

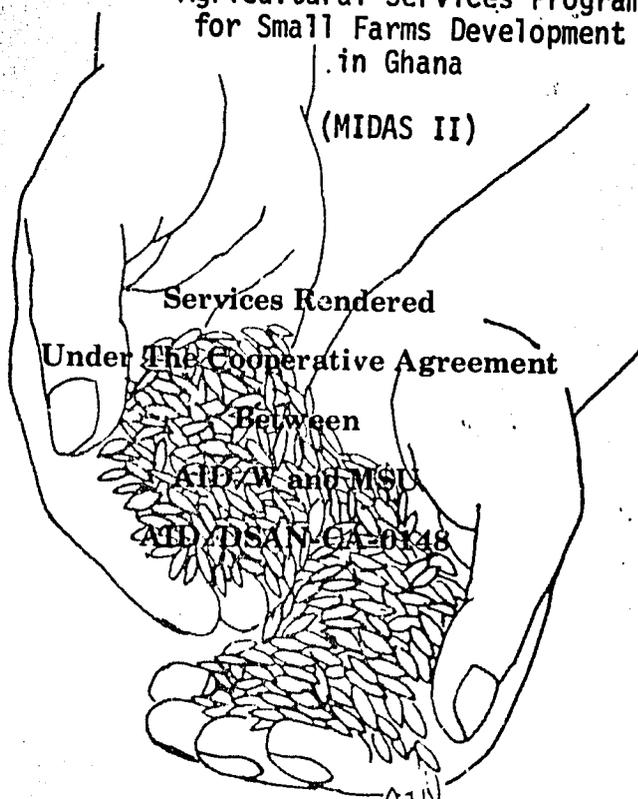
REPORT TO:

TA 80-02

USAID/Ghana
and AID/W

Re-design of Project Paper
for
Managed Inputs and Delivery of
Agricultural Services Program
for Small Farms Development
in Ghana

(MIDAS II)



Services Rendered
Under The Cooperative Agreement
Between
AID/W and MSU
AID/DISAN-CA-0148

February, 1980

SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI



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SEED TECHNOLOGY LABORATORY
Mississippi Agricultural and Forestry Experiment Station
Mississippi State University
Mississippi State, MS

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Report Summary

Title: Seed Component Re-design for Managed Inputs and Delivery of Agricultural Services Program for Small Farms Development - Phase II (MIDAS II - re-design of PP)

Contract: MSU/AID/DSAN-CA-0148

Consultant: C. H. Andrews, Seed Technology Laboratory, MSU

Period of Consultation: Jan. 20 - Feb. 16, 1980

Summary

In 1975 the original Project Paper (PP) was designed for MIDAS and accepted by both the U.S. Government and the G.O.G. Phase I of the MIDAS project terminates in September 1980 with much to be desired in terms of implementation of the selected components, seeds, fertilizer, credit, extension, small farm systems research, marketing and extension/demonstration. Contributing to the lack of progress was the delay in signing the loan together with shortages in host country commodities. In addition the scope of the original PP projected activity in each component on a broad national scale. It became quite evident early on that this scope was entirely too optimistic; hence, a Phase II of MIDAS was proposed to reduce the scope and concentrate on a regional level, specifically the Brong-Ahafo region. The seed and fertilizer components, however, were to continue on a national level.

The project evaluation report of July, 1979 pointed out numerous weaknesses and deficiencies in implementation during Phase I of MIDAS. With the re-direction of emphasis to a regional level and with the quite obvious necessity to alter the scope of operations, it became advisable to re-design the project and prepare more feasible goals and objectives for a second phase.

Therefore, a technical team of specialists was selected to travel to Ghana, and after careful examination of the situation, they were requested to submit a re-design of the original PP to encompass a five year period, FY 81-85, to be called MIDAS II.

The report contained herein pertains to the Seed Component of MIDAS II.

ACKNOWLEDGEMENTS

The author sincerely appreciates the assistance of the USAID/G staff, especially, Dr. Oleen Hess, F&A Officer, and Mr. Frank Mertens, Project Manager for Seeds, for providing the necessary resources which facilitated the completion of this assignment. In addition the staff personnel of the Ghana Seed Company (GSC), both Experience, Inc. consultants, Mr. Orris Shulstad, Mr. John Sutherland and Mr. Tim Hanna and the Ghanaian counterparts, Mr. Josiah Wobil and Mr. Ben Blay, are singled out for their special contribution in time and information concerning the overall seed program in Ghana. Mr. Tom Biney, MIDAS Project Coordinator, is recognized for contributing unselfishly of his time during this period.

The author wishes to acknowledge his appreciation for the agreeable working conditions which prevailed among the design team members:

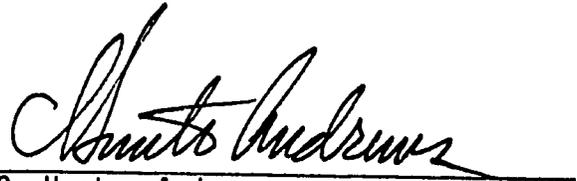
Ms. Renee Laryea - Project Design Officer, Africa Bureau

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Dr. Robert Jackson, Agronomist, AID-DSB/AGR



C. Hunter Andrews

I. BACKGROUND

At the request of USAID/G, Mississippi State University provided consultants to study and analyze the seed situation in Ghana first in November, 1973 and later in September and December, 1974. The recommendations resulting from these consultations are documented in MSU/AID reports TA 73-12, TA 74-15, and TA 74-15A. Initially, the specific mission was to determine the feasibility of foreign seed company participation in the seed industry in Ghana. However, with no measurable success in this endeavor, the second approach was designed to provide a detailed analysis of the status of existing seed operations in Ghana and to determine the best approach for improving seed production and supply. Final recommendations of MSU outlined specific approaches for re-organizing and strengthening the Seed Multiplication Unit, its staff, facilities, equipment and financial soundness.

The basic recommendations of the MSU report were incorporated into a Project Paper (PP) which was approved by the U. S. Government (USAID/G) and the Ghanaian Government (GOG) in 1975. The resulting PP was entitled "Managed Inputs and Delivery of Agricultural Services Program for Small Farms Development (MIDAS)". This project was designed to develop an institutionalized, coordinated system to provide improved agricultural inputs and services to small farmers on a timely and regular basis. The inputs and services include seeds, fertilizer, credit, small farm systems research, marketing, and extension/demonstration.

The implementation schedule of Phase I of MIDAS was very erratic with little evidence of timely achievement of project goals. Many factors contributed to this lack of progress, mainly delay in signing the loan agreement and lack of host country commodities for construction. The Project Evaluation Team in July 1979 pointed out numerous deficiencies and made strong recommendations for re-design and projection of practical goals for the second phase of MIDAS.

Thus, AID/W secured the services of qualified technicians who formed the MIDAS II re-desin team. Consultation activities were conducted from January 20 - February 15, 1980 during which time the input and service components were carefully analyzed and subsequently re-designed for a five year period to begin in FY 81 and end in FY 85.

II. TERMS OF REFERENCE

The terms of reference were outlined in a memorandum from the Project Design Officer, Ms. Renee Laryea, as follows:

1. Analyze and/or review in cooperation with the agricultural economist and agronomist the technology selected for the seed component.
2. Determine if the price of seed to the farmer covers all costs of production and distribution.
3. Review the management, operation and servicing of the farm machinery.
4. Review the commodities on hand and assess their condition.
5. Coordinate the economic, agronomic, financial, administrative and social aspects with respective team members.
6. Design the component inputs into project's log frame, implementation plan, evaluation program and baseline follow-up studies.
7. Develop the components EOPS target levels.
8. Prepare the seeds portion of the PP revision including the narrative, the USAID, GOG, farmer, etc. inputs, technical services, participant training, commodities and other cost elements of the budget.

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III. DRAFT

MANAGED INPUT AND DELIVERY OF AGRICULTURAL SERVICES
(MIDAS)

SEED MULTIPLICATION COMPONENT

C. HUNTER ANDREWS

SEED MULTIPLICATION COMPONENT

The re-design of the Seed Multiplication Component of MIDAS II is submitted after complete, careful and considerate review and evaluation of all previous background documents together with on-site discussions with relevant USAID/G and GOG officials. Background reports include the initial Mississippi State University (MSU) assessment and recommendation reports (TA 73-12, TA 74-15, TA 74-15A, TA 78-08), the subsequent MIDAS PP, project reports of MIDAS consultants (Experience, Incorporated) which include recommended design changes from the original PP and supportive USAID/G documents justifying such changes, the background document for the MIDAS project evaluation team, and finally the MIDAS Team Evaluation Report.

This information has been supplemented by on-site personal conferences and contacts with USAID/G officials and Project Managers, Experience, Inc. consultants and pertinent GOG officials cognizant of the MIDAS project activities. Additionally, field trips were made to selected regions where MIDAS II activities will be focused.

Therefore, after a thorough in-depth review and evaluation of the past history and a current situation analysis, this re-design for the Seed Multiplication component of MIDAS II is submitted. It is felt that the objectives, proposed goals and outputs are more realistic and attainable within the time-frame of MIDAS II.

SUMMARY AND RECOMMENDATIONS

The seed multiplication component of MIDAS II is designed to assist the GOG to provide sufficient quantities of seed of improved varieties to Ghanaian farmers at a reasonable cost so as to enhance their productive capacity and thus improve the social and economic status of the small farmers in Ghana. This will be accomplished by assisting the GOG to produce, dry, process, store, test and market seed of improved varieties.

The recently organized Ghana Seed Company (GSC--formerly Seed Multiplication Unit (SMU)) will have the responsibility of maintaining and coordinating the Foundation seed farms at Winneba, Kumasi, Tamale (and Ho) for the purpose of continued production of Foundation seed. In addition, the GSC will assume the responsibility of developing Regional Seed Centers, with AID assistance, at Winneba, Kumasi, and Tamale which will have the capability of drying, processing, storing, testing and marketing genetically and mechanically pure seed of improved varieties. A mid-project review and evaluation of MIDAS II between year 2 and 3 will determine if the Regional Seed Centers at Winneba and Kumasi are properly staffed and operational. At that time the decision of timing the issuance of PIO/Cs for the Tamale center will be determined. The Tamale center can be brought on stream with minimum effort since existing structures can be upgraded to the level of new centers at Winneba and Kumasi. In the long run, the seed multiplication unit at Ho will continue to contribute to the overall scope of Ghana's total seed needs. Although beyond the time frame of MIDAS II, consideration should be given to providing some support to the Ho unit in the critical areas of drying and processing.

Seed inspection (certification) and testing will be a function of the newly formed Ghana Seed Inspection Service (GSIS). This responsibility was previously a function of SMU, now GSC. However, shortage of resources (land, equipment, labor) in the GSC together with the decision to delegate the responsibility of Certified seed production to contract growers emphasized the desirability of moving inspection and testing out of GSC and organizing it on a national scale. Thus, with assistance from AID, the GSIS will be organized within the MOA. GSIS headquarters and central seed testing laboratory will be established in Accra, and the first regional office will be established in Kumasi. The headquarters office will service the Winneba Regional Center, thus eliminating the need for a regional center there. If MIDAS II goals are accomplished by establishing the first two regional seed centers at Winneba and Kumasi, then establishment of a second regional GSIS office is recommended to accompany the proposed seed center at Tamale. Additionally, consideration should be given at the appropriate time for GSIS support in the Ho region.

Certified seed production will be accomplished through the registration and organization of contract seed producers. These growers will purchase Foundation seed from the GSC, multiply it and sell the Certified seed back to GSC. The GSC, of course, will then dry, process, test, and store this Certified seed in their regional seed centers for further distribution. This technique not only ensures that rapid and adequate quantities of Certified seed will become available without depending upon a sole production agency, the GSC, but it also brings the private farmers (contract growers) into the seed program. This tends to create and promote more interest and confidence in the program and certainly extends the initial spread effect and benefits to a larger group of Ghana's rural population.

Seed marketing will be a function of the GSC and is being re-organized to distribute seeds more efficiently to farmers in outlying rural areas. The distribution of Foundation seed creates little problem, because the GSC will already have contracts with seed growers. To market Certified seeds more extensively in rural areas, however, the GSC will establish distribution agreements with the same outlets which the GFC will use to distribute fertilizer. The GSC will also investigate the possibility of using GNTC outlets (over 300) for marketing seed. In addition, company owned stores and KIOSKS will be evaluated as seed outlets in rural areas. The GSC, together with the GOG, will arrive at equitable seed prices which should allow for sufficient profit margin for the GSC.

A cadre of adequately trained technicians is essential for the efficient and effective operation of the new and expanded facilities of both GSC and GSIS. Seed production, drying, processing, inspection, testing, and storage requires knowledge and skills which are not part of the usual background and experience of agronomists or other plant science specialists. Ghana has some manpower with limited background and experience in some of the seed technology areas; however, most will require additional training either on the job or abroad. With AID assistance, both the GSC and the GSIS will be able to provide its staff with in-depth professional training, operational technical training, and on-the-job training in a number of disciplines related to seed technology.

Recommendations

AID should assist the GOG by implementing the following recommendations for the seed multiplication component of MIDAS II.

- A. Assist with the organization of the GSC with headquarters in Accra and the development of Regional Seed Centers at Winneba, Kumasi, and Tamale;
- b. enhance the capability of GSC to produce Foundation seed by strengthening the production capability of the Foundation seed farmers at Winneba, Kumasi, Tamale and Ho;

- c. assist with the organization of GSIS with central headquarters in Accra and regional headquarters at Kumasi;
- d. assist the GSC in developing marketing outlets in a manner similar to developing fertilizer outlets; and
- e. assist in training an adequate number of seed technology specialists both for GSC and GSIS.

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SEED MULTIPLICATION COMPONENT

OBJECTIVE

The objective of the Seed Multiplication Component of MIDAS II is to assist the GOG to provide sufficient quantities of improved seed to Ghanaian farmers at a reasonable cost so as to enhance their productive capacity and thus improve the social and economic status of the small farmers of Ghana. This will be accomplished by improving the institutional and operational infrastructure of the National Seed Program in Ghana. A cadre of seed technicians will be trained who will efficiently operate appropriate institutions and/or programs necessary for effectively implementing the National Seed Program.

ORGANIZATION

The National Seed Program for Ghana will consist of the following primary institutions/programs and their associated components:

1. Ghana Seed Company (GSC)
2. Ghana Seed Inspection Service (GSIS)

A. Ghana Seed Company (GSC)

The newly organized GSC is an evolutionary product of the initial Hybrid Maize Seed Production Unit created in 1961 to primarily promote and distribute high yielding synthetic maize varieties. In 1962 the name was changed to Improved Seed Multiplication Unit (and later to Seed Multiplication Unit (SMU) when they began to multiply seeds of other crops. Re-organization in 1968 enabled the SMU to assume a greater supervisory and inspection role and to concentrate primarily on multiplying introduced Breeder Seed to adequate stocks of Foundation Seed.

This re-direction of efforts to concentrate only on Foundation seed production was deemed necessary in view of resource shortage such as land and equipment. Thus, the bulk of the Certified Seed was produced by "Registered" seed growers under contract to the SMU.

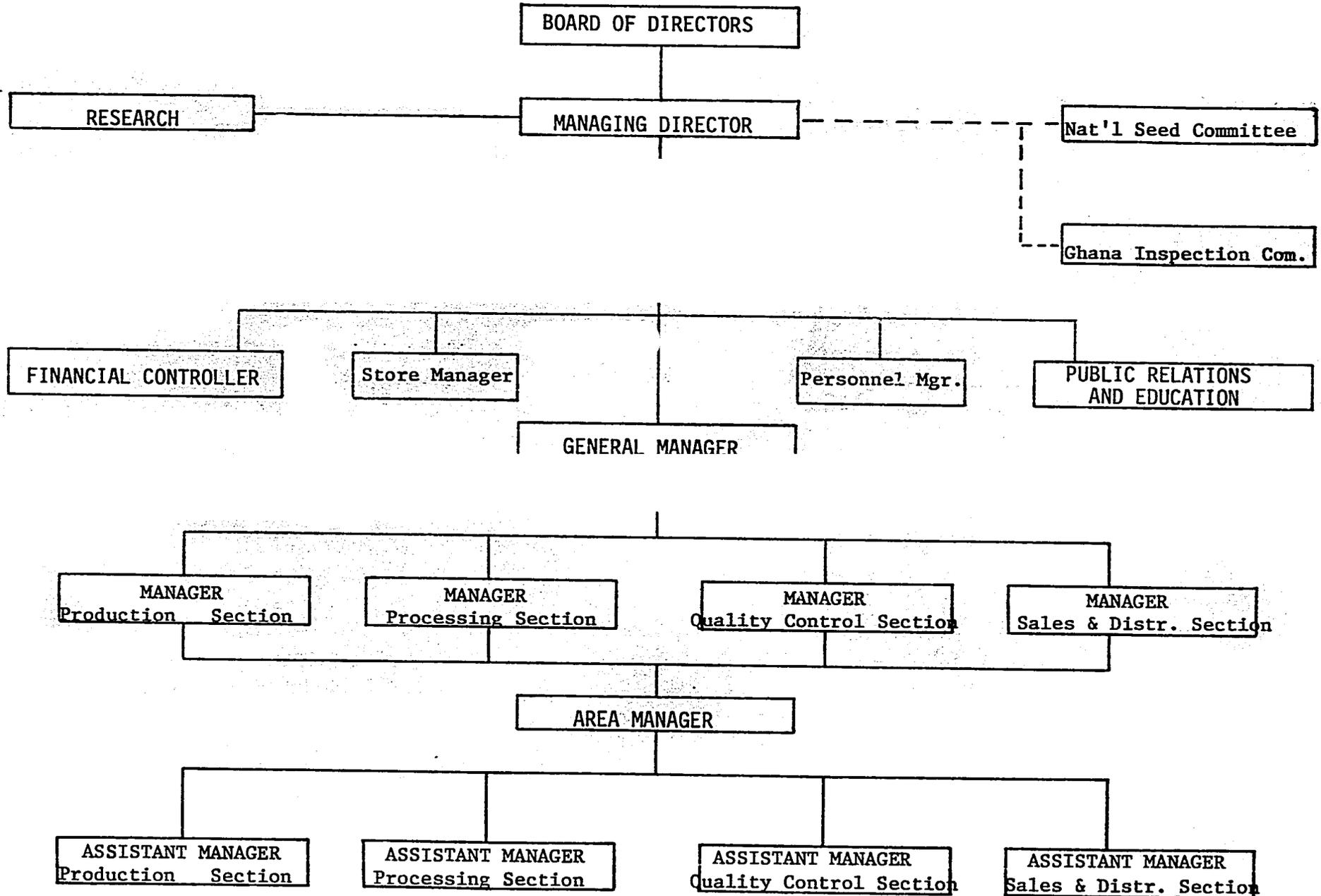
Another highly favorable re-organizational move occurred in March, 1978, which will significantly affect the National Seed Program. The SMU/MOA became the Ghana Seed Company (GSC), an act which was legally promulgated by the Supreme Military Council (SMC) of the GOG. The GSC was activated in 1979 and is a parastatal company which is expected to function along commercial, private enterprise guidelines. Subsequently, all prior SMU/MOA institutions and programs (structures, equipment, needs, contracts, obligation, commitments, seed growers, etc.) will be incorporated into the GSC.

1. Purpose of GSC. The GSC will be charged with the responsibility of coordinating the production of Foundation seed and making this seed available to the Registered seed growers in Ghana. Subsequently, the contract-produced Certified seed will be pur-

Figure 1.

ORGANIZATIONAL CHART

GHANA SEED COMPANY



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chased and after proper processing will be marketed throughout Ghana. In discharging these responsibilities the GSC will develop its National Headquarters in Accra with Regional Seed Centers being established first at Winneba, next at Kumasi, and finally at Tamale.

It must be pointed out that PIO/Cs for equipment for two seed centers have already been issued. To prevent arrival of additional equipment prior to construction of adequate buildings, it is advisable to wait for the mid-project evaluation (between year 2 and 3) to determine the timely issuance of PIO/Cs for the equipment for the third facility.

2. Organization of GSC

(a) Headquarters. The headquarters for the GSC will be established in Accra and will be in charge of organizing and coordinating the programs of the Regional Seed Centers. The headquarters office will consist of the Managing Director and supporting staff deemed necessary to execute the responsibilities of this office (see figure 1). The Experience, Incorporated consultants will be housed in the headquarters and will assist in organizing and coordinating activities.

The GSC Headquarters will also develop and equip a small quality control laboratory for the purpose of establishing and maintaining uniform quality standards for all Foundation Seed.

(b) Regional Seed Centers. Three Regional Seed Centers are planned for development during the implementation phase of MIDAS II. These sites have been designated as Winneba, Kumasi and Tamale and were chosen because they already have on-going seed multiplication units. It is noteworthy that original studies of Mississippi State University identified a fourth location, Ho, for development. Even now the GSC strongly defends the idea of assisting the Ho region to develop additional expertise in seed multiplication, and any future AID assistance beyond the scope of MIDAS II should consider including the Ho seed multiplication unit.

PIO/Cs have been issued for equipment for two seed centers, and the processing equipment should be arriving within a couple of months. In view of the absence of readily available buildings at either Winneba or Kumasi, it is logical to move the equipment directly to Tamale where it can be immediately put into use. Existing buildings and storage facilities at Tamala make this possible. Thereafter, the focus will be on the Winneba Center as it has been designated at the first unit to be constructed.

Even though the goal of MIDAS II is three centers, PIO/Cs for equipment for the third center, more than likely

Kumasi, should be held in abeyance at least until FY 84. Under no circumstances should this equipment be ordered until that already in country is in place. A mid-project review, probably between year 2 and 3 of MIDAS II, should determine the timely issuance of PIO/Cs for the third center. At that time it may be feasible to consider some assistance to the Ho unit. To strengthen the Ho Multiplication to a status similar to that of the other centers, approximately \$200,000 would be sufficient to provide dryers and cleaning equipment.

The impact upon the availability of maize and rice seed by functional Regional Seed Centers can be seen by projections in Table 1.

Regional Seed Center - Winneba. The Regional Seed Center at Winneba will consist of newly constructed facilities for drying, processing and storing Foundation and Certified Seed for the Central and Western Regions of Ghana. The existing Foundation Seed farm, within 15 km of the Seed Center, will be capable of producing sufficient quantities of Foundation maize seed, while contract producers will provide the Certified seed. The Winneba Seed Center will develop the capability of evaluating seed quality of both Foundation and Certified seed by equipping and staffing a small quality evaluation laboratory.

The construction site for the Winneba Seed Center has been selected, title received and architectural drawings are complete and approved. Tender for the bids was published in early February, and construction should begin no later than April, 1980 to be completed and functional by July, 1981.

The PIO/C for the equipment has been issued; therefore timely arrival of the equipment should coincide with the completion of the facility. Provisions have been made for the Winneba Seed Center to be supported by a farm workshop, and one set of mechanics tools has been ordered. The PIO/C for the shop equipment is still pending approval of an additional \$25,000 requested by the supplier.

The Winneba Regional Seed Center will consist of the following:

- Two Wagon dryers
- One column dryer
- One seed processing building
- Conditioned seed storage -- both temperature and humidity controlled -- for five additional rooms within the single storage facility.
- Headquarters area
- Spare parts area

Table 1. Maize and Rice Seed Output as Influenced by the Operational Status of Regional Seed Centers at Winneba, Kumasi, and Tamale

	10/1/80-9/30/81 Year 1	10/1/81-9/30/82 Year 2	10/1/82-9/30/83 Year 3	10/1/83-9/30/84 Year 4	10/1/84-9/1/85 Year 5
MAIZE (200# bags)					
¹ Winneba 7/81	11,000	17,000	19,000	20,000	22,000
² Kumasi 7/82	4,000	11,000	19,000	20,000	22,000
³ Tamale 7/84	3,000	5,000	9,000	12,000	21,000
Ho	2,000	3,000	3,000	3,000	3,000
TOTAL	20,000	36,000	50,000	55,000	70,000
RICE (160# bags)					
¹ Winneba 7/81	--	--	--	--	--
² Kumasi 7/82	--	--	--	--	--
³ Tamale 7/84	49,500	54,500	59,000	74,000	73,500
Ho	500	500	1,000	1,000	1,500
TOTAL	50,000	55,000	60,000	75,000	75,000

- ¹ Winneba Center - operational 7/81
² Kumasi Center - operational 7/82
³ Tamale Center - operational 7/84

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- Workers' canteen
- Water tower and tank
- Rest house
- Two bungalows
- Field house and research area (Winneba only).

Farm machinery, including land preparation and harvesting equipment, has already been procured under the original MIDAS PP. Thus, the capability of producing Foundation seed has been greatly enhanced; however, additional equipment and spare parts will be necessary for continued and efficient operation of this farm.

Regional Seed Center - Kumasi. The Regional Seed Center at Kumasi will consist of newly constructed facilities for drying, processing and storing Foundation and Certified seed for the Ashanti, Brong-Ahafo, and part of the Eastern Regions. This center will be constructed on the existing Foundation seed farm, and therefore site selection poses no problem. The facility design and architectural drawings will be quite similar to the Winneba Center which should expedite construction of this unit.

The same strategy will be used in developing this Center as with the Winneba Center, that is, Foundation seed will be produced on the seed farm, and Certified seed will be produced by contract growers. Additionally, the Kumasi Seed Center will develop the capability of evaluating seed quality of both Foundation and Certified seed in the small seed quality evaluation laboratory.

The PIO/C for the equipment has been issued, and it is anticipated that this equipment will arrive prior to construction of the Seed Center facility. Proper storage for this equipment will be necessary until it can be installed. It is anticipated that this will be accomplished at the Winneba site. The mechanics tools and shop equipment should not be ordered until significant action has been taken to establish the Seed Center.

The Kumasi Regional Seed Center will consist of the following:

- Two wagon dryers
- One column dryer
- One seed processing building
- Conditioned seed storage -- both temperature and humidity controlled -- for five additional rooms within the single storage facility.
- Headquarters area
- Workshop area
- Spare parts area

- Workers' canteen
- Water tower and tank
- Rest house
- Two bungalows

Farm machinery, including land preparation and harvesting equipment, has already been procured under the original MIDAS PP. Thus, the capability of producing Foundation Seed has been greatly enhanced; however, additional equipment and spare parts will be necessary for continued and efficient operation of this farm.

Regional Seed Center - Tamale. The Regional Seed Center at Tamale will be developed primarily from existing buildings and facilities of the on-going seed multiplication unit. This center will serve the Northern and Upper Regions where rice is a major crop.

Similar strategy will be used in developing the Tamale Center; however, the column dryers and storage units will not be necessary, since adequate storage already exists and since rice is harvested at very low moisture content. The Center will produce the Foundation seed and contract growers will produce the Certified Seed.

(c) Contract Seed Producers

In late 1968 it became apparent that the SMU had neither the land nor staff to produce sufficient quantities of improved seed required for continued agricultural development in Ghana. Thus, some of the production farms were phased out and Certified seed production was delegated to "Registered" seed producers.

There does exist a sufficient number of capable and qualified seed producers in fairly close proximity to each of the Seed Centers who are agreeable to producing Certified seed for the GSC under contract. This arrangement will enable the GSC to concentrate its efforts on the production of sufficient quantities of high quality Foundation seed and on proving the adaptive ability of newly introduced varieties and those developed indigenously.

There are some problems associated with this system. First, the contract documents between the GSC and the private growers are not binding; therefore, either party may default for whatever reason. Secondly, the official price of seed is established by the GOG, and even though the GSC pays a premium to the contract grower, often the "food price" is considerably higher, and the contract grower seeks this "food" market.

The GSC is frequently limited in its flexibility to respond to seasonal harvests of "seed" crops due to lack of supplies and spare parts, i.e., bags for seed, money for seed purchase, and maintenance of transporting vehicles. If this happens, and it does frequently, then the traveling "food merchants" have ready cash for immediate purchase of the seed crop which will be diverted to the food market.

Contract seed production should be continued and promoted, and GSC policies and strategy should be devised to minimize the problem areas. The GSC Managing Director has indicated that contract revisions will result in a satisfactory agreement between both the GSC and the grower. As the processing plants become functional, the GSC will be able to purchase the Certified seed immediately at harvest thus minimizing the competition from the commercial food market. Additional incentives to contract growers include availability of dependable high quality Foundation seed which has been properly cleaned and treated to insure good germination, production supervision by GSC field representatives, assistance with bank credit and an immediate market. The growers are also relieved of on-the-farm drying, shelling cleaning and storage obligations. When the contract grower signs a contract, he is assured of an adequate quantity of seed to plant his production acreage.

B. Ghana Seed Inspection Service (GSIS)

The original PP did not identify or elaborate on any specific plans for a seed inspection (certification) agency or for seed testing (quality evaluation) activities. Both of these activities are essential for a national seed program to become effective. Thus, the GOG has authorized the formation of the Ghana Seed Inspection Service (GSIS), and it is anticipated that these activities will be initiated at least by July, 1980.

The GSIS will be a semi-autonomous agency within the MOA and will develop the capability of inspecting both Foundation and Certified seed production fields to determine that proper production practices have been used to maintain genetic and mechanical purity. Seed inspectors properly trained in commonly used certification and inspection techniques will perform these tasks. It is anticipated that the inspectors from the GSIS headquarters in Accra will serve the Winneba region, while a regional office of GSIS will be established at Kumasi and Tamala for their respective regions.

The GSIS will also develop the capability of testing seed for quality evaluation. The Accra headquarters will establish a well equipped seed testing laboratory for testing and standardizing quality regulations for the entire country. The regional GSIS offices at Kumasi and Tamale will develop a regional seed testing laboratory with a minimum amount of basic equipment necessary for this task.

The MIDAS Evaluation Report suggests one Central Seed Testing Laboratory for the entire country which would, no doubt, provide adequate facilities for testing all seed produced in Ghana. However, timely results are definitely essential in this area, particularly when negotiating the purchase of contract produced seed, and awaiting results from a central laboratory (no doubt in Accra) is not advisable. On-the-spot determinations of seed quality will be necessary in order for an effective seed program to develop. Therefore, it is proposed in the MIDAS II re-design that the GSIS Headquarters in Accra be equipped with complete facilities for seed inspection and testing (to serve Winneba region) and that a regional office be established at Kumasi and Tamale to provide inspection and testing service to these regions.

PIO/Cs have already been issued for procuring the necessary equipment for the GSIS headquarters and the Kumasi and Tamale Regional offices. Figure 2 shows the proposed staffing pattern for the GSIS.

PROJECT DESCRIPTION

The objective of the Seed Multiplication Component is to assist the GOG to provide sufficient quantities of seed of improved varieties to Ghanaian farmers at a reasonable cost so as to enhance their productive capacity and thus improve the social and economic status of the small farmers of Ghana. This will be accomplished by improving the institutional and operational infrastructure of the National Seed Program in Ghana, that is, facilitating the organizational and operational capacity of the GSC and the GSIS, which will result in the expansion and improvement of seed production, processing, inspection and testing capabilities in Ghana. Thus, the GOG, through the GSC and the GSIS, will ensure wider distribution and availability of larger volumes of high quality seeds of improved varieties to Ghanaian farmers.

To implement this project, the GOG, with AID assistance, will focus its initial inputs into four basic and essential areas:

1. development of the Ghana Seed Company (GSC) and their regional seed centers for producing, drying, processing, storing, and marketing Foundation seed;
2. contracting to indigenous farmers for the production of Certified seed to be purchased and processed by the GSC regional centers;
3. developing the Ghana Seed Inspection Service (GSIS) for implementing the inspection (certification) and testing aspects of the seed program; and
4. developing a seed distribution and marketing system which will be effective in making the Certified seed readily available to the small farmers in rural areas of Ghana.

Figure 2. Proposed Staffing Pattern for the
Ghana Seed Inspection Service (GSIS)

I. Headquarters Office

<u>Position Description</u>	<u>Number</u>
Officer-in-Charge	1
Asst. Officer-in-Charge (Chief Seed Technologist)	1
Finance and Records Officer	1
Asst. Finance and Records Officer	1
Principal Secretary-Stenographer	1
Analyst/Inspector (5 Purity Analysts, 3 Germination Specialists)	8
Clerk Typists (1 Tag Printer)	3
Drivers	2
Messengers	2
Janitor	1
Watchmen	2

II. Branch Office

<u>Position Description</u>	<u>Number</u>
Assistant Officer-in-Charge 1 - Kumasi 1 - Tamale	2
Analyst/Inspector 3 - Kumasi 3 - Tamale	6
Clerk Typist 1 - Kumasi 1 - Tamale	2
Messenger 1 - Kumasi 1 - Tamale	2
Driver 1 - Kumasi 1 - Tamale	2

Thus, the Seed Multiplication Component of the MIDAS project is based upon the collaboration of AID with the GOG (GSC and MOA) for the purpose of expanding and improving the ability of the GSC (formerly SMU/MOA) to provide Foundation seed and by selecting contract growers to produce Certified seed. The GSC will process both Foundation and Certified seed and establish a comprehensive seed distributional system. Headquarters for the GSC will be established in Accra, and regional seed centers will be established in Winneba, Kumasi and Tamale. An optimistic viewpoint will project completion of two facilities by the end of year 3 of MIDAS II; however, the success of this certainly depends upon the immediate availability of host country commodities such as cement, electrical supplies, iron rods, etc. A mid-project evaluation will determine timely issuance of PIO/Cs for the third seed center which probably will be Tamale.

The responsibility of producing Certified seed has been removed from the GSC and delegated to contract seed growers. This is a sound move in that it removes from the GSC additional responsibility of Certified seed production which would tax their resources, land equipment, and labor. It is quite evident that Ghana has many qualified farmers who are willing and capable of purchasing Foundation seed from the GSC and producing Certified seed under the guidance of GSC. Thus, this multiplication technique will result in increased quantities of Certified seed being made available to large numbers of Ghanaian farmers, both large and small. The GSC will purchase the Certified seed from the contract growers at a price which will include a set premium above the current feed-grain price. The GSC will then dry, process, and store the Certified seed for future sale. These seed handling operations will be incorporated in the Regional Seed Centers as the Certified seed component of the GSC. These incentives should provide security to the contract producers and promote mutual benefit between the GSC and the growers.

Seed inspection (certification) and testing services are essential for a national seed program to become effective. Thus, the GOG has authorized the organization of the GSIS which will assume the responsibilities which were originally conducted by the GSC. It became evident that GSC should not inspect and test their own seed, thus the need arose for a completely unbiased and independent autonomous agency, the GSIS. This agency will enforce the provisions of the 1972 Seed Law which established seed certification regulations and standards. The GSIS will develop the capability of inspecting both Foundation and Certified seed production fields to determine that proper production practices have been used to maintain genetic and mechanical purity. The GSIS will also develop the capability of testing seed for quality evaluation. GSIS headquarters will be established in Accra with a Central Seed Testing Laboratory capable of servicing the Winneba region. A regional office will be established in the Kumasi region, while GSIS services can be extended to Tamale and Ho as conditions permit.

Well trained technicians will be absolutely necessary for successful expansion and operation of the GSC and the GSIS. Even though

Ghana has some manpower with background and experience in these areas, most would require additional training on the job and abroad. With AID assistance, the GSC and the GSIS will be able to provide its staff with required in-depth professional and operational training. Proposed training is outlined in the implementation schedule.

The marketing network for assuring widespread distribution of Certified seed will require considerable effort to develop. Historically, seed sales and distribution in Ghana have been the responsibility of the Extension Service within the MOA. This system has proven quite unreliable in Ghana as well as in other countries developing seed multiplication programs. Thus, a more reliable and efficient marketing system must be developed within the GSC in order to ensure timely and adequate quantities of improved seed to rural communities.

To accomplish this task, the GSC plans to explore several marketing systems to evaluate their effectiveness. Sales offices will be developed in conjunction with GSC headquarters to serve the Greater Accra area, and at their Regional Seed Centers in Winneba, Kumasi, Tamale and Ho to serve these respective areas. Plans include a seed outlet at Bolgatanga to service the extreme northern portion of Ghana.

To supplement this basic marketing scheme, GSC plans to initiate at least two pilot projects for distributing seeds. The first of these consists of establishing a company store in Atebubu (Brong-Ahafo Region) as the initial test area for determining market acceptance and for identifying related problems of servicing and accounting for seed sales outside of GSC control. If this proves successful, then additional outlets will be set up at Sunyani, Wenchi, Ejura, Kintampo, Yeji and Kwadjorm (See Figure 3).

A second pilot project will consist of evaluating the feasibility of building GSC KIOSKS at selected locations for the purpose of distributing seeds in the rural sector. To supplement this plan, GSC company vehicles will be sent to rural villages on designated market days with the approval of the local chief.

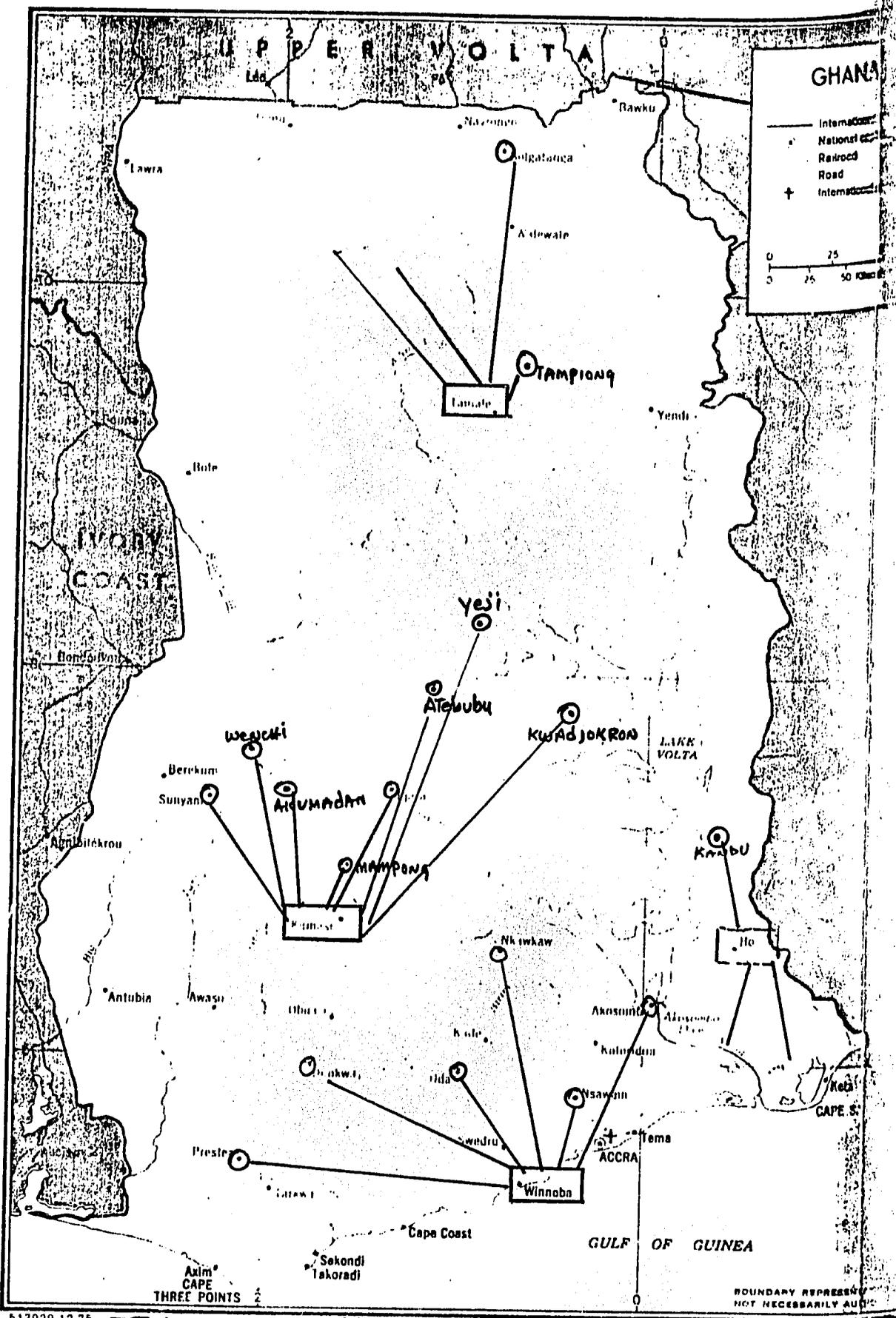
Other alternatives to distribute seeds over a wide area will involve the GNTC and their 300 outlets and utilizing the same outlets through which the GFC fertilizer. The map in figure 3 shows probable distribution coverage.

PROJECT ANALYSES

Technical

The original MIDAS PP incorporated Mississippi State University recommendations for improving the institutional and operational infrastructure of the National Seed Program for Ghana. This plan called for establishing three Foundation seed plants and two Certified seed plants, one of each at Winneba and Kumasi, and only a Foundation seed plant at Tamale.

FIGURE 3. GSC DISTRIBUTION & MARKETING PATTERN



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- ☐ REGIONAL SEED CENTERS
- ☐ PROVISIONAL SEED CENTER
- SEED DISTRIBUTION POINTS

BOUNDARY REPRESENTATION NOT NECESSARILY AUTHORITY

The MIDAS consultant team (Experience, Inc.) revised the original plan and reduced the number of plants from five to four, one each at Winneba, Kumasi, Tamale and Ho. These plants will handle both Foundation and Certified seed by having two separate processing lines in each building, one for Foundation and one for Certified seed. This technology approach was selected first of all because the GSC will produce only Foundation seed and purchase Certified seed from contract growers. Thus, both classes of seed will be processed in the same facility. The private contract growers will produce Certified seed under contract to the GSC who will purchase the contracted Certified seed, process and store at their seed units and subsequently market on a broad scale. This technology approach brings a larger group of farmer-seed producers into the seed program at an early date. Also, by developing only four centers, in effect the capital outlay for one building site (Certified unit) has been eliminated from the original plan, and, in some instances, only one piece of equipment may service both the Foundation and Certified processing lines.

Further technology changes from the original design simply resulted in altering the drying and storage facilities. The drying technology selected includes wagon-type units supplemented by continuous flow column dryers. These were selected over the originally designed rather simple bag-type and bin dryers because the wagon dryers offer more flexibility in handling small lots of Foundation seed; whereas, the continuous flow column dryers are capable of drying larger quantities of Certified seed. When used in conjunction, these two dryers offer rapid and simultaneous drying capabilities during peak harvest periods. This technology also eliminates the requirement for cement (which is in critically short supply) to construct the bag and bin drying units of the initial proposal.

The storage component originally proposed by the Mississippi State University study included only dehumidified storage for the Foundation seed units and only warehouse storage for the Certified units. These recommendations were based primarily upon the assumptions that the large storage facilities in the Tamale and Ho regions could be effectively integrated into the overall system. As the emphasis shifted to combination Foundation/Certified units, the necessity arose for installing both dehumidified and air conditioned storage to protect the quality of the seed during extended periods of high temperature and humidity which frequently prevail. It should be pointed out that the initial technology proposed by E. I. included refrigerated storage; however, this choice in technology was seriously challenged by the project evaluation team as being too sophisticated for Ghanaian conditions. Therefore, after further consideration storage facilities will be dehumidified and air conditioned, a very satisfactory technology for maintaining adequate seed viability in the tropics.

Although the original PP failed to identify or elaborate on any specific plan for a seed inspection (certification) and testing agency, both of these activities are essential for the effective operation of a National Seed Program. Thus, the GOG has authorized the formation of

the GSIS, and it is anticipated that these activities will be initiated at least by July, 1980. The GSIS will be a semi-autonomous agency within the MOA, and will develop the capability of inspecting both Foundation and Certified seed production fields to verify that the proper production practices have been employed to maintain genetic and mechanical purity. Seed inspectors properly trained in commonly acceptable certification, inspection and testing techniques will perform these tasks. The GSIS headquarters will be established in Accra with a Central Seed Testing Laboratory. These facilities will serve the Winneba region, while regional offices will be established at Kumasi and Tamale to serve those regions. Further expansion into the Ho region will depend upon progress of the GSC facilities.

The GSIS will also develop the capability of testing seeds for quality evaluation. The Accra headquarters will develop a well equipped Central Seed Testing Laboratory for testing and standardizing quality standards for the entire country. The regional office at Kumasi (and later at Tamale and Ho) will develop regional testing laboratories with a minimum amount of basic equipment necessary for making timely seed quality evaluations when negotiating the purchase of contract produced seed.

A cadre of well trained technicians is absolutely essential for the successful expansion and operation of the GSC and GSIS. Seed production, drying, processing, storage and distribution requires special knowledge and skills which are not part of the usual background and experience of agronomists or other plant science specialists. Even though Ghana has some manpower with background and experience in these areas, most would require additional training on the job and abroad. With AID assistance, the GSC and the GSIS will be able to provide its staff with required in-depth training in a number of disciplines related to seed technology, plant breeding and agricultural engineering.

The marketing network of the GSC is also currently being reorganized to distribute seeds more efficiently to farmers in outlying rural areas. In this respect the GSC will consider establishing distribution networks and agreements with the same outlets which the GFC will use to distribute fertilizer. The GFC will sell seeds to strategically located commodity dealers where farmers will be able to purchase seeds together with fertilizer. These firms will transport the seeds to their distribution outlets for further distributional and spread effect. The GSC will also consider marketing seeds through the GNTC outlets. The GSC will work closely with the extension/research personnel of the MOA, the GSIS, and the market-extension agents at the FLOs to determine the demand for seeds in different regions of Ghana. The GOG, together with the GSC, will establish prices at which seeds will be sold in each region allowing for transport and storage costs incurred by the GSC.

Administrative

The GSC was authorized and activated in August, 1979. This is a very favorable move since the company will be organized as a semi-

government (parastatal-private) enterprise and operate along private industry guidelines. The GSC, when properly staffed and trained, will have the administrative capability to perform the assigned task of producing Foundation seed; however, additional support in the way of buildings, equipment and training is necessary in order to implement the seed activities in the selected regions. PIO/Cs have already been issued for much of the equipment for the processing and storage centers; however, additional support is projected as the program expands into the Tamale and Ho regions. AID has already supplied farm equipment to upgrade the production capability of the Foundation seed farms. Successful implementation of projected project activities will no doubt enable the GSC to effectively produce high quality Foundation seed.

The GSIS has been officially authorized (certificate of registration issued), and this agency will inspect and test Foundation and Certified seed and certify the seed according to acceptable standards. Some Ghanaian technicians have already been trained in the essential activities of this agency and could logically assume immediate positions for early activation and operation. PIO/Cs have been issued for the major equipment items for this agency.

Sufficient numbers of qualified Ghanaian farmers exist who will qualify as contract seed growers. The GSC will evaluate individual farmer capability and subsequently authorize registration of selected farmers for the purpose of producing Certified seed. This practice has already proven satisfactory and further organization will effectively extend this phase of the overall program to a greater number of farm units.

Marketing developments planned by the GSC include comparing the effectiveness of available marketing outlets, i.e., existing fertilizer outlets, GNTC outlets, or distributing seed through their own facilities. No doubt a combination of these possibilities will ensure wider distribution and spread effect.

IMPLEMENTATION SCHEDULE
Seed Multiplication Component

<u>Date</u>	<u>Event</u>	<u>Action Agent</u>
4/80	Begin construction of Winneba Regional Seed Center	GSC
4/80	Seed processing equipment for two seed Centers arrives	USAID/GSC
9/80	Seed drying and storage equipment for two Seed Centers arrives	USAID/GSC
9/80	GSIS establishes headquarters and branch offices at Kumasi and Tamale	USAID/GSIS
9/80	Seed testing equipment for GSIS arrives	USAID/GSIS
11/80	PIO/T for vehicles for GSC and GSIS	USAID
6/81	Begin construction of Kumasi Regional Seed Center	GSC
7/81	Completion of Winneba Regional Seed Center	GSC
8/81	Arrival of engineering consultant for equipment shake-down (Winneba)	USAID
1/82	In-country training course designed by MSU contract at Winneba plant	AID/USAID/MSU
7/82	Completion of Kumasi Regional Seed Center	GSC
8/82	Arrival of engineering consultant for equipment shake-down (Kumasi)	USAID
1/83	Mid-project Evaluation	AID/USAID/GOG
10/83	PIO/C for equipment for third Seed Center issued (pending mid-project review)	USAID/GSC

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ISSUES

The Project Evaluation of MIDAS I (Phase I) pointed out some controversial issues, and most likely some areas that need close supervision by USAID/G during the second phase, MIDAS II. These issues arose following the arrival of the technical assistance contractors, Experience, Incorporated, as they proposed significant changes from the technology proposed in the original PP.

The Seed Component of the original PP was based upon the analyses and recommendations of the Mississippi State University Seed Technology Laboratory. The differences in technology proposed by the E. I. consultants and the MSU recommendations can be briefly summarized as follows:

1. Number and type of seed centers (units):
 - a. MSU proposed 5 separate seed centers:
 - 1 Foundation seed unit at Winneba
 - 1 Foundation seed unit at Kumasi
 - 1 Foundation seed unit at Tamale
 - 1 Certified seed unit at Winneba
 - 1 Certified seed unit at Kumasi
 - b. E. I. Proposed 4 separate seed centers to handle both Foundation and Certified Seed:
 - 1 Foundation & Certified at Winneba
 - 1 Foundation & Certified at Kumasi
 - 1 Foundation & Certified at Tamale
 - 1 Foundation & Certified at HO
2. Type of storage facilities:
 - a. MSU recommended only limited storage capacity with dehumidified and air conditioned storage at the Foundation Centers and warehouse storage at the Certified Centers.
 - b. E.I. initially proposed refrigerated storage for all units and later changed to dehumidified storage.
3. Type of drying facilities:
 - a. MSU recommended a combination sack drier and bin drier system for all units.
 - b. E. I. proposed wagon driers supplemented by continuous flow column-type driers.

Each of these technology approaches can be analyzed as follows:

1. Number of Seed Centers - MSU considered that private industry (growers) would play a major role in seed multipli-

cation, i.e., Ejura Farms; hence, the separation of Foundation & Certified Centers. The total picture changed somewhat when the Ghana Seed Company was organized with their emphasis on Foundation Seed Production and contract growers producing Certified Seed. Also, Ejura farms encountered severe difficulty and apparently vanished from the production scheme.

It appears that the concept, proposed by E. I. and supported by GOG (GSC) and USAID/G of establishing 4 seed centers to handle both Foundation and Certified seed is sound. This reduces the number of units to four with possibly some equipment playing a dual role in both Foundation and Certified seed systems. This approach may also reduce the pressure of identifying qualified technicians to operate additional facilities. Also, this approach may enhance and facilitate the production of Certified seed by contract growers. Of importance is the necessity to maintain separate identity of Foundation and Certified seed as they will be handled in the same facility.

Thus, the technology approach of E.I. can be justified in this issue and should prove economical and workable.

2. Type of Storage facilities - MSU recommended only a limited storage capacity for the following reasons:
 - a. The Seed Multiplication Unit already had a large "cold room" of 406 ton capacity, and construction was underway on a seed storage warehouse at Ho, 5445 sq. ft., of which 1350 sq. ft. would be cold storage. This 1350 sq. ft. would provide storage for about 135 tons, even at just 1 ton seed per 10 sq. ft. of floor space.
 - b. The German Technical Assistance program indicated that they would construct two very large seed storage warehouses in the Northern and Upper Regions of Ghana (Tamale & Bolgatanga).

Since conditions in Ghana range from wet-arid to wet-semi-arid, conditioned storage would be needed for storage of any kind of seed (except possibly rice) for periods longer than 3-4 months. However, the concept of RH + Temp. equaling exactly 100, i.e., 50% + 50F, are not needed and cannot be justified except for storage of germplasm and breeder seed. Such conditions will maintain seed quality for longer than 5 years. MSU experience has shown that conditions of about 70F (20-22C) and 55-60% RH are quite satisfactory for storage up to 12-14 months. These conditions can be achieved with heavy duty, industrial type air conditioners and condensation or desiccant-type dehumidifiers. The storehouses should be compartmentalized into individual units so that portions not needed could be idle to save energy.

- c. Construction of air-conditioned storage requires a vapor barrier in the floor slab and in the walls and ceiling together with adequate insulation. Prior experience tells us that about 2 inches of styrofoam rigid insulation or equivalent is quite good. Insulation only in the ceiling is satisfactory if walls are provided with a vapor barrier and constructed of same type material with dead air space for insulation such as concrete block, double brick, etc. A good coat of vapor resistant paint outside and inside is important.

Thus, at the time of the MSU evaluation and recommendations, the existing storage facilities together with the anticipated German program indicated less emphasis was necessary in this area.

On the other hand, Experience, Inc. initially proposed that new storage facilities be constructed at each center and that it should be refrigerated. This is based no doubt on the old "Rule-of-Thumb" which states that $\%RH + \text{Temp } F$ should equal exactly 100. The rigid conditions are only necessary for highly prized seed stocks (Breeder or genetic stocks) and entail considerable initial investment and continually high level of maintenance which is very doubtful in Ghana at the present time.

After considering these implications, E. I. reconsidered and is proposing only air conditioned-dehumidified storage since all units will be handling foundation seed. This is acceptable and can be justified as sound technology approach.

3. Type of Drying Facilities

MSU proposed a simple sack drier for small quantities of Foundation seed complimented by a bin drying system for ear corn and also as interim storage. These systems have proven quite adequate and functional in numerous seed programs in Central and South America. E. I., however, proposes unit wagon-type driers for small lots of Foundation seed supplemented by continuous flow column-type driers for larger quantities of certified seed.

The wagon units are quite easy to justify, since they are self-contained, flexible and quite functional. The column-type drier may present some problems due to delicate instrumentation and level of maintenance and operational skill required. If installed properly, however, these units should provide excellent and rapid drying. Caution must be utilized to prevent mixing of seed in the column dryers.

It should be pointed out that the complete lack of cement in Ghana, something that was not anticipated when MSU made their recommendations, would have severely limited construction of bag and bin dryers.

Thus, the selection of drying systems can be justified with some noted precautions.

Hopefully, this discussion of various issues which were noted in the project evaluation paper of July, 1979 will adequately explain the series of events and justifications which have evolved during Phase I of MIDAS.

In addition it should be clearly recognized that the changes in technology were introduced by E. I. & GOG (GSC) and endorsed by USAID/G after the original PP was approved. Thus, PIO/Cs for processing, drying and storage equipment had been issued prior to the re-design exercise. This means that two seed centers - Winneba and Kumasi - were projected for completion. Additionally, considerable equipment, quite delicate in nature, has been ordered for the Ghana Seed Inspection Service (GSIS). It is professionally awkward and difficult to appear in mid-stream and attempt to sort out an already "cut and dried" situation and be called upon to justify conditions and technology which have, in fact, already and irrevocably been decided upon. The best that can be done is to determine underlying reasons and point out options as has been done in this case. Certainly, as much professional guidance as possible was utilized and emphasized for the re-design of MIDAS II.

Finally, it has already been pointed out to the Project Design Officer that the optimistic scope of MIDAS I produced little results. It makes little sense to project wider objectives under MIDAS II unless concrete evidence of success at both Winneba and Kumasi becomes evident in the near future. Additional procurement of equipment for a third center is not advisable until the current situation experiences considerable progress and momentum.

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APPENDIX

APPENDIX I

Itinerary and Contacts

- 1/22 Meeting with USAID/G for orientation and briefing:
 Mission Director's report
 Reports of Project managers
 Team design officer's comments
- 1/23 Meeting with Ghana Seed Company and Experience, Inc.
 Ben Blay - GSC
 John Sutherland - E. I.
 Orris Shulstad - E. I.
 Tim Hanna - E. I.
 Frank Mertens - USAID/G - project mgr.
- 1/24 USAID Meetings and review
- 1/25 Visit Winneba Seed Center Site with Shulstad, Hanna and Mertens. Visit with John Addipah, Richard Ackah and Sara Ampoo-Nunoo. Meeting with MIDAS Team and Tom Biney of the Midas Project Executive Committee (MPEC).
- 1/26 Work on Seed Component Report
- 1/27 Work on Seed Component Report
- 1/28 Meeting with GSC and E. I. to discuss additional difficulties.
- 1/29 Visit Volta Region and Ho Seed Multiplication Unit
 Mr. Hesse-Ouwsu, Area Director
 Hanna, Sutherland, Josiah Wobil - GSC
- 1/30 Data collecting, reviewing and draft writing of seed component
- 1/31 MIDAS Team meeting with USAID/G for up-dating information and review.
- 2/1 Meeting with GSC on cost analysis and equipment needs
- 2/2 Draft writing and background reading
- 2/4 Meeting with GSC to discuss economic and financial analysis
- 2/5 Meeting with GSC to work on projected budget needs for MIDAS II

- 2/6 Meet with Procurement Officer Tony Bilecky and Orris Shulstad to work on equipment procurement
- 2/7 Meet with USAID/G to present draft reports of each component
- 2/8 Meet with Oleen Hess (F&A officer) for budget review
- 2/9 Work on final draft of seed component
- 2/10 Work on final draft of seed component
- 2/11 Several meetings with USAID/G and MIDAS Team for final discussions
- 2/12 Revise budget and work on final details
- 2/13 Meeting with Tom Biney for overall discussions of MIDAS with GOG officials
- 2/14 Final discussions with GOG officials and GSC personnel
- 2/15 Meeting with MPEC and departure arrangements

APPENDIX II
PROCUREMENT PLAN
MIDAS II

I. RESPONSIBILITIES

The Ministries of Agriculture, Finance and Economic Planning and the Bank of Ghana are the implementing agencies for MIDAS II. However, the MIDAS Project Executive Committee, through the various entities has the primary implementing responsibilities for the six main components of the project.

It is anticipated that MIDAS II will utilize the services of the AAPC, New York, to serve as its procurement services agent (PSA) for all commodities that have been agreed upon to be procured by AAPC. Procurement will be in accordance with AID Regulation 1 practices.

A new contract with AAPC will be negotiated prior to PP approval for expected services and fees to be paid by MIDAS II to AAPC. (The project officer is responsible for the execution of such agreement).

II. EQUIPMENT LIST

A. Seed Multiplication Component (Tamale Unit)

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF\$000</u>
1 ea.	Clipper 4-screen, Dustless Type Air Screen Cleaner	H-454	\$15,0
2 ea.	Clipper Air Screen Cleaner with motor @\$6,400 each	27	12,8
1 ea.	3-Screen Air Screen Cleaner with screen and motor	354	12,0
5 ea.	Bucket Elevators 28' with accessories @ 4,000/unit	DG-C2-175	20,0
1 ea	Bucket Elevator 13' with accessories @ 1,500/unit		1,5
1 ea.	Seedburo Aluminum Frame Elevator with chain and drag flights with 3/4 hp electric motor	178	1,2

1 ea.	Gravity Table, Oliver Model, Capacity of approximately 5000 lbs. and spares.	160A	20,0
1 ea.	Seed Treater, similar to Gustafson Model B 4.5 ton/hour capacity	Model B	4,1
3 ea.	Bag conveyor, portable, 24" belt width, 24 ft. length similar to Burrows Model NOR18-19 @ 3,200 ea.	NOR-18-19	9,6
1 ea.	Combined Sheller-Cleaner with capacity of 800-1200 BPH, including motors and spare parts for maize shelling.	2A	50,0
1 ea.	Air Compressor, Sears	30G 17578N	1,0
2 ea.	Blower, Portable 220/50H: 1 phase complete with nozzle & holding handle \$550 ea.	Seedburo #98800	1,1
2 ea.	Vacuum cleaner, Tornado 1½ HP with accessories @ \$1,600 ea.	Seedburo	3,2
2 ea.	Platform scales, Fairbank-Morse with double beam, Metric @ 1,000 ea.	Seedburo	2,0
3 ea.	Fishbien Portable Bag Closers including tools, extra needles and and spares @ \$1,100	Seedburo	3,3
1 ea.	Disc Separator, Carter-Day size 2520 w/motor and spare parts (for rice)	Style BU-3	24,0
1 ea.	Motor Truck Scale, Fairbanks with Model 50-5509 Registry Beam (metric)	11-3153A	28,0
5 ea.	Bins, surge or holding type floor mounted above equipment 1 ea. - 300 bushel 1 ea.- 900 bushel 2 ea - 500 bushel capacity	Seedburo	14,8
4 pr.	Wagon-type Drier units for rice & maize drying including burner, Max. 8 tons per wagon @ \$20,00 each pair		80,0
1 ea.	Cyclone - Dust Collector Burrows type, Misc. equipment and accessories for above	8-8012	4,0
1 ea.	Generator, 500 KVA	CAT or equivalent	30,0
	Subtotal		367,6

B. Seed and Soil Testing Equipment
Reserved

C. Farm Machinery

5 ea.	Mowers, Rotary Bushhog - \$2,000 ea.	10,0
3 ea.	Planters, 4-row, plate type trailing attach @ \$11,000 ea.	33,0
5 ea.	Cultivars, front-mounted 4-row for IH tractors at \$7,000 ea.	35,0
5 ea.	IH tractors, diesel, 95HP @ \$70,000 ea.	350,0
4 ea.	Disc plows - 4 bottom plows with spares @ \$6,000 ea.	24,0
2 ea.	Low Boy, Tilting Trailer, 6-ton @ \$6,000 ea.	12,0
4 ea.	Farm wagons, kasten, Rubber wheel - less box @ \$2,000	8,0
4 ea.	Spreader, 3-point hitch PTO, 500 lbs. @ \$1,600 ea.	6,4
	Subtotal	478,4

NOTE: Commodities listed in Items A and C above are scheduled procurement first quarter FY 84.

D. Vehicles

10	7-ton Diesel Trucks (GSC) @ \$36,000 ea	360,0
5	Personnel carriers (GSC) @ \$15,000 ea.	75,0
6	Crew Cab-Pickups (GSC) @ \$15,000 ea.	90,0
1	Personnel carrier (GSIS) @ \$15,000 ea.	15,0
4	Pickups (GSIS) @ \$15,00 ea.	6,0
4	*Motorcycles (GSIS) @ \$1,500 ea.	6,0
2	10-ton Trucks @ \$40,000 ea. Spare and replacement parts	80,0 <u>8,0</u>
	Subtotal	694,0

* Off Shore Procurement