>	<b>1,863</b>
Milage	6,064	95%		
Per Diem	5,462	80%		
Transport	245	95%		
Assit. Enumerators	437	0%		
Rent (Gitarama)	18	0%		
<b>Publishing</b>	<b>2,592</b>		<b>1,017</b>	<b>1,575</b>
Questionnaires	492	100%		
Publications	2,100	25%		
<b>Personnel Cost</b>	<b>32,700</b>		<b>31,278</b>	<b>1,422</b>
USAID, Contract	9,476	85%		
MINAGRI, Contract	14,086	100%		
MINAGRI, Direct Hire	5,799	100%		
Salary Supplement	2,648	100%		
Retirement	616	100%		
Social Security	72	100%		
<b>Training of Enumerators</b>	<b>2,696</b>	<b>10%</b>	<b>270</b>	<b>2,426</b>
<b>Miscellaneous</b>	<b>1,840</b>		<b>1,746</b>	<b>94</b>
Utilities	600	100%		
Phone/Fax	468	80%		
Building Maintenance	532	100%		

- Medical Care 240 100%

Total ('000 FRw)

73,964

62,008

11,956

Total ('000 \$) (@140 FRw/\$)

528

443

85

## Appendix D. Gender Considerations

AID/Washington's offices of POL/CDIE and RD/WID are participating in a study of WID related policies and programs in DAC member countries. The DAC Expert Group on Evaluation and Women in Development are jointly sponsoring this study with the concerned AID/Washington offices. As a part of this study, a desk study will be undertaken of evaluation experiences of member's development projects. For evaluations completed between June 1, 1992 and May 31, 1993, a series of questions have been added to each evaluations scope of work. The response to these questions included in these evaluations will be sent to AID/W for collation. The questions and instruction were sent to the field in STATE (92)222798 on July 12, 1992.

While some of these gender related issues are examined within the text of this evaluation, this annex directly address the question developed for this study. This should facilitate compilation of the data from these question by AID/W.

### I. Design, Appraisal and Implementation

1. *How were the interest and role of women (compared to men) taken into account in each of the design, appraisal and implementation stages of the project/program evaluated?*

From the evidence available, there appears to have been no special attention made in the design or appraisal of the project directed towards the interest or the role of women as compared to men. Women related concerns were taken account of in the implementation of the project in two studies done by DSA (Role of Women in Rwandan Agriculture, and Nutritional Study), gender disaggregation of heads of farm households (the principal sample unit in DSA's methodology), and in sensitizing enumerators on the role of women within the farm household. On this latter point, it was noted that women are the principal labor on the farm and control important parts of the farming activities but are often overlooked in surveys because the males do much of the talking. Enumerators are trained to seek out the true situation in the farm household and often this means bringing the women into the response to the questionnaire.

2. *In what ways did women (compared to men) participate in these processes?*

Three of the seventy-eight enumerators in DSA are women. One of the four individuals that have shared in a rotational basis in the leadership of DSA is a woman. One of the eight senior technicians in the DSA is also female. The study on the Role of Women was done by a team of four women. While not directly related to the project, the nutrition study supported by UNICEF is headed from the UNICEF side by a woman nutritionist who works extremely closely with DSA staff.

### II. Effects and Impacts

1. *What were the effects, positive or negative, of the program/project concerning women's (compared to men's) access to income, education and training, and with respect to workloads, role in household and community, and health conditions?*

It is difficult to find a quantitative answer to this question. The most important work done in the project that relates to women (compared to men) has been the study on the Role of Women. This study painted a fairly dark picture of the plight of women in the country and served a role to sensitize government officials, donors and PVO's of this situation. It also played an important role in sensitizing the DSA staff of the Rwandan woman's situation. However, there is no specific impact noted as a result of this study. There may be a much more significant effect from the Nutrition study but since the work on this is less than a year in implementation it is too early to say what the effect will be.

2. *How were the interests and role of women (compared to men) taken into account in the evaluation stage?*

The evaluation looked at how gender-desegregated data was being collected and at responses to this questionnaire. No other specific gender-related activities were undertaken.

3. *Were significant factors concerning women (compared to men) overlooked at the appraisal (design) stage?*

Yes. From the Project Paper it is hard to find evidence that gender-related issues were addressed at all. The development of gender-desegregated data, and initial work on intra-household resource allocation (a potentially important issue for women), were added after the project design.

### III. Data Availability

1. *Were gender-specific data available for each of the program/project stages?*

*A. Design;*

Unknown

*B. Appraisal/Approval;*

Unknown

*C. Implementation;*

The basic unit for gathering data at DSA is the farm household. Gender-specific data is gathered on the head of household and members of the household. Data on staff and other personnel working on the project is also gender-specific.

*D. Monitoring;*

Same as above

*E. Evaluation.*

Same as above

#### **IV. Sustainability**

1. *How did women's integration in the AID activity affect the sustainability of project/program outcomes? Were outcomes more sustained (or less sustained) when women were taken into account in the AID activity?*

The sustainability of this project was not affected by women's integration or non-integration into project activities.

2. *Are the results achieved by the programs/projects equally sustainable between men and women beneficiaries?*

There are no differences between men and women beneficiaries of the results of this project.

## **E. Technical Appendices**

- 1. Area, Yield and Production**
- 2. Statistics for Special Crops**
- 3. Sample Design**

## Appendix E1: SUPERFICIE, RENDEMENT, PRODUCTION

### OBSERVATIONS SUR LE CALCUL DE SUPERFICIES, RENDEMENTS ET PRODUCTIONS DANS LE CAS DE CULTURES MIXTES OU ASSOCIEES

1. **Types de Superficies:** Il existe trois différentes définitions de la superficie agricole employée dans le cas de cultures associées ou mixtes:

**Superficie Développée:** Elle s'obtient en affectant toute la superficie cultivée de la parcelle à chaque culture présente dans l'association. Exemple: soit une parcelle de 2 ha portant du maïs et du manioc en association. La superficie développée pour le maïs sera de 2 hectares ainsi que la superficie développée du manioc qui comptera aussi 2 hectares.

**Superficie Imputée:** C'est la surface qu'occuperait la culture considérée si elle était pratiquée en peuplement pur. En général, la somme des superficies imputées diffère de la superficie totale du champ. Voir les exemples ci-dessous.

**Superficie Attribuée:** Elle correspond à la fraction de la surface du champ où l'on pratique une culture donnée. Elle est proportionnelle à la superficie imputée. La somme des superficies attribuées aux différentes espèces de la combinaison doit être alors égale à la surface totale du champ. Voir les exemples ci-dessous.

2. **Invariabilité de la Production:** La production d'une culture sur un champ, en association ou en pur, est toujours la même quel que soit le type de superficie (développée, imputée ou attribuée) adoptée. Par contre l'estimation du rendement varie selon le type de superficie. Donc, toutes les méthodes conduisent à la même production parce qu'on obtient l'expression suivante pour chaque cas considéré.

$$P_i = S p_i K$$

où

$P_i$  = production en kg d'une culture  $i$  en association avec d'autres cultures, où  $i = 1, 2, 3 \dots n$  représente le nombre de cultures

$p_i$  = poids de la récolte du produit  $i$  en kg sur le carré de rendement de dimension  $a \times a = s \text{ m}^2$

$S$  = superficie totale en ha de la parcelle portant les cultures associées

$K = 10000 \text{ m}^2 / 25 \text{ m}^2 = 400$ : facteur pour ramener poids du produit du carré à la base de l'hectare pour un carré de  $5 \text{ m} \times 5 \text{ m} = 25 \text{ m}^2$

Cette formule sert donc à calculer la production dans tous les trois cas de superficies adoptée.

**3. Les Formules de Calcul:**

$S_i(D)$  = Superficie Développée

$S_i(I)$  = Superficie Imputée

$S_i(A)$  = Superficie Attribuée

R = Rendement (remplacer S par R ci-dessus)

P = Production (remplacer S par P ci-dessus)

$D_i$  = Densité Théorique

$d_i$  = Densité Observée

Calculs de production selon les différents types de superficies et de rendements: Cas d'une culture i

	Superficie Développée	Superficie Imputée	Superficie Attribuée
Superficie	$S_i(D) = S$	$S_i(I) = S(d_i/D_i)$	$S_i(A) = S \frac{d_i/D_i}{\sum d_i/D_i}$
Rendement	$R_i(D) = p_i(10000/s)$	$R_i(I) = p_i(10000/s)(D_i/d_i)$	$R_i(A) = p_i(10000/s)(D_i/d_i) \sum d_i/D_i$

Production P  $P_i(D) = S_i R_i$   $P_i(I) = S_i R_i$   $P_i(A) = S_i R_i$

$$P_i = S p_i (10000/s)$$

$$= S (d_i/D_i) p_i (10000/s) (D_i/d_i)$$

$$= S \frac{d_i/D_i}{\sum d_i/D_i} p_i (10000/s) (D_i/d_i) \sum d_i/D_i$$

$$= S p_i K$$

$$= S p_i K$$

$$= S p_i K$$

4. Exemple: L'arachide (culture 1) et le manioc (culture 2) sont en association. On sait que:

Densité observée dans le carré	Densité théorique du carré de rendement	poids de la production du carré
$d_1 = 25$	$D_1 = 50$	$p_1 = 2.5 \text{ kg}$
$d_2 = 30$	$D_2 = 90$	$p_2 = 12 \text{ kg}$
Superficie de la parcelle: 50 ares = 0.5 hectares		

Calculer (a) la production, (b) le rendement et (c) la superficie selon les différentes types de superficies de ces deux cultures en association.

Corrigé:

(a) La production: Comme indiqué plus haut, la production ne varie pas quel que soit le type (la méthode estimation) de superficie. Elle est calculée à partir de la formule:

$$P_i = S p_i K$$

Cas de l'arachide:  $S = 0.5 \text{ ha}$   $p_1 = 2.5 \text{ kg}$   $K = 400 = 10000/25$

$$P_1 = 0.5 \times 2.5 \times 400 = 500 \text{ kg}$$

Cas du manioc:  $S = 0.5 \text{ ha}$   $p_2 = 12 \text{ kg}$   $K = 400$

$$P_2 = 0.5 \times 12 \times 400 = 2400 \text{ kg}$$

(b) Superficie:

Superficie Développée:  $S_1 (D) = S_2 (D) = 0.5 \text{ ha}$

Superficie Imputée:

$$S_i (I) = S d_i/D_i$$

$$S_1 (I) = 0.50 \times 25/50 = 0.50 \times 0.50 = 0.25$$

$$S_2 (I) = 0.50 \times 30/90 = 0.50 \times 0.33 = 0.16$$

On note que  $S_1 + S_2 = 0.25 + 0.16 = 0.41 \text{ ha}$ , ce de  $S = 0.50 \text{ ha}$ .

qui est différent

Superficie Attribuée:

$$S_i = S \frac{d_i/D_i}{\sum d_i/D_i}$$

$$\begin{aligned} S_1 (A) &= 0.5 \times \frac{25/50}{25/50 + 30/90} = \frac{1/2}{1/2 + 1/3} \text{ ha} \\ &= 1/2 \times 3/5 = 3/10 = 0.30 \text{ ha d'arachides} \end{aligned}$$

$$\begin{aligned} S_2 (A) &= 0.5 \times \frac{30/90}{25/50 + 30/90} = \frac{1/3}{1/2 + 1/3} \text{ ha} \\ &= 1/2 \times 2/5 = 2/10 = 0.20 \text{ ha de manioc} \end{aligned}$$

On note que  $S_1 (A) + S_2 (A) = 0.30 + 0.20 = 0.50$  ha. Donc, sans même faire le moindre calcul, on peut arriver à  $S_2$  en cas de deux cultures en association. Il s'agit simplement d'exécuter l'opération:  $S - S_1 = S_2 = 0.50 - 0.30 = 0.20$  ha

(c) Rendement:

Le calcul de rendement s'effectue en utilisant la production et la superficie, sans recours à une formule compliquée.

Rendement dans le cas de la superficie développée

$$R_i (D) = P_i / S_i (D)$$

$$R_1 (D) = 500 \text{ kg} / 0.50 \text{ ha} = 1000 \text{ kg/ha}$$

$$R_2 (D) = 2400 \text{ kg} / 0.50 \text{ ha} = 4800 \text{ kg/ha}$$

Rendement dans le cas de la superficie imputée

$$R_i (I) = P_i / S_i (I)$$

$$R_1 (I) = 500 \text{ kg} / 0.25 \text{ ha} = 2000 \text{ kg/ha}$$

$$R_2 (I) = 2400 \text{ kg} / 0.16 \text{ ha} = 14400 \text{ kg/ha}$$

**Rendement dans le cas de la superficie attribuée**

$$R_i (A) = P_i / S_i (A)$$

$$R_1 (A) = 500 \text{ kg} / 0.30 \text{ ha} = 1667 \text{ kg/ha}$$

$$R_2 (A) = 2400 \text{ kg} / 0.20 \text{ ha} = 12000 \text{ kg/ha}$$

(d) En résumé,

**Pour l'arachide**

	Méthode d'estimation de la superficie		
	Développée	Imputée	Attribuée
Production	500 kg	500 kg	500 kg
Superficie	0.50 ha	0.25 ha	0.30 ha
Rendement	1000 kg/ha	2000 kg/ha	1667 kg/ha

**Pour le manioc**

	Méthode d'estimation de la superficie		
	Développée	Imputée	Attribuée
Production	2400 kg	2400 kg	2400 kg
Superficie	0.50 ha	0.16 ha	0.20 ha
Rendement	4800 kg/ha	14400 kg/ha	12000 kg/ha

**4. Conclusions:**

(a) Pour calculer la production il faudrait employer la formule:

$$P_i = S_p K$$

(b) Ensuite, calculer les superficies d'après les formules fournies pour les cas de superficies développée, imputée et attribuée.

(c) Comme troisième et dernière étape calculer les rendements d'après la formule:

$$R_i = P_i/S_i$$

sans recours aux formules compliquées.

(d) Enfin, adopter l'emploi des formules:

$$P_i = S_p K ; \quad S_i ; \quad R_i = P_i/S_i$$

tout en maintenant l'ordre.

Référence: Rapport de Mission Sur les Méthodes D'Enquete, Raymond Henri, Mars 1990, pages 18-21

Suha Satana, le 24 aout 1990

## Appendix E2: Statistics for Special Crops

Throughout Africa there are problems with certain statistics pertaining to biannual and perennial crops if these are not properly separated from annual crops, particularly in the case of mixed cropping. In order to eliminate possible bias in the statistics involving areas and yields of certain special crops -- cassava, coffee and tea -- additional crop categories should be defined as follows:

1) Cassava: Separate this year's cassava from last year's by defining a) cassava planted this year (jeune manioc) which does not produce and which is associated with other crops, b) cassava planted last year (manioc productif) which produces a crop and which is not associated with other crops. To attribute land area to young cassava, use the entire field area. Use partial attributions for annual crops only. The rule of thumb is that the crop that occupies the field more than a year, occupies 100 percent of the land, no matter what intercropping contains.

2) Coffee: Differentiate between Arabica and Robusta (if there is any demand for this type of distinction) and between coffee trees equal or less than 4 years and coffee trees more than four years. Coffee less than four years yields very little, thus it should not be mixed with coffee more than four years old. Intercropped young coffee should not be attributed partial land area, as argued for the case of cassava.

3) Tea: Intercropping with tea is possible only during the first year following the establishment of the plantation. Hence ASPAP should not attribute partial areas to first year tea, as is the case with the above two crops. A very important parameter about tea is the age of the tea bushes. This information should be collected routinely.

4) Bananas: A banana field yields a crop for many years. Hence it should never be attributed partial areas, no matter what the age of the plants. It is useful to distinguish between bananas less than one year and more than one year in order to follow the establishment of new fields.

## Appendix E3: Sample Design

### Background

Good sampling methodology is essential to any data collection system. Since it is not always practical to study and readily comprehend the underlying sampling methods (particularly by just examining the data itself), data users must have confidence in the collection system and the persons who operate it. This is the most effective assurance one can provide to the users that scientific methods have indeed been employed in every stage of data handling leading up to tabulation and publication which render the end product both useful and powerful. Otherwise, good data and bad data are virtually indistinguishable on paper.

According to most observers in Rwanda, ASPAP data collection methodology meets the essential preconditions for winning the users trust. We also concur that it is one of the rare African data collection efforts that inspires users confidence and respect. Undoubtedly, this is one of the major accomplishments of the project regardless of whether or not agricultural policy was influenced and/or impacted in Rwanda. In most countries the functions of data collection and use are properly segregated.

In fact, sometimes, having the same agency both collect and market the results may even be construed as conflict of interest, very much like having insider information before playing the stock market.

As already pointed out, ASPAP's success in designing and implementing scientific methods in data collection have also been favored by the conditions in Rwanda. First, the country is small making country-wide data collection effort less unmanageable. In this connection one cannot resist the temptation of making reference to Zaire where problems surrounding survey methods have been insurmountable over the last 30 years, which were principally due to the size of the country. Incidentally, the current sample size for Zaire's agricultural survey is around 4000 households for a country of 2.5 million square kilometers as opposed to Rwanda's 1248 households for an area which is roughly 100 times smaller. Second, there have been comprehensive population censuses in Rwanda which provided the necessary sample frames for ASPAP (i.e. lists of households and rural population). Third, still due to its small size, Rwanda is endowed with roads and a communication system which facilitate data collection and transmission. Fourth, it has been possible to relatively master the farming systems in the country, an understanding of which is critical to sound data collection (one cannot measure something one does not understand). The above discussion is not intended to convey the message that the establishment of the data collection system in Rwanda has been a very easy task. The process has simply been favored by many conducive circumstances.

Bureau of the Census (BUCEN) was the institutional contractor to the first phase project -- ASAP. Hence, the current sampling methodology that ASPAP uses has been the product of many person months of Bureau of the Census (BUCEN) and its partner agency International Statistics Program Center (ISPC) where the U.S. has a distinct comparative advantage. The end-product, however, resembles many FAO designed systems in Africa because of the realities of the continent: subsistence mixed crop farming, near impossibility of using satellite imagery, illiterate farmers requiring personal visits, difficulty of travel (hence of coverage) in the rural areas, lack of cartographic facilities and finally, low level of host government funding.

Much of the sampling work required mathematical expertise which was initially provided by STTA Karen Stanecki, Rita Petroni and David Megill who were behind the sampling methodology of 1984 under Daniel Clay's coordinating role. Megill revisited ASPAP in 1992 twice -- March and June -- to revise the sample frame and introduce some refinements such as the development of a new sample for DSA, inclusion of research on DEFF's, calculation of variances and derivation of the appropriate weights through which the

sample data are expanded to yield population estimates. Megill's interventions were of high quality and helped ASPAP fill certain gaps in the sampling methodology as well as update the sampling weights.

Megill's calculation of variances pertained to the 1989 and 1990 prefectural and national estimates of crop production for the major crop categories. It is the opinion of this evaluation that computation of variances (and hence coefficients of variation, CV) should cover most of the basic parameters that are reported by ASPAP. The statistical report for 1989, for instance, does not include any data on the variability of the estimates. The statistical package SPSS currently used by ASPAP is capable of producing the estimates on variability and this should be exploited.

One of the interesting points about the Megill studies is that the number of households is not a fixed number and is subject to error as indicated by the presence of CV's as shown at the bottom of his tables. Since the extrapolation process involves the number of households, the extrapolated estimates will have two sources of error: one coming from the sample and the other coming from the extrapolation factors themselves. It will be very useful to make an analysis of the compounding effect of these variances (i.e., compute  $\text{Var}(XY)$  where both X and Y are stochastic) upon the CV's of the national and prefectural estimates.

### Type of Sampling

ASPAP uses multistage cluster sampling which is the most suited approach for cost effective data collection. First the country is stratified by its 10 prefectures (excluding urban Kigali) where the primary sampling units (PSU) are drawn from among the district de recencement (DR) with probability proportional to size, in order to have the same level of representation (sampling fraction) for the whole country (an essential condition for unbiased national estimates). Then, four clusters of four households are selected from each of the 78 DR's retained for the sample. Since most districts de recencement have more or less the same population, each household surveyed has about the same sampling weight. Cluster sampling combined with stratification is a very good sampling strategy for rural Rwanda. For cluster sampling to work efficiently (i.e., have low errors), clusters must be as heterogeneous as possible within the cluster but as homogeneous as possible between the clusters. The project determined that having four clusters of four households per primary sampling unit would optimize both enumerator use and keep sampling errors within reasonable bounds.

### The Frame: Some Future Considerations

ASPAP uses a list frame consisting of households in the districts de recencement. The household list used for the 1989 survey was developed by the MINIPLAN for the employment survey of 1988 which was updated by ASPAP itself. Data for the last frame comes from the national census of 1991 which include household lists for the 6204 districts in Rwanda. Of these, 91 districts did not qualify for agricultural districts and were thus eliminated from the frame, leaving behind a total of 5932 districts out of which ASPAP's 78 district were selected. Essentially, this was the most important element in Megill's consultancy, which was concluded with success.

One possible approach to improve ASPAP in the long-run may involve a multiple frame (i.e., both a list frame and an area frame). In multiple frame surveys, the list frame sample drawn for a survey is supplemented by an area frame.

As suggested in some of the meetings attended by the evaluation team, if DSA is to do an agricultural census every ten years, it would be appropriate to consider another type of frame as a tool of reference. One such tool is the area frame sampling where the basis for extrapolation is the area rather than population. In the present frame, even if we did not know the number of households we can divide the figure for population by the estimated household size and get the number of households. In simple terms, we multiply this number with the sample averages to get the regional or national samples. Thus in a list frame based on persons' lists, everything is related to population. In case of area frame sampling, the coefficients of extrapolations are area-based. For instance, if 1 percent of the sampled area for Rwanda grows an estimated 2100 tons of beans, then the national total is  $21,00 \times 100 = 210,000$  tons. Populations are very dynamic, but farmed areas are not as dynamic, particularly in Rwanda where there is indeed very little land left unused which can render an area base obsolete. Short term TA may be considered from the USDA (a repository of world class experts in area frame sampling) to assess the feasibility of area frame construction in Rwanda, which, once established, can serve as a basis for a multiple frame for the ensuing annual surveys.

### Use of Replicas in Sampling

Currently, the design of ASPAP uses the same households in repeated sampling. Twenty-five percent of the sample clusters should be changed every time the same survey is repeated. Hence, in each DR a fourth of the clusters (i.e., one cluster of 4 households) should be dropped from the sample and a new cluster (i.e., a group of 4 households) should be added in the sample. This practice would eliminate the bias due to repeated use of the same sample (with the same specific households) over time. This, however must be weighed against these disadvantages: the buckets provided to the farmers for the production survey cannot be reclaimed and thus will have to be replaced and there will be loss of some overlap between the households surveyed for routine studies and those surveyed for special studies.

### Sample Sizes

In principle, a workable sample design that satisfies the user's need at the least cost is the ideal design to choose. The sample size is dependent upon the desired precision, level of funding, amount of time and resources (people, machines and materials). Obviously, how many questionnaires and manuals are needed, and how much personnel and time will be needed to collect and process the data are dependent upon sample size. There is plenty of evidence that scientific studies have been conducted by ASPAP for the evaluation of the sample size.

The current sample size is determined by financial constraints. MINAGRI has allocated only 78 enumerators for ASPAP's use after the sample size was reduced from 150 DA in 1986. Hence, the number 78 is not a derived sample size for a given level of precision, it is an imposed constraint for which the sample design has been optimized to minimize sampling and non-sampling errors and keep the scheme within reasonable limits for execution and administration.

One episode which has generated some unjust criticism for ASPAP involves the measurement of coffee production in the Kibuye prefecture for the season of 1989. In this prefecture coffee is mostly grown on the medium altitude waterfront of lake Kivu. Yet, by sheer coincidence the random ASPAP sample of DR's covered only the highlands which did not grow much coffee. The measured production was an unusual low of 105 tons with a standard error almost of the same size (94 tons). Hence, the coefficient of variation was

89.3 percent which really alerted the reader that the figure cannot be trusted as would be the case in many routine statistics involving rare phenomena.

Depending on the phenomenon under investigation, it is possible to consider the estimation of certain high variability parameters via large samples while those with lower variability can be estimated by small samples. To minimize costs some ASPAP surveys can be conducted in two parts: one part concerning those parameters with high variability and using a large sample and another one for parameters with low variability using a small sample. If no prior information exists on the variance, it may be useful to make a rapid reconnaissance to determine the range within which the parameter varies and simply divide this by 4 to get a good measure of the standard deviation. This is also tantamount to complementing some of the routine ASPAP surveys by special studies to investigate certain rare phenomena.

It is usually not possible to state that a certain level of precision should always be maintained for any given parameter. The question is one of cost and budget. Ideally, one should like to have as much precision as the resources allow. This is what ASPAP has done.

If ASPAP is interested in finding quick national estimates of total production for certain crops with low CV's (less than 10 percent), some interesting relationships will be observed. For instance, it is possible to state that national bean production can be made very accurately with a random sample of about 300 households (and there will be a 95 percent chance that the national per household bean production will be within 10 percent of the true mean using the variances computed by Megill in conjunction with some simplifying assumptions). Reducing the sample size will inevitably increase the CV, but a four fold reduction in the sample size will reflect in a two fold increase in the CV. This is because of the principle of diminishing returns in sampling. This is in contrast with the much larger sample size that would be needed for wheat and coffee. Thus, it is important to remember that every parameter on the questionnaire in effect defines its own sample size. If we have 100 variables, chances are there would be 100 different sample sizes, one for each of the parameters. Since, we can have only one size for a survey, the sample size selected is indeed a melange compromise of many things. Obviously, some variables are measured with overconfidence, some with underconfidence, while some others are measured at just the right level.

Below are two statistical refreshers selected for the interested reader. These are relegated to the status of attachments to the annex which is itself removed from the main text for technical reasons.

## Attachment 1 to Annex E3: Some Properties of Small Samples

ASPAP's sampling fraction is computed to be 1.31 percent (78 divided by 5932) for the PSU's (i.e. districts de recensement) and 0.1 percent for households (1248 divided by 1,226,390).

One may be easily led to believe that such a small percentage coverage may not yield reliable prefectural and national estimates. But, this is largely incorrect as explained below.

- Small samples may provide useful information and still conform with the useful criteria of being scientifically sound (acceptable variances and amenability to extrapolation), low cost, managerially not overburdening in addition to providing better estimates due to elimination of gross non-sampling errors possible in large samples.

To illustrate this point it may be useful to use an example which involves estimation of total population by extrapolating on the basis of the mean number of persons per households and total number of households in a given area. This example comes from a classical text in sampling theory: Sampling Techniques by William C. Cochran, Wiley and Sons, page 47.

A simple random sample of 30 households was drawn from a city area containing 14848 households. The numbers of persons per household in the sample were as follows: 5,6,3,3,2,3,3,3,4,4,3,2,7,4,3,5,4,4,3,3,4,3,3,1,2,4,3,4,2,4. The problem involves estimation of the total number of people in the area and computation of the probability that this estimate is within plus or minus 10 percent of the true value.

It turns out that the average number of persons in a household is 3.47 and the extrapolated population is  $3.47 \times 14,848 = 51,473$  persons. There is a 90 percent chance that this estimate is within ten percent of the true population. As evidenced, with a small sample size of 30 households from a population of 14848 i.e., a sample of 0.20 percent of the population, one can still obtain an estimate of the total number of people with 10 percent accuracy to which a 90 percent confidence can be attached.

Naturally, if variables of interest can be estimated on the basis of small samples with lower costs for both data collection and treatment, large and expensive samples should not be selected to achieve the same objective. Paradoxically, in instances where statistical theory has not been used as a guide, the adopted approach to the data-collection problem usually seems to favor large samples, making the process both expensive and counterproductive. It is commendable that ASPAP has effectively avoided this illusion by keeping its sample size low and manageable.

Surprising as it may appear, the size of a sample is not a function of the size of the total population. One always hears that the sample is 1 percent or 5 percent of the total population as though this were a criterion of credibility. Similarly, one usually encounters elaborate arguments that any given area with a higher incidence of the observed elements or phenomena (i.e., population density) should be studied via a larger sample. The relationship between the population size and the sample size is a fallacious one. The relationship between the sample size, the desired degree of precision and the variability of the phenomena which is being measured is a real one. And, this is what ASPAP has taken into account (albeit in an ex-post sense) in determining its sampling methodology.

## Attachment 2 to Annex E3: Diminishing Returns in Statistics

Diminishing returns are encountered in almost any endeavor of men and sampling is no exception to this principle.

The reliability of agricultural statistics can be assessed by examining the variances of the estimates derived from the data. Variance, which is a measure of dispersion of the mean values obtained, can be manipulated by varying the size of the sample. In estimating the mean, one is interested in the variance of the mean rather than the variance of the population. The two variances, however, are related. The relationship between the population variance and the variance of the mean is:

$$\text{Var}(\bar{y}) = \sigma^2/n$$

This ratio (variance) gets smaller as the sample size is increased due to the fact that an unchanging number in the numerator (population variance) is divided by increasing numbers in the denominator (sample size). Yet, the reduction in variance, which is a good thing, diminishes as the sample size increases. Meanwhile, the cost of adding another unit in the sample usually remains constant (as expressed in dollars per observation or questionnaire filled). To get the most out of the limited resources, one should never indiscriminately add further units in the sample. The guiding principle is that variance reduction, which has a dollar value (at least intrinsically), must be balanced against the rising cost. Therefore, in statistical work more money does not necessarily generate an output justifiable with the amount of money spent. This is the principle of diminishing returns as it manifests itself in data collection, and there is sufficient evidence the analysis of costs (money) and returns (reduced variances) has been made in ASPAP's design.