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LAYING THE BASE FOR WORKABLE PRIVATIZATION OF EGYPT'S SEED INDUSTRY

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LAYING THE BASE FOR WORKABLE PRIVATIZATION OF EGYPT'S SEED INDUSTRY

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FOREWORD

To minimize government expenditures, improve service to farmers improve personal income and diet, reduce import of food, and maximize domestic food production, full supply of improved yield inputs—including high-yielding seed—is essential.

Under favorable operating/technical conditions, the private sector can play an important role in supplying higher-yielding seed. An efficient private sector can reduce seed cost to government, respond quickly to farmer needs, create employment, and generate tax income for government.

However, the private sector alone cannot provide the required high-yielding seed. Government must always carry out public-service seed activities and support the private sector.. Government must also initiate the supply of higher-yielding seed, and create farmer demand for it.

Seed supply is a cooperative effort involving government and the private sector. This guideline is designed to show what must be done to create a business/technical/economic environment in which the private sector can successfully supply higher-yielding seed, and earn a profit while providing a needed service.

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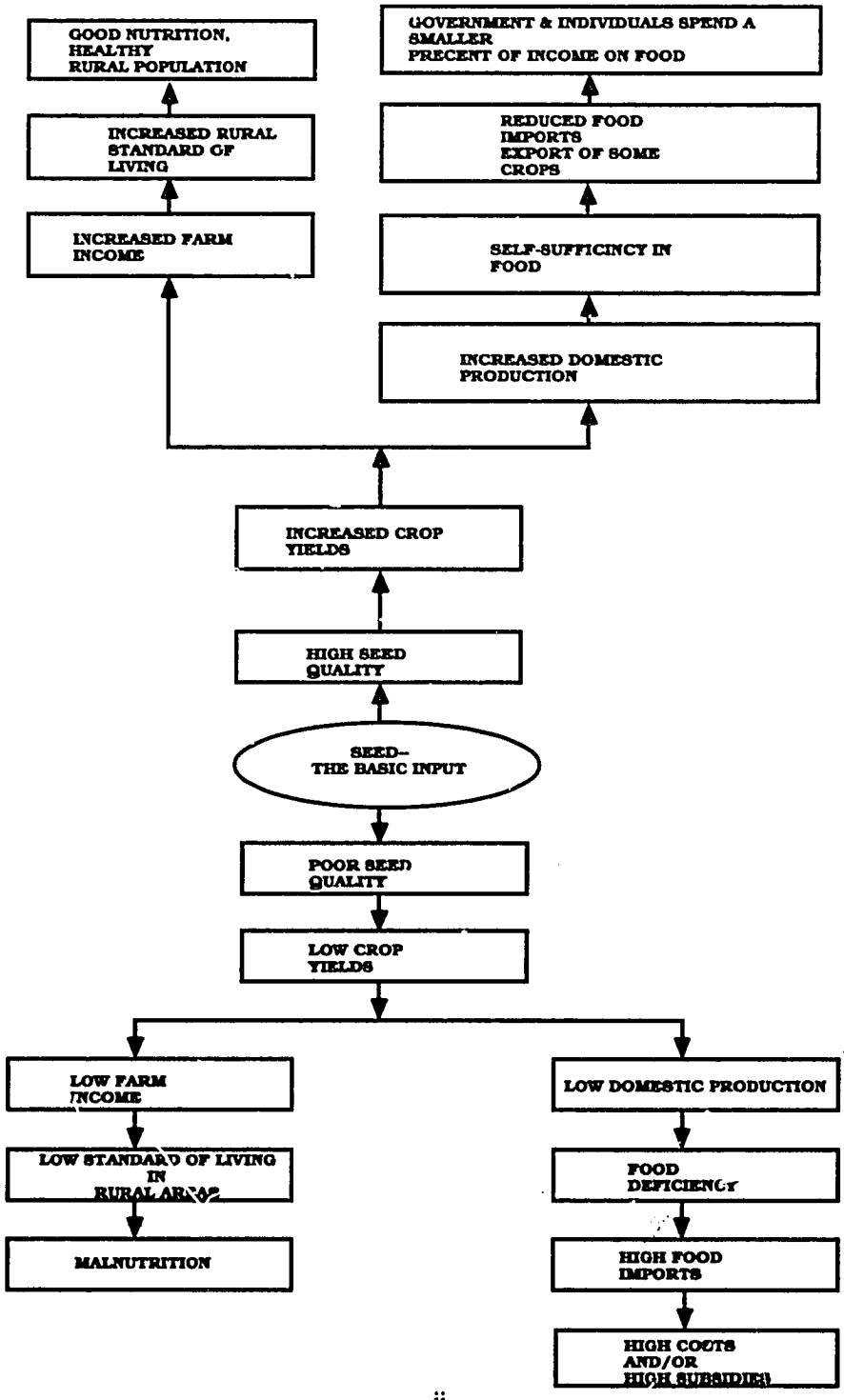
GOOD NUTRITION, HEALTHY RURAL POPULATION
INCREASED RURAL STANDARD OF LIVING
INCREASED FARM INCOME
GOVERNMENT & INDIVIDUALS SPEND A SMALLER PRECENT OF INCOME ON FOOD
REDUCED FOOD IMPORTS EXPORT OF SOME CROPS
SELF-SUFFICINCY IN FOOD
INCREASED DOMESTIC PRODUCTION
INCREASED CROP YIELDS
HIGH SEED QUALITY
SEED-- THE BASIC INPUT
POOR SEED QUALITY
LOW CROP YIELDS
LOW FARM INCOME
LOW STANDARD OF LIVING IN RURAL AREAS
MALNUTRITION
LOW DOMESTIC PRODUCTION
FOOD DEFICIENCY
HIGH FOOD IMPORTS
HIGH COSTS AND/OR HIGH SUBSIDIES

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SUMMARY

Seed industry privatization is currently of great interest. Realistic private-sector seed supply can improve seed quality, improve service to farmers, and reduce use of national resources and government funds. However, it cannot be "force-fed": premature responsibility dumped on the private sector, before conditions are ready and in activities they are not free to plan, can only disrupt seed supply and food production. Government must first lay the base for successful private-sector seed supply. This includes supportive laws and policies, training, technical support services, creating farmer awareness, and many other activities. Active government efforts to support and encourage effective private sector seed supply can increase food production and government tax income, while reducing government budget expenditures for seed.

THE NEED

Benefits of Higher-Yielding Seed

The question often arises, Why supply farmers with "high-quality seed?"; farmers produce crops, so they can produce their own seed. Farmers do produce botanical seed/grain, but they cannot produce pure seed which delivers uncontaminated research developments and increased yields.

When seed are planted, their embryoes grow and develop into the plants in the farmer's field, which are the same plants as those in the seed; they do not change genetically. When the farmer plants, his seed have already determined what the crop will be, its yield potential, and its stand. Despite all his efforts, the farmer cannot exceed the genetic yield ceiling brought by his seed; he can only create growing conditions so his crop can produce the maximum possible of its genetic potential.

Only high seed quality can give farmers the maximum yield at the most efficient production cost, and effective use of national resources. When adequate, low-cost food supplies are ensured, other industries and the national economy can develop efficiently.

Why a Seed Industry?

High-quality, high-yielding seed don't "just happen"; natural pressures and seed/grain handling procedures change or contaminate the pure genetic qualities artificially combined in a variety. To produce genetically-pure, high-quality seed requires specific high technology in a complex sequence of operations; in precise time-sensitive periods; applied completely and properly by highly-trained, careful, dedicated personnel; specialized equipment; and carefully organized and managed operations.

Regardless of farmer technology, good seed requires a high-technology "seed industry", a coordinated, carefully-managed, integrated sequence of technical operations. Only a complete, organized, coordinated, quality-oriented technical/economic seed industry can supply higher-yielding seed.

What is a Seed Industry?

The seed industry is not an end in itself, nor is it an empire-building process in government or the private sector. It exists only to serve farmers.

It transfers yield-increasing research developments and technology to farmers by supplying them with high-quality, genetically-pure, higher-yielding seed in the amount needed, kind needed, when needed, where needed, at acceptable prices. It helps farmers produce higher yields and earn more; it helps the nation meet its food needs with less land and less imports.

A seed industry must conduct, and integrate into a careful time-sequence, many operations from variety development to seed supply to farmers. Who conducts these activities, government or private sector? Not just one or the other; in an efficient seed industry, both must carry out essential roles in a coordinated program. They must cooperate and work together, each doing what it is best-qualified to do.

The seed industry must be based on applying technology and technical operations; any other objective will ultimately impede effective seed supply to farmers.

THE FOCUS

All seed industry organization, policies, and activities must focus on one objective: Supplying farmer needs for higher-yielding seed; i.e., supplying the market demand, to increase their income and total national food production.

In developing agricultures, farmers must be educated on using improved seed and inputs to increase yields. However, the objective is still the same: create farmer demand for improved seed, and supply this market.

REALISTIC IMPLEMENTATION

The only workable objectives in developing and upgrading the complex structure of a seed industry and encouraging private-sector participation are to **(1)** supply higher-yielding seed to farmers efficiently at the proper time, and **(2)** do this in a timely manner, at least cost to farmers, the government, and in national resources. Focusing on other objectives, i.e., premature or forced privatization, government revenue, employment, etc., will result in inefficiencies, increased costs in national resources, and disruptions in seed supply and food production.

Equally essential is to remember that people—farmers, merchants and staff of both government and private sector seed supply and supporting activities—must implement changes/improvements/privatization. It cannot be "force-fed"; only problems can result from implementation methods copied from other countries without proper adaptation, without adequate facilities and support, or without first educating and getting full support of the people involved. Privatization is essential in the national economy, but must be adapted and implemented to fit local conditions.

ESSENTIAL SEED INDUSTRY ACTIVITIES

Seed Industry Characteristics

Seed production and supply involve a long time lag between start of the production cycle and sale to farmers; during this time, many things may affect farmer willingness to buy seed. Also, seed are living, and can die and lose their value under unfavorable conditions. Farmers only need seed at certain times; all seed operations are seasonal, and seed must reach farmers at the right time, right place, right cost, and right kind. No matter what it costs to produce high-quality seed, farmers who are not well-educated on seed value will pay only a certain price; at a certain price level, different farmers will use their own grain rather than buy improved seed. Farmers have little risk capital; once "burned" by being sold poor-quality seed, they will not return to that supplier.

Seed supply involves (1) high-risk, high-investment, time-sensitive, market-sensitive, long time-lag, high-technology input; (2) low-technology customers, and (3) a long time to recover investment. Successful seed supply requires intensive research and public-service supporting activities, good management, close supervision, tight coordination and integration, good market data, quick response to market locations and demands, and continuing education of staff and farmers.

Seed Industry Operations and Components

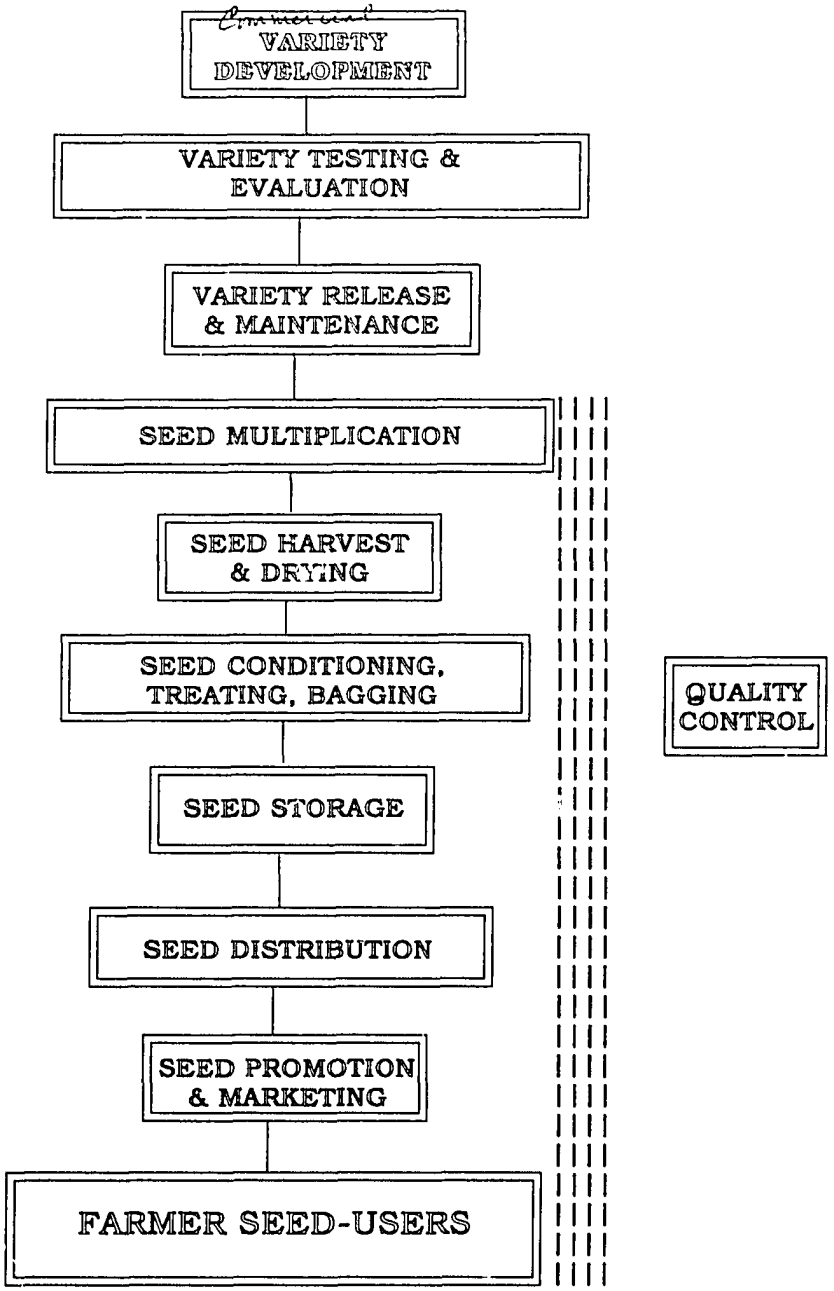
A specific sequence of technical operations is required for stable supply of high-yielding, high-quality seed. There can be, and is, wide variation in administration, organization, agencies which handle activities, how many activities a single agency handles, etc.; but, the same technical operations are required. Figure 1 shows the general sequence of seed supply activities; each activity includes many detailed technical/ scientific/economic operations which must be fully completed at the right time, in the proper sequence.

In planning and implementing effective privatization of long-term seed supply industry/program, the first consideration is to identify activities which must be carried out (Table 1) in a balanced sequence to maintain a timely flow of truly improved seed, so food production is enhanced, not interrupted; and, then to identify those which are suitable to private sector investment.

WHO CONDUCTS SEED INDUSTRY ACTIVITIES?

Efficient seed supply to farmers requires long-term investment, many activities, high technology, quick action, cost-effective operations, and rapid changes to meet changing needs. Government agencies havee an administrative structure which ensures continuity, standard procedures, stable and reliable services; but, they cannot fit close time-sensitive schedules or have the flexibility to respond quickly. Government organizations at the mass marketing level usually are not as efficient or cost-effective, and inadequately serve farmers. Time-sensitive operations to supply a market—especially farmers and their seasonal agricultural operations—must be carried out by agencies which can respond immediately to time schedules and farmer needs. Decades of experience in many countries have shown that a profit-motivated private sector, free to respond to farmer needs, can efficiently handle market-sensitive production/conditioning/distribution/marketing large volumes of seed to farmers.

FIGURE 1 ***General sequence of seed industry operations. Each step shown includes many activities which must be conducted in the proper sequence and at the right time.***



ACTIVITIES REQUIRED FOR BALANCED, EFFICIENT SEED SUPPLY

TABLE 1

ESSENTIAL ACTIVITIES	THEIR COMPONENTS
Legal Base	
	Realistic, comprehensive Seed Law.
	Effective regulations under the Seed Law.
	Effective, adequately-funded Seed Law implementing agency.
	Uniform, complete implementation of Seed Law.
	Realistic, long-term Seed Policy with effect of law.
	Policy Advisory Committee including all concerned sectors.
	Business, labor, tax, etc., laws favoring investment in seed.
Technical Base	
	Collection & maintenance of germ plasm.
	Organized crop research focused on established priorities.
	Continuing flow of improved, higher-yielding varieties.
	Detailed variety descriptions, adequate to guide field inspectors.
	Varieties from private & public agencies released and recommended on basis of yield/value, without bias.
	Continued improvement of crop production practices.
	Seed research to resolve problems & support operations.
Stock Seed	
	Adequate Breeder seed produced and maintained.
	Adequate Foundation seed produced and maintained.
	Excess Breeder & Foundation seed carried over in safe long-term storage.
	Foundation seed made available to all qualified requests.
Seed Production	
	Larger, better, conveniently-located contract growers selected.
	Production planned far enough in advance to ensure stock seed.
	Growers closely supervised, trained and inspected.
	Effective production practices used to ensure high yields.
	Isolation, roguing and other seed production practices closely followed.
Seed Certification & Field Inspection	
	Certification handled by a separate agency.
	Adequate operating funds and trained personnel to supervise all operations effectively.
	All fields properly inspected; only acceptable fields certified.
	Certification system maintains traceable identity of all fields and lots.

TABLE 1
(CONTINUED 2)

ESSENTIAL ACTIVITIES	THEIR COMPONENTS
Seed Harvest & Handling	Seed harvested at proper stage, with equipment which maintains seed purity, avoids mixture and damage; if required, seed programs provide harvest equipment to contract growers. Seed labelled, identity maintained, contamination avoided. Seed delivered to drying/conditioning immediately after harvest; seed program controls transport to ensure fast delivery.
Seed Drying & Conditioning	High-moisture seed dried immediately after harvest. Conditioning facilities designed for complete clean-up, and cleaned-up before conditioning to avoid contamination. Seed identity maintained in all operations. Conditioning equipment adequate to make all required separations at the required capacity. Conditioning plants located near production area. Adequate safe storage for raw and cleaned seed. Enough plants to minimize potential mechanical mixtures, reduce time required to have seed ready, and minimize transport cost.
Seed Treatment	All seed properly treated at the conditioning plant. Proper rates of proper chemicals uniformly applied. Treated seed properly labelled.
Seed Field/Lot Identification & Records	Each seed container of each lot adequately and properly labelled & numbered. Efficient lot and field numbering system which relates seed lots and fields. Records adequate to trace seed to its origin, identify all operations and potential sources of problems.
Seed Packaging & Labelling	Small easily-handled packages containing amount of seed recommended for a specific field area. Packages protect seed, keeps it pure and identified. Handling/stacking/transport system which avoids damage.
Internal Quality Control	Each seed plant with an internal quality control unit (IQC). Each IQC equipped and staffed to sample and test seed before, during and after conditioning. Management structure so IQC can control/guide/stop operations where seed quality or cost efficiency is affected.

TABLE 1
(CONTINUED 3) ESSENTIAL ACTIVITIES THEIR COMPONENTS

External Quality Control

Complete systems for Certification and Seed Law implementation; both may be combined into 1 unit.
Active implementation agencies, with trained personnel, budgets and equipment adequate for effective implementation.
All Seed subject to Seed Law; maximum emphasis on using Certified seed.

Carryover

All seed not planted kept in storage which can maintain its quality until the next planting season.
Safe carryover storages provided at strategic locations.

Seed Storage

Safe storage conditions for all seed in all locations: raw seed, after conditioning, at all distribution points.
Network of safe storages located throughout production & use areas, to hold seed safely and deliver efficiently.

Seed Testing

Adequate seed testing labs in convenient locations, to test all seed quickly.
Labs properly equipped and personnel trained in standardized procedures so test results are uniform and repeatable.
Samples tested immediately upon receipt.
Test results reported quickly.
National/regional Referee Lab(s) to ensure standardized procedures and uniform, repeatable test results.

Seed Transport

Adequate transport to move seed to all required distribution points by the time it is needed for planting
Transport only in vans which protect seed from heat and moisture.
Transport controlled by seed programs to ensure rapid, safe seed movement.

Seed Distribution

Adequate system of local retail outlets, so seed is available near all farmer-users.
Adequate network of distribution centers, so seed can be quickly supplied to retail outlets.
At each location, seed kept in safe storages.

TABLE 1
(CONTINUED 4) ESSENTIAL ACTIVITIES THEIR COMPONENTS

Seed Promotion & Marketing

Strong ongoing extension educational promotion to get farmers to use higher-yielding seed.
Crop production practice packages include good seed.
All means of contacting farmers used to promote good seed.
All seed sold to farmers must be of dependable high quality
Seed available near target farmers, when they need it, in useful package size, reasonably priced, with credit so it is easy to buy.
Advertising, promotion, etc., tells farmers where and how to get good seed.
All promotion coordinated to avoid conflicting information.

Seed Industry Credit

Operating and capital investment credit available to all qualified agencies at reasonable rates & collateral requirements.

Credit for Farmer Seed Users

Credit available to all farmers, so they have a choice of where they buy seed.
Credit rates reasonable; special incentives to use Certified seed.

Personnel Training

Ongoing university program to supply trained seed specialists.
in-service short-term upgrading & refresher training regularly required for all staff.
Specified training required for specific positions.

Equipment & Spare Parts Supply

Established channels for rapid supply of equipment and parts, at reasonable cost; minimum tax on imported items, or tax-free.

Private Sector

Strong participation in seed supply, especially market-sensitive operations such as production, distribution, marketing.
Strong government support and cooperation.
Legal freedom to make management decisions in response to farmer needs and market demands.
Long-term support by strong government policy, to ensure safe investment.
A mechanism—association, etc.—to discuss and cooperate with government, voice needs and concerns, have input to policy, regulations, etc.
Investment incentives to attract private sector into seed supply.
Concessional credit to encourage investment, especially in supply of "low-profit" seed.

A seed industry is not just supplying seed to farmers. It involves many different, inter-related activities. Many do not generate a net return on investment (time, facilities, people, risk, etc.). These are "public service" operations required to create and maintain the infrastructural base and technical/economic support essential for reliable supply of high-quality seed. Government will always have an important role in carrying out public-service supporting/developing/regulating/guiding operations. Government must be a dedicated participant in research, variety development and release, quality control, seed testing, seed law enforcement and regulation, Breeder and Foundation seed supply, supplying nonprofitable seed to farmers, etc.—all activities which do not generate profit but must be carried out so farmers have a continuing supply of higher-yielding seed.

The private sector can efficiently handle profit-making, time-sensitive, high-volume market oriented operations. It can operate cost-efficiently, change rapidly to meet market demands, and conduct large-scale market-oriented activities effectively. Private sector seed supply releases government funds for other essential social activities; improves operating efficiency; reduces use of national resources to supply seed; improves service to farmers; generates tax income for government; and creates more rural employment.

Seed supply is never "government **vs.** private sector"; to serve national needs effectively, it must always be "government **and** private sector". Both have vitally important roles; neither can operate efficiently and cost-effectively without the other (Table 2). A seed industry cannot be organized to build an empire in either government or the private sector; it requires both sectors working together, and exists only to provide higher-yielding seed to farmers who produce food.

Working together, government and the private sector can operate integrated seed industry activities and supply high-quality seed most efficiently, thus ensuring higher food yields at lower cost. This reduces food import costs; food costs to families; government expenditures for food; cropland requirements; and use of labor, inputs and pesticides. It improves individual and national living standards, quality of rural employment, agricultural productivity, and government tax income. It releases more workers for industry, as fewer workers are required to produce the needed food; it may even produce exportable or storable surpluses.

SEED INDUSTRY ROLES HANDLED MOST EFFICIENTLY BY THE PRIVATE SECTOR, GOVERNMENT, OR BOTH/EITHER

TABLE 2

GOVERNMENT	GOVERNMENT &/or PRIVATE SECTOR	PRIVATE SECTOR
POLICY		
NATIONAL SEED PLAN		
STATISTICS		
SEED LAW & REGULATION		
CERTIFICATION		
OFFICIAL TESTING LABS		
	REGISTERED TESTING LABS	
	GERM PLASM	
BASIC RESEARCH		
	VARIETY DEVELOPMENT	
VARIETY TESTING		
VARIETY APPROVAL		
	BREEDER SEED	
	FOUNDATION SEED	
	REGISTERED SEED	
	CERTIFIED SEED	
"NON-PROFIT BUT NEEDED" SEED		
		COMMERCIAL & NON-CERTIFIED SEED
	CONDITIONING	
CONDITIONING SERVICES		
	INTERNAL QC LABS	
	STORAGE	
	DISTRIBUTION	
		MARKETING
		RETAILING
	SALES PROMOTION	
EXTENSION PROMOTION		
	EDUCATION/PROMOTION	
PUBLIC TRAINING & EDUCATION		
TRAINING SPECIALISTS		
	SEED INDUSTRY CREDIT	
	FARMER CREDIT	

THE ROLE OF GOVERNMENT

TRADITIONAL GOVERNMENT ACTIVITIES

Whatever its political form, government's traditional roles are to:

A. protect citizens;

B. provide necessities citizens cannot provide themselves;

C. organize, support, and guide activities which affect all citizens and the society;

D. promote the wellbeing of individuals and society as a whole;

E. initiate development; and

F. encourage private action which helps the individual and society.

Figure 2 shows traditional areas of government activity.

GOVERNMENT IN AGRICULTURE

Agriculture—the source of food—requires many inputs and activities; many are "non-profit" public-service activities which must be maintained by government for the benefit of citizens.

GOAL

Government's goal in agriculture is to ensure adequate food, feed and fiber, at reasonable cost while protecting national resources and developing an infrastructure which is efficient in the long-run.

OBJECTIVES

To achieve this goal, government seeks to:

A. Develop, utilize and conserve farm lands and resources.

B. Maintain research to solve problems, improve efficiency.

C. Maintain adequate, balanced, efficient production levels.

D. Ensure adequate safe storage/distribution/marketing.

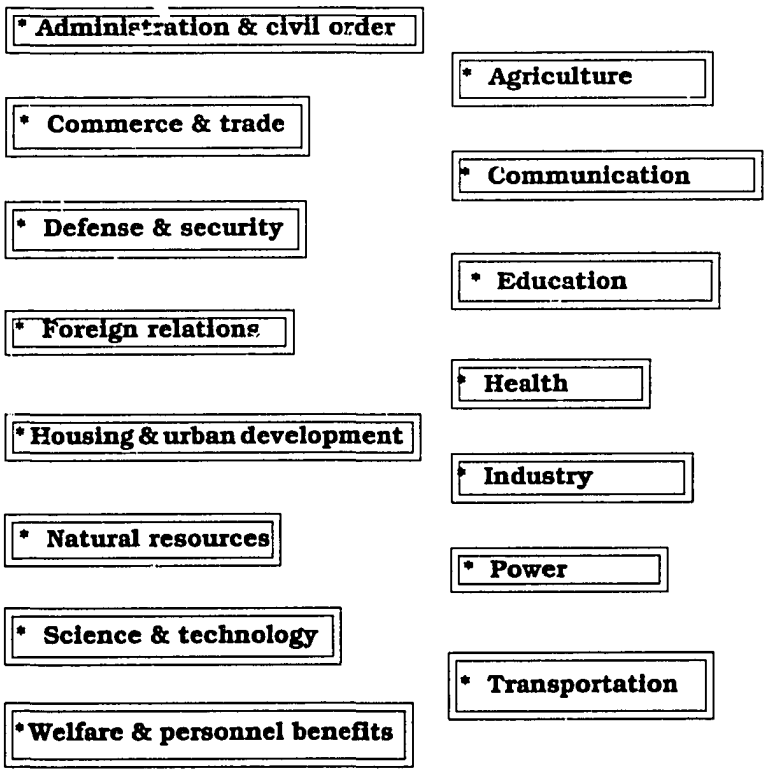
E. Ensure adequate, efficient production inputs.

F. Minimize external debt and adverse balance of payments.

G. Maximize standard and quality of life for citizens.

TRADITIONAL GOVERNMENT ACTION AREAS

FIGURE 2 *Traditional areas in which government exercises leadership in developing the nation and serving citizens.*



CROP PRODUCTION INPUTS

Efficient agriculture and food production require effective, adequate and timely supply of many essential inputs:

A. Crop lands
B. Soil fertility and conservation
C. Irrigation
D. High-yielding varieties
E. High-quality seed
F. Fertilizers
G. Insecticides, herbicides and pesticides
H. Equipment, spare parts, and maintenance
I. Fuel and energy
J. Credit
K. Labor
L. Management and technical guidance
M. Continuously-upgraded applied technology
N. Research to solve problems and improve output

High-quality, higher-yielding seed are the basic input. Seed provide the crop plants; other inputs build the environment which enables the plants to perform profitably.

THE PRIVATE SECTOR

WHY A PRIVATE SECTOR?

Government must conduct many non-profit, public-service seed industry activities; the private sector is better-suited to conduct high-volume, market-oriented, market-responsive commercial profit-making activities. Government and the nation benefit if the private sector handles market-oriented seed operations, because:

A. The private sector can change faster and react quicker to seasonal needs, so farmer and national needs are supplied better and more timely.

B. The private sector must earn a profit (its "salary" for work, investment in facilities and operations, management efforts, risk-taking, etc.), so it must operate cost-effectively. It uses less national resources to supply the needed seed.

C. Government seed production is less efficient; it uses government funds for seed, personnel, facilities and operations, so there is less money left for hospitals, schools, etc. When the private sector supplies seed, it frees government money for other uses, and pays taxes which increase government funds.

D. Private sector seed supply creates jobs at higher salaries and pays farmers more for seed crops, so it increases personal income. It creates rural employment, helps economic development of rural areas, and helps move business out of big-city areas.

WHAT CAN THE PRIVATE SECTOR DO?

The private-sector must operate at a profit, with returns equal to investment in other areas. In seed, it can effectively handle profit-making operations—market-oriented, time-sensitive, high-volume, requiring rapid response to farmer needs, and which must change rapidly to meet changing needs.

WHAT IS NEEDED FOR STABLE PRIVATE-SECTOR SEED SUPPLY?

Contrary to common misconception, competition from government seed production is not the major obstacle to private-sector seed production, provided that government supplies "non-profit" seed and maintains realistic prices. Before private-sector seed supply can develop effectively, the true constraints must be corrected:

A. Business-related laws must create a business climate in which seed managers can make unhindered decisions based on perceived real market demand, free choice of products supplied, profit potential, and operating efficiency.

B. Facilities such as seed plants must be modernized, located in areas ideally placed in relation to operations, and be able to operate properly and efficiently.

C. Government support services—variety testing, seed testing, seed law regulation, Certification, etc.—must be good, readily available, applied uniformly, technically correct, and complete.

D. A backlog of technically-trained local personnel on which the private sector can draw must be developed, to reduce the need for expensive expatriate staff and still ensure efficient, correct operations.

E. Credit for farmer seed purchase must permit farmers to buy seed from any reliable supplier.

F. Adequate and intensive extension education must convince farmers to continually buy improved seed for all their crops, to create and maintain a real—not just potential—market.

G. The seed industry must have easily-available credit at concessional rates for capital investment and operations. It must be able to import or buy equipment without excessive delay or duties.

H. Quality of the seed it supplies must be truly and consistently high.

I. Small-medium but technically/economically good, wholly-Egyptian seed firms must be possible, encouraged and profitable with good management; total dependence cannot be placed on multinational firms, although they must be encouraged to participate.

J. Private-sector seed firms must not only make profit, but also operate with concern for social development, concentrate on supplying a high-quality product and help farmers while earning a realistic return for services rendered.

When such conditions are satisfied, Egypt can have a vigorous private-sector seed supply.

SEED CROPS WITH PRIVATE-SECTOR POTENTIAL

Self-pollinated crops such as small-grains require high planting rates, and farmers can easily plant their own grain instead of higher-priced technically-produced seed. Getting farmers to use improved small-grain seed requires intensive market-building. Until this exists, there is little profit incentive for the private-sector; even then, high planting rates limit the profit margin. Only after establishing their main business on high-profit seed crops such as hybrids or maize, can private seed firms "spread their overhead" by handling some low-profit self-pollinated crop seed.

Seed firms can profit from some cross-pollinated crops such as maize which cross and mix with other nearby crop plants. In some crops, relatively low planting rates permit farmers to pay a higher price for seed, and still keep per-feddan seed cost low. Hybrids have built-in "genetic variety protection" and create a predictable recurring seed market, because farmers must buy new seed each season. Farmers are also more willing to purchase seed of crops whose seed is difficult to save, or require only a small amount of high-quality seed. These are the kinds of seed crops handled by the private sector.

Table 3 shows cross-pollinated field crops, crops with low planting rates, vegetables, clover, etc., and hybrids which offer returns on investment, and have profit potential. These are the seed kinds produced by the private sector. Crops whose seed are low-profit, easily replaced by grain, high seeding rates, low crop income, etc., will, of national necessity, be produced by government, except in small amounts by private-sector firms "spreading their overhead".

MULTINATIONALS OR DOMESTIC PRIVATE-SECTOR SEED FIRMS?

Large multinational seed firms can bring new genetic materials and technology into the domestic seed industry. However, they are interested usually in producing their own, often limited, genetic materials or crop kinds in a way which generates profit. They export their profits; specific requirements often must be met to attract their participation. They are usually not interested in areas where the educational/extension base must be built to establish a real commercial seed market.

Local, domestic—but still of economic size—well-organized and equipped seed firms can supply local seed needs, including some crop seed of lower—but sure—profit margin. Such firms, established by local persons or groups, can best meet more local seed requirements because they can operate at lower profit margins, serve a small area, and know and help its farmers. With adequate government support, they can significantly contribute to input supply, and form the major part of the seed industry. This does not include small poorly-trained and weakly-capitalized farmers; they can never provide a reliable supply of high-technology seed.

For maximum technology development, operating and cost efficiency, and supply of local seed needs, multinational seed firms should be encouraged, and extensive efforts made to develop smaller wholly-national seed firms which ultimately must form the base and bulk of the private-sector seed industry.

ESSENTIAL BUT "NON-PROFIT" SEED

To maximize national food production, all farmers must plant the best possible seed, even of crops whose seed is "non-profit". In the national interest and to ensure food supplies, government must either supply "non-profit crop" seed, or subsidize its supply by the private sector, whichever is most efficient under local conditions.

TABLE 3

POTENTIAL OF VARIOUS CROPS FOR PRIVATE-SECTOR SEED PRODUCTION IN EGYPT

GOOD POTENTIAL FOR PRIVATE SECTOR SUPPLY	LOW PROFIT; GOVERNMENT MUST STILL SUPPLY
Hybrids	Barley
Bean, green	Bean, broad (faba)
Cabbage	Chickpea
Carrot	Cotton
Cauliflower	Cowpea
Clover, berseem	Fenugreek
Cucumber	Flax
Eggplant	Groundnut (peanut)
Lettuce	Jute
Maize (corn)	Lentil
Melon & cantaloupe	Lupines
Onion	Mallows
Pepper	Okra
RadishPea	
Potato	Rice
Sorghum	Sesame
Spinach	Soybean
Squash	Wheat
Sugarbeet	
Tomato	
Turnip	
Watermelon	

GOVERNMENT INITIATION AND SUPPORT TO SEED SUPPLY

ENCOURAGING PRIVATE-SECTOR SEED SUPPLY

Seed supply requires a major long-term investment which can be recovered only over a long time; when money is spent, it must generate income and not risk loss; otherwise, it will be invested in something else. Government must initiate, guide, and support the seed industry. Before the private sector can efficiently supply improved seed, government must create a favorable economic/technical operating environment which is dependable in the long-term. To do this, government must:

A. Initiate improved seed supply, to demonstrate its value to farmers and demonstrate to potential seed suppliers that a market exists and how they can be successful.

B. Create, demonstrate and maintain farmer deman—a market—for improved seed.

C. Encourage, promote and support private sector seed supply.

D. Create and maintain the necessary infrastructure, provide high-quality support services, and ensure business conditions which permit successful operations.

E. Establish—enact and implement—a supportive, stable long-range policy and legal base of technical seed legislation and policy, and general business laws and policy which create assured favorable long-term operating environment and conditions.

E. Control quality to protect reliable seedsmen and farmer-seed users.

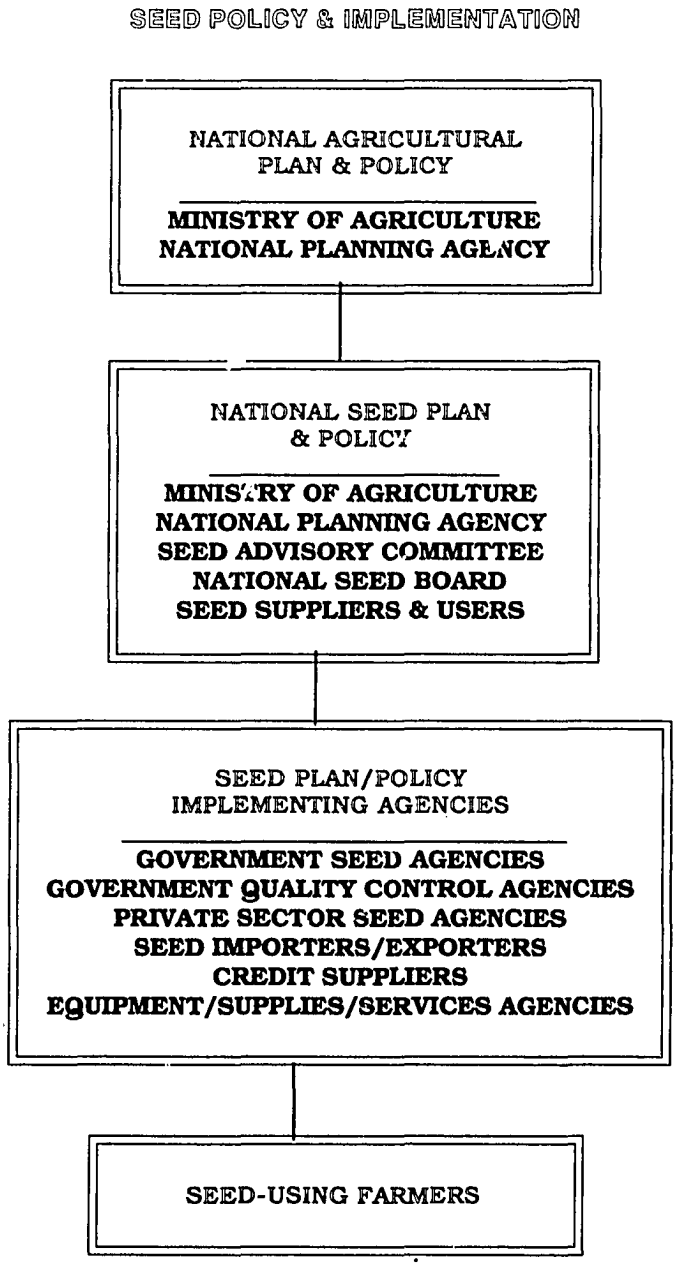
CREATING A FAVORABLE SEED BUSINESS ENVIRONMENT

High-level legislative and policy actions by many government agencies are necessary to create a business/economic/technical environment in which the private sector feels secure in investing in the high-risk, long-term-payout seed industry.

AGRICULTURAL POLICY

There must be a long-range national agricultural policy which states government objectives, actions, and support to develop agriculture. This must include inputs such as seed, and government approaches, priorities, objectives and support (Figure 3).

FIGURE 3. ***Seed policy as part of the national agricultural policy, and its implementation levels and agencies.***



SEED POLICY

Supplying high-quality seed requires a long production lead time, and heavy investments which require years to pay off. To encourage private-sector seed investment, there must be a realistic, up-to-date, long-term policy reflecting government's long-range commitment to private-sector seed supply, be growth-oriented and cover both current and long-term needs. Investors must feel secure in making long-term investments, so policy should have the force of law. It should define roles of both government and the private sector, and specify government commitment, activities and support. The seed policy must:

A. Be dependable and effective over the long-term, as well as cover short-term needs.

B. Have the force of law.

C. Consider needs/constraints of both suppliers and users.

D. Define Government priority for use of improved seed.

E. Define and ensure Government support to seed supply.

F. Define Government/private sector roles and cooperation.

G. Designate implementers for ALL infrastructure, with maximum participation by the private sector.

H. Define support from other Government agencies.

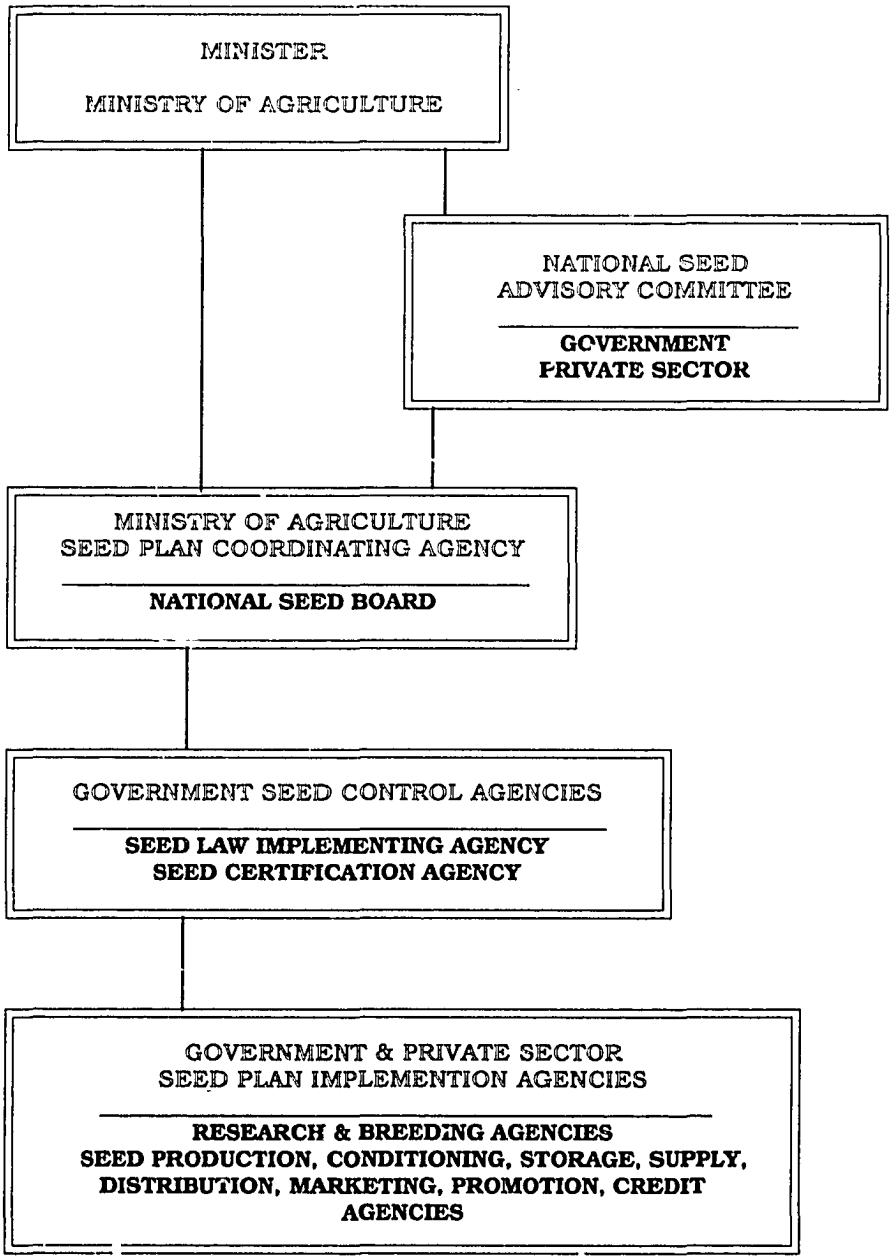
I. Define special incentives to attract private-sector participation.

J. Be flexible, but spelled out in adequate detail.

POLICY ADVISORY AGENCY: THE NATIONAL SEED ADVISORY COMMITTEE

Policy is made at a high governmental level; but, to establish realistic policy, the policy-makers must have in-depth knowledge of short- and long-term requirements of both seed suppliers and users. A national-level body, the National Seed Advisory Committee or other appropriate name, operating at a high policy level, is needed to advise government and recommend on seed policy, legislation, support, development plans, and all matters affecting supply and use (Figure 4). It should constantly review current and long-term needs, based on intimate understanding of needs of both suppliers and farmer-users, and advise policy-makers.

FIGURE 4. ***Structural relationships for effective coordination and guidance in a bi-sectorial (government and private sector) seed industry, with a National Seed Advisory Committee and a National Implementation Guidance Board.***



This Committee has no operating responsibilities; it is solely advisory, to consider the ultimate goal of supplying high-yielding seed to farmers; keep in mind the roles, requirements, constraints, and cooperation of both government and private sector agencies; identify conditions, constraints, needs, and trends; and advise on actions, legislation, policy, implementation and directions for long-term efficiency. Its role includes to:

A. Guide and advise in formulating, planning, and implementing:
- —National Seed Plan
- —National Seed Policy
- —Industry Infrastructure
- —Private Sector support and encouragement
- —Seed Law
- —Seed Certification

B. Help ensure that the National Seed Policy and National Seed Plan:
- —Are realistic.
- —Fit current and long-range seed supply industry needs.
- —Ensure high-yielding seed to farmers.
- —Support overall agricultural and economic development.

C. Ensure effective Government and private sector support, cooperation, and participation.

The Committee should include competent leaders from all concerned government and private-sector agencies, including: Ministry of Agriculture; Ministry of Finance; Government personnel agency; Government international cooperation agency; Government seed agencies; Seed Law and Certification implementing agency(ies); Agricultural research and variety development; Agricultural universities; Agricultural extension; Agricultural information and statistics; Government private-sector development agency; Private-sector agri-industry; Private-sector seed industry; Crop/grain buying/marketing/processing industry; and national planning, development and coordination boards.

It must have an active permanent high-level Secretariat with good permanent staff, preferably the agency charged with guiding the implementation of seed industry development.

IMPLEMENTING/COORDINATING/SUPPORTING: THE NATIONAL SEED BOARD

An active agency must guide and support implementation of the National Seed Plan (Figure 4). The National Seed Board (or the same agency with another appropriate name), is a high-level implementing and coordinating agency responsible for initiating, organizing, coordinating, guiding, supporting, balancing, follow-up and implementing the technical, administrative, organization and management of:

A. National Seed Policy and Plan.

B. Officials, agencies and firms which develop/implement operations under National Seed Plan and Policy, and/or assign responsibilities.

C. The many complex seed infrastructure operations.

D. Serve as Secretariat to the National Seed Advisory Committee, and the Seed Industry Association or other technical, business, or professional seed societies.

E. Help ensure that operations are complete and balanced.

F. Ensure that farmers receive high-quality, high-yielding seed.

G. Help develop/integrate/support private-sector seed supply, to minimize government expenditure to supply seed.

H. Identify needs and constraints, and help direct support and corrective action toward them.

BUSINESS LAWS

All businesses, including seed firms, must abide by a code of business-related laws on labor, incorporation structure, safety, pollution, product quality, etc. However, laws must not be excessively restrictive, and must permit operations, management and decision-making in response to the identified real market the firm serves. Laws which allow undue government interference in or restriction of business decisions, methods of operation, unnecessary paperwork, etc., are not conducive to an active business environment in which a seed firm can respond efficiently and profitably to farmer needs. There should be periodic special legislative/legal reviews of all such laws; those which impede reliable private-sector operations which are in the national interest, such as seed, should be repealed or updated to reflect new realities.

TAX LAWS

Government must maintain specific services for the benefit of citizens; to pay for these, it collects taxes. Special tax levy rates are a means of channeling private-sector activities into priority areas, or away from undesirable activities. Special priority areas such as supplying higher-yielding seed should receive preferential tax rates, to encourage investment. To be sure farmers get yield-increasing seed at the lowest possible cost, seed firms should be tax-free or assessed only minimum, concessional tax rates.

IMPORT REGULATIONS AND DUTIES

Essential equipment, supplies and staff are seldom available locally; they must be imported for cost- and quality-efficient operations and facilities. High-yielding seed is in the national interest; seed firms should be allowed to import their requirements duty-free, in an expedited procedure with minimum paperwork. Re-export of such commodities should be waived; they are expended or worn out in seed supply. Rationale for import duty exemption is that income from import duties would be only a small part of the benefit derived from their use in domestic supply of high-yielding seed.

Regular supply channels should be established, by encouraging local firms to be import agents/suppliers of essential machines, supplies, chemicals, treatments, etc., and removing taxes and duties.

CURRENCY EXCHANGE AND REPATRIATION OF PROFIT

When a multinational firm enters the domestic seed industry, it brings improved technology, genetic materials, management and operation techniques. Locally, it creates employment, improves farmer income by contracting seed production, increases food production by supplying higher-yielding seed, and pays taxes to the government. In return, it expects a profit from the services it provides. It brought external benefits into the country; it must be free to repatriate its profit, at least up to a specified level commensurate with its investment and effort.

INVESTMENT INCENTIVES

High-yielding seed is a priority input, essential to increase food production. To encourage private-sector participation, many countries offer special incentives for specified investments; these include (1) tax exemption for a specified number of years; (2) duty-free import of genetic materials, equipment, supplies, etc.; (3) tax-free status for expatriate staff; (4) accelerated depreciation; (5) low-cost utilities, or increased write-off as business expenses; (6) loans at concessional rates for capital investment and operations; (7) unrestricted export of certain levels of earnings; (8) special technical assistance; etc.

The loss of tax revenue by such concessions is made up many times over by increased domestic food production, local employment and farmer income, and reduced government expenditures for seed supply.

EXPORT/ IMPORT OF GENETIC MATERIALS

Regular international exchange of germ plasm is essential to continue development of higher-yielding locally-adapted varieties. Mechanisms must be established for regular import and export of genetic materials for research and testing. Within requirements of phytosanitary measures, exchange—incoming and outgoing—must be easily made, without delay, through a regular office with standardized quick procedures.

IMPORT/ EXPORT OF SEED

Rapid, efficient export of seed must be possible when local firms can supply foreign markets. When emergencies or specific needs arise, it must be quick and easy to import needed seed. There should be no tax on seed import or export; bureaucratic requirements should be minimal; phytosanitary requirements should be quick; import/export permits must be easily obtained; letters of credit easily handled; and release from customs must be immediate. Only when seed imports actually compete with specific equally-good local seed/varieties supplied at reasonable cost should seed imports be taxed.

TRAINING AND UPGRADING PERSONNEL

Every position in a seed program—from management to operating a bag-sewing machine—requires application of specific technology, often under difficult conditions. Government must ensure an adequate pool of trained seed personnel which is readily available to private-sector seed firms, and means of improving their skills. Government must maintain (1) a strong in-country university-level seed technology

curriculum to develop competent seed specialists; (2) ongoing short-term training for regular upgrading/refreshing training of seed staff and workers; and (3) technical manuals on all equipment, operations, and procedures. Training must be readily and economically available for government and private-sector personnel, and for persons interested in entering the seed industry. Ideally, government seed staff should be able to transfer to private-sector seed firms without losing personal benefits.

QUALITY CONTROL

Quality control (QC) prevents problems, identifies acceptable and non-acceptable seed, improves operating efficiency, and maintains desired seed quality standards. Two kinds are required: (1) internal QC, part of technical management in a seed program; and (2) external quality control by an outside agency to ensure that all seed meet desired standards (Figure 5).

External quality control is normally provided by government, and includes Seed Law Regulation, and Seed Certification. It is:

A. Industry-wide; the Seed Law covers ALL seed sellers/firms; Certification covers all producers of Certified seed classes.

B. A check on quality by a "dis-interested third-party" agency, favoring neither suppliers nor users.

C. Help to seedsmen to achieve quality, and protect them from unscrupulous competition.

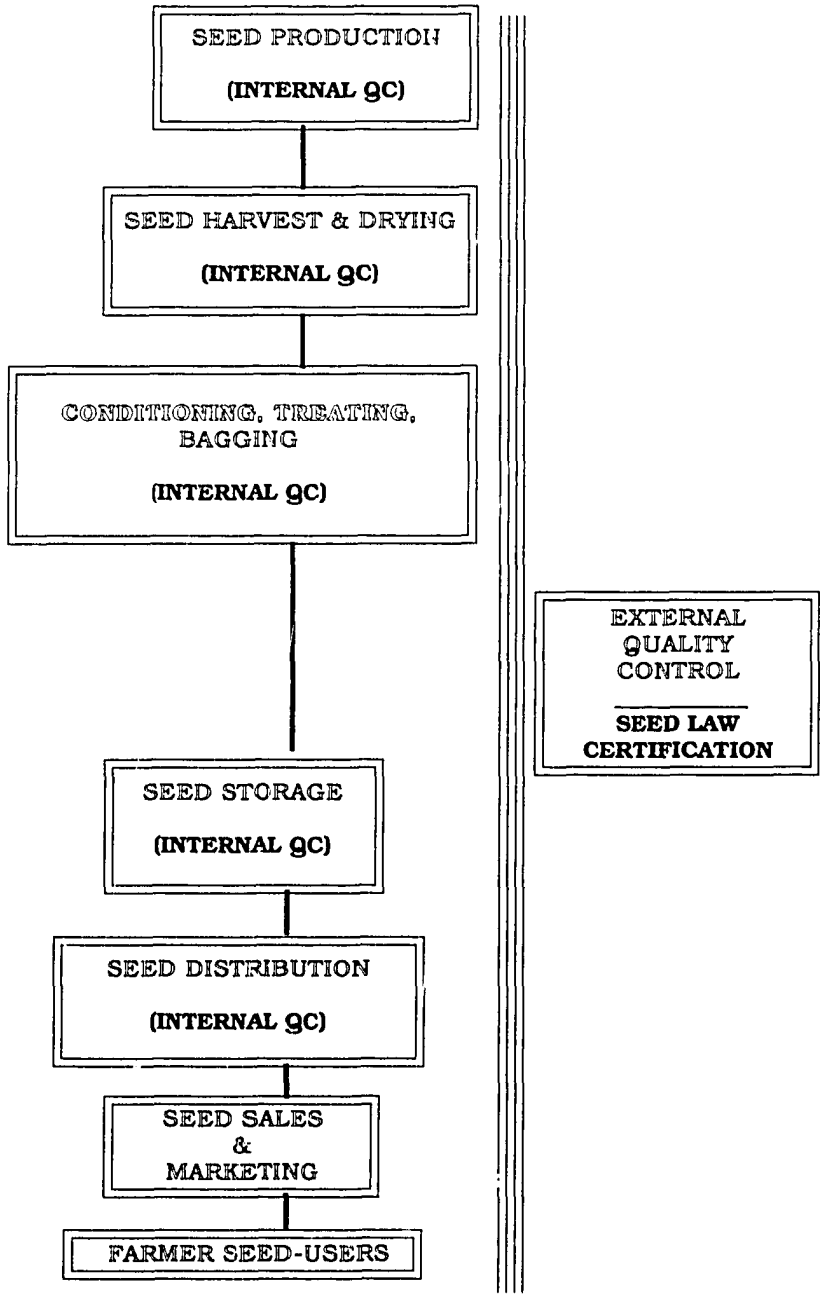
D. Help to farmers to be sure seed is truly labelled and meets or exceeds specified standards, so they get seed of known quality.

SEED LAW

TheSeed Law must (1) satisfy current needs and ensure adequate supply of high-yielding seed; (2) provide stable, dependable long-range conditions to promote seed supply investment; (3) encourage seed industry development; and (4) prevent supply of low-quality seed.

The Seed Law should specifically concern seed, not general agriculture, and apply equally to all crops. It must be realistic, considering requirements of both suppliers and users. It must be practical in quality standards; if standards are too low, farmers have no confidence in the seed and it does not help increase yields; if standards are higher than are economically attainable, it either restricts supply or is ignored in actual practice.

FIGURE 5. *Operating relationships of internal and external quality control in the seed industry.*



To keep the Law current while maintaining dependable long-term policy, it should include 2 parts:

A. The Law or legislative act itself, is difficult and slow to change; agriculture constantly changes, and the Law must fit current conditions. The Law should include only long-term policy, objectives, intents, and guidance, and set the legal base for controlling and supporting seed supply.

B. Regulations or Ministerial Decrees under the Law, can be issued more quickly, so they should provide all required details and operating procedures within the Law's policy, to keep the Law current.

The Seed Law:

A. Covers all seed lots and bags, but not seed fields, offered for sale by anyone except farmer-to-farmer exchange which is not organized business. It covers all stages of distribution and marketing. It samples and tests seed for purity, germination, and proper labelling; sub-standard or mis-labelled seed cannot be sold.

B. Ensures that seed meet specified quality standards, to protect reliable seedsmen from unfair competition and farmers from bad seed. It promotes development of high-quality seed supply, and farmer use of higher-yielding seed.

C. Prevents spread of especially troublesome weed species, by designating them as prohibited or restricted noxious weeds, and limiting their occurrence in seed.

SEED CERTIFICATION

The Seed Law covers only seed offered for sale; Certification is a special quality control system to provide higher genetic purity and seed quality by covering all aspects of seed production: (1) controlling generations or classes of Certified seed; (2) limiting generations of seed multiplication; (3) setting special standards of high seed quality; (4) emphasizing genetic (varietal purity) quality; (5) inspecting fields and facilities, and testing seed to verify genetic quality/purity/germination/identity; (6) uses special identifying tags and labels. Seed Certification is especially suited to maximize the yield effect of improved varieties and high-quality seed, and help develop a quality-oriented seed industry. It is the best means of getting genetic research developments to farmers. Certification should be initiated and scrupulously maintained at high quality levels with sound technical operations conducted in a way which encourages seed industry development.

INITIATING IMPROVED-SEED SUPPLY

Farmers do not automatically seek and buy high-quality but higher-priced seed; few farmers understand seed quality and how it benefits them. Farmers are not interested in government plans or academic ideals; their interest is in their family's wellbeing and income. Government must take the lead, educate farmers in the personal benefits of improved varieties and seed, conduct demonstrations and

training, and initiate supply of high-quality seed. Properly done, this builds farmer demand for improved seed and demonstrates a business opportunity which the private sector can enter.

Government always initiates seed supply and demonstrates benefits, successful procedures, market potential, etc. As the private sector develops, government programs can be dismantled (rarely transferred successfully) by stages, so profit-making seed operations are transferred to the private sector without disrupting seed supply to farmers. The cost of phased-out facilities is a small price to pay for initiating efficient seed supply, especially as most such facilities serve their normal useful lifespan before they can be phased out.

SUPPLYING "NON-PROFIT" SEED

Some crop seed do not provide an adequate profit margin, and are not handled by private-sector seed firms. However, national food production requires assured supply of high-yielding seed of these crops. Government must supply such seed.

GOVERNMENT SEED SUPPLY

Government must ensure that all farmers, of all income levels, receive high-yielding seed for all crops of national interest or with market demand. The private sector will never produce total seed needs of all crops; government will be forced to maintain some seed production. However, government seed production/supply should never compete directly with private-sector suppliers. Government seed supply should:

A. Maintain reasonable prices, avoiding a price differential with seed from the private sector.

B. Supply only "non-profit" seed and seed not provided by the private sector. Government should NOT produce or supply seed of the same kind/variety as the private sector, or which competes directly with private-sector seed. As private-sector production expands, it is to government's advantage to curtail its production.

C. As much as possible, use private-sector merchants to distribute its seed. Distribution, especially involving farmer credit, should not be limited to government agencies. Farmer credit for seed purchase should not favor government seed; the farmer must have complete freedom of choice as to the registered supplier from whom he buys his seed.

D. Due to low income, low education, etc., some farmers are not "in the cash market" for improved seed. The private sector must make a profit, and cannot subsidize low-income farmers. The result is that the most-needy farmers do not have access to cash-purchased high-yielding private-sector seed. To maximize national food production and raise income of this bottom group of farmers, government, through special projects, should provide them with seed at low cost or even free, but ensure that such seed is used only as intended. Government usually produces such seed in its programs which produce other seed kinds; if possible and more economic, it may purchase such seed from the private sector and subsidize supply to special farmer groups.

TAXES ON SEED

Seed are an input vitally important to domestic food production; they should not be taxed, except standard sales tax. Seed of priority crops should be exempt from sales tax.

SEED INDUSTRY CREDIT

The seed industry requires heavy investments in facilities, operating costs and seed inventories. Government must ensure long-term and short-term credit at concessional rates for registered seed producers, conditioners, suppliers, distributors and retail merchants, with concessional collateral requirements. Concessional credit rates demonstrate government priority to seed supply, encourage private-sector firms to invest in seed supply, and help farmers get yield-increasing seed at lowest cost.

CREDIT FOR FARMER SEED-USERS

For farmers to produce the highest possible food crop yields, they must have ready access to credit at reasonable rates, to purchase seed; to develop a seed industry, there must be a real market for seed. Readily-available credit at low rates should let farmers choose their seed and seed supplier; for example, a voucher to exchange for a given amount/kind of seed at any registered seed supplier. This helps develop a private-sector distribution system, brings local merchants into the improved seed program, and increases use of high-quality seed.

EDUCATIONAL PROMOTION—GETTING FARMERS TO USE HIGH-QUALITY SEED

To build a real market which the private sector can supply, farmers must be educated on the value of improved seed—to them, not to government targets. This requires intensive, ongoing extension education/promotion using every mass-media, group and personal contact means to educate farmers on benefits of high-quality seed, how to find it, and make them want to use it. Improved seed must be a part of every crop production/promotion program.

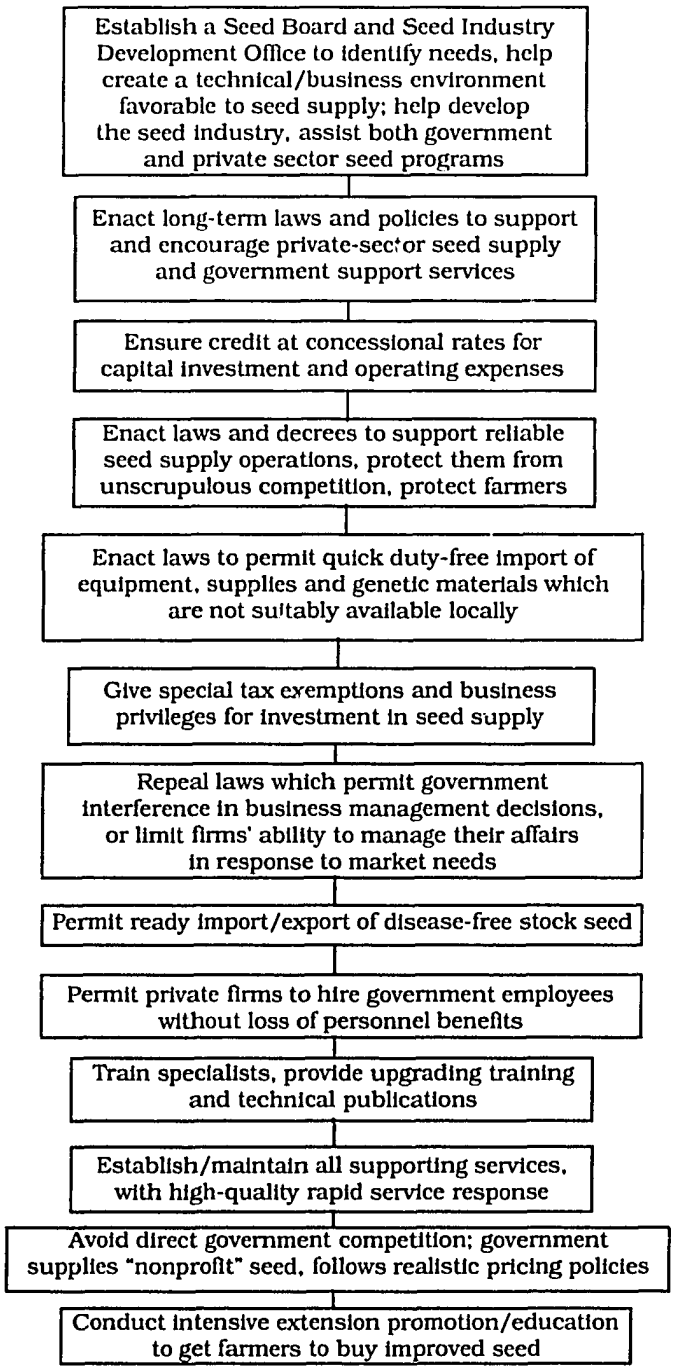
TECHNICAL AND OPERATING SUPPORT

After creating favorable business operating conditions, government must establish and maintain a realistic, reliable and accurate base of supporting technical services and activities.

GERM PLASM COLLECTION AND MAINTENANCE

Breeding new varieties requires a wide range of well-tested and catalogued genetic materials. An extensive collection of domestic and foreign germ plasm must be maintained in safe long-term storages, re-multiplied, tested, catalogued, and supplied freely to qualified government and private-sector breeders.

FIGURE 6. ***Government actions required to establish a favorable business environment to support stable, profitable private-sector seed supply.***



CROP RESEARCH AND VARIETY DEVELOPMENT

High food production requires a continuing flow of improved varieties and hybrids. Strong ongoing research and variety development is essential, with close links to the seed industry and extension to help identify farmer needs, develop suitable varieties, multiply pure seed, and transfer research developments to farmers in the form of seed. Private seed firms should be encouraged to conduct research and variety development, and genetic materials and data should be freely exchanged.

Crop production research—agronomic practices, pest and disease control, irrigation, crop management, etc.—must be improved, along with genetic developments. Special research is needed on producing and managing seed crops.

VARIETY TESTING

New varieties should be released, and old varieties discontinued, only on the basis of performance in intensive, realistic field trials in all production areas. Testing is a necessary public service by government. Three years' testing results should be required to avoid releasing deficient varieties.

To ensure consistent performance and reliable evaluation of varieties released for farmers, tests should:

A. Be conducted in all areas where the variety will be used.

B. Be managed and harvested by the same methods farmers use.

C. Handle varieties from both government and private-sector programs equally, without bias.

D. Speed up release of new materials by standardizing testing procedures in government and private breeding programs, and accept1 year of testing in a breeder's program as part of the 3-year testing requirement.

E. Test a specified number of lines from a private breeder free of charge, with only a token charge for additional lines. The purpose of testing is not to make a profit, but to identify varieties which benefit farmers and national food production.

VARIETY RELEASE AND RECOMMENDATION

Approval, release and recommendation of superior new varieties should be (1) done quickly to get new varieties to farmers, but with enough test data to prevent inadvertent release of varieties with potential problems; (2) without bias as to the source of the variety; (3) handled by a formal release committee which includes representatives of all concerned agencies.

A release committee is essential to: (1) receive new variety proposals; (2) evaluate test data to determine variety performance and fit to identified needs; (3) recommend release or rejection; (4) maintain a register of approved varieties; (5) guide seed Certification of recommended varieties; and (6) publish a list of approved varieties, with detailed descriptions.

The committee should include representatives of government research agencies, Seed Certification and Seed Law agencies, government and private-sector seed programs, agricultural extension, and firms which buy/market/process commercial crops.

A new variety is useless if pure seed do not reach farmers; the seed system must supply adequate amounts of pure seed. The Release Committee should help ensure that seed is ready when the new variety is released; this requires (1) pre-multiplying Breeder, Foundation and Registered seed during final testing stages; and (2) advance planning of release and seed Certification, so pre-multiplied seed are Certified; (3) Certified seed should be ready for farmers when the variety is released; (4) if the variety is not released, the pre-multiplied seed is not be used for planting.

VARIETY DESCRIPTION

Pure seed can be produced only by careful field roguing to remove offtypes before they contaminate the seed, and careful inspection to be sure standards are met. Inspectors and roguers must be able to identify offtypes in the field. Breeders and agronomists must provide detailed variety descriptions of agronomic traits and morphological characters adequate to guide roguing and inspection. If necessary, genetic markers should be included in new varieties so pure seed can be produced.

VARIETY PROTECTION

Time, money and technical effort go into developing higher-yielding varieties. Government conducts research as a public service, but many private seed firms breed useful varieties, if they can earn an income on their investment. The breeder's right to benefit from his work should be protected, so farmers can benefit fully from his improved variety. Protection such as under UPOV, the international organization to help protect breeders, helps farmers get the best possible varieties. Varieties developed by both government and private programs should be protected; government can license seed production of its varieties to private seed firms.

SEED TECHNOLOGY RESEARCH

Many technical, operational and economic problems affect seed supply. Seed technology research is needed to develop preventive measures and solutions, and improve industry efficiency and quality. Basic concepts and research developments in other countries can be adapted to fit local needs; local research should concentrate on specific problems encountered here, and develop practical solutions for problems encountered under local conditions. The seed industry and agro-economy are not yet to the stage where basic research in seed technology is justifiable use of national resources.

IMPLEMENTING THE SEED LAW

The Seed Law is useless if not properly and equitably implemented on all seed sold through commercial channels. Implementation requires a special agency of highly-trained staff with adequate transport, budget and authority. All seed in all storages and sales placess of government and private sector agencies should be sampled and tested at regular intervals, and meet Seed Law requirements. Seed must be inspected and tested by:

—uniform, complete sampling and inspection methods
—standardized, repeatible testing methods
—unbiased enforcement of compliance with standards

SEED TESTING LABS

All seed lots must be properly sampled and tested to be sure they meet quality standards and are accurately labelled.

Seed Certification and Seed Law enforcement must be supported by seed testing laboratories which can make accurate, reliable and repeatable tests, and report test results quickly. Official or registered testing labs which perform official tests used for Seed Law and Certification implementation must (1) use standardized procedures for accurate, repeatable test results; (2) have adequate properly-operating equipment; (3) have highly-trained analysts; (4) have adequate supplies; (5) be strategically-located so samples can be delivered quickly.

In operation, service testing labs should (1) complete purity tests and begin germination tests within 24 hours after the sample is received; (2) report test results within 24 hours after germination test is completed; (3) test samples for all agencies—inspectors, seedsmen, farmers, etc.; (4) test seed free for farmers; (5) test a certain number of samples free for any seedsman; and (6) be able to test and recommend conditioning requirements.

There should be a national network of official service-testing labs with at least 1 in every Governorate, so samples can be delivered quickly, tests completed quickly, and results reported quickly.

REFEREE TESTING/ TRAINING

A strong Referee Testing/Training Lab must train and guide testing labs and analysts so they use uniform procedures and get accurate results which can be repeated by other labs within accepted tolerances. Without such testing, there cannot be a strong private-sector seed supply. The referee lab continuously guides and checks all labs and analysts by training, preparing procedures manuals, and sending referee samples to check on testing; 5% of all tests in all labs should be referee check samples, until all analysts use uniform procedures and evaluations.

IMPLEMENTING SEED CERTIFICATION

Certification must provide strong, competent and all-inclusive technical guidance to all phases of seed production and supply (Figure 7). A strong Certification agency, with an office in each Governorate, is needed. It should have adequate highly-trained personnel, transport, facilities and operating budgets to inspect every seed field properly and at the right time, and sample seed lots at all locations. Inspectors should be highly-qualified, reliable, competent, and authorized to inspect all fields, harvest facilities, storages, conditioning plants and seed lots.

FIGURE 7. *Seed Certification quality control activities in different seed industry operations.*

IN SEED PRODUCTION:

- Requires specific eligible planting seed
- Requires specified field cropping history
- Requires isolation to prevent contamination
- Inspects fields, requires specified standards
- Requires complete labeling of seed

IN SEED CONDITIONING:

- Requires specified conditioning facilities
- Inspects plant clean-up before conditioning
- Requires/inspects clean, safe storages
- Requires complete labelling of seed
- Requires complete records

IN SEED TESTING:

- Requires sampling/testing of cleaned seed
- Requires testing in official labs

IN SEED BAGGING & LABELLING:

- Requires complete labelling of seed
- Provides specific labels for each generation

IN SEED DISTRIBUTION:

- Requires safe storage/handling
- Requires complete labeling
- Requires regular retesting of carryover seed

CONDITIONING SERVICES

All seed must be conditioned; however, seldom can a new private-sector seed firm, especially a smaller one established locally, afford the major expense of a seed conditioning plant in its first few years of operation. This is especially true when equipment import is difficult and design engineering is not available. As a developmental assistance service, government plants often provide "custom" conditioning for private-sector firms, at a per-ton charge. Once the firms develop adequate turnover and feel secure in making the investment, they can install their own plant. In the meantime, government should have modern efficient plants with adequate capacity to help the private-sector develop.

BREEDER AND FOUNDATION SEED

Adequate Breeder and Foundation seed of high genetic quality must be supplied; this requires special programs with adequate facilities and operating funds, to produce them under special conditions of isolation, inspection, roguing, handling, etc. For adequate timely supply without shortage, seed for several seasons is produced in one season and held in long-term conditioned storage. As needed for sale/planting, seed is removed from storage; when stored stocks are reduced to a certain level, a new crop is produced. Specially-organized government units, staffed with highly-competent staff trained in breeding, agronomy and seed technology, usually produce these seed classes, especially of publicly-developed or introduced varieties.

Foundation seed and inbred lines should be available to private seed firms at reasonable cost.

REGISTERED SEED

Registered seed of O-P varieties is required to plant Certified seed fields. Registered seed must be produced and handled under controlled conditions and carefully inspected at all stages, to ensure maximum quality.

CERTIFIED SEED

Enough Certified seed of O-P varieties and hybrids should be produced to supply all farmers who wish to plant it, and ongoing promotion maintained to encourage all farmers to plant high-quality Certified seed. All fields should be carefully rogued/detasseled/inspected, and all handling/conditioning/storage inspected and supervised. The Certification agency is usually a government entity; as the seed industry develops, it helps growers and private-sector firms achieve the high seed quality required for high yields and to develop farmer confidence.

PRIVATE-SECTOR MULTIPLICATION OF GOVERNMENT-DEVELOPED VARIETIES

Most research and variety development is by government, at least until agriculture and the seed industry is highly developed. To ensure adequate supply of pure seed to farmers, government should provide adequate stock seed to private-sector seed firms which multiply seed for farmers. This may be done either by (1) contracting with one or more specific private seed firms, under specified conditions, to be sole multipliers and distributors of seed of specific varieties; or (2) supplying stock seed freely to any firm which wishes to multiply seed.

STANDARDS Standards for seed fields and lots must be established, and must assure high seed quality for farmers, yet be realistically achievable by seed producers. Standards must be flexible, improved as technology improves, and lowered temporarily to meet seed shortages. Changes should be made after careful study and full discusssion.

INSPECTIONS Each seed field, Certified or non-Certified, must be regularly inspected by the internal quality control program. Certified seed fields are also inspected by the Certification agency at the proper times to compare its quality with the standards to accept or reject it. Field inspectors must be highly-trained, honest and able to make accurate inspections and work long hours during the season. Government must provide training, variety descriptions, procedures, standards, etc., to ensure good inspectors and inspections.

COORDINATING AND GUIDING SEED SUPPLY

A seed industry can be effective and cost/quality-efficient only when it is bi-sectorial; i.e., includes a complete range of government public-service and support operations, and private-sector commercial operations, all well-coordinated with close intercommunication.

COORDINATION AND COOPERATION Close coordination and cooperation among both sectors and all agencies requires several intercommunication measures, regularly and properly maintained:

A. A national-level Seed Industry Organization—Committee, Association, Club, etc.—which regularly brings together all involved agencies, keeps them advised on current conditions and new developments, provides a forum for discussing needs, improvements and developments to help the seed industry serve the country better, and speak with one voice for the seed industry.

B. Annual conferences of the entire seed industry, to discuss common problems, research and technology developments, advice to and assistance from official agencies, promote seed use and industry interests, etc.

C. A regularly-issued Seed Industry Newsletter (most likely by the Seed Board) to distribute current information.

D. A technical seed journal, with regular reports of seed research and technology developments.

E. Agricultural extension seed specialists in every Governorate, to help (1) include improved seed in crop production practices, (2) seed suppliers reach farmers who need seed, (3) farmers find the seed they need, and (4) seed growers with technical matters.

MANAGEMENT INFORMATION

Anything affecting agriculture affects seed supply. Up-to-date information must be available to all agencies, to help seed managers make realistic decisions. A government agency should regularly collects statistics on farmer seed needs, seed available, etc., and distribute it quickly to all concerned agencies.
To help provide up-to-date internal management information, government should help develop an integrated, computer-based record-keeping and reporting system and make it available to government and private-sector seed operations.

IMPLEMENTING IMPROVEMENTS AND PRIVATIZATION

Many activities, operations, and agencies are required for a stable industry which can support privatization and supply high-quality seed when farmers need them. All cannot be implemented immediately; time is required to train persons, help them understand their role and how to fulfill it, get funding, implement facilities and activities in a manner which fits the local situation so it can work effectively, etc.

An effective seed industry, with government support activities and private-sector commercial activities, can best be implemented in phases according to the technical nature and sequence of each activity, and when conditions are ripe for it. The essential activities include three types of activities or phases:

A. Determining details of seed needs, use, benefits from improved seed, present, supply, etc. (Figure 8).

B. Determining detailed infrastructural developments required (Figure 9).

C. Implementing the improvements (Figure 10).

FIGURE 8. ***Phase 1 of developing an efficient seed supply industry: identifying the benefits of improved seed, seed needs, supplies, existing infrastructure, and production potentials.***

PHASE 1. DETERMINE THE NEED: SURVEY, COMPILE, ANALYZE:

1. National needs for food, fiber and feed.
2. Present crop yields, production levels and total production.
3. Imports of food, feed and fiber.
4. Use of improved inputs, seed and varieties.
5. Sources and quality of seed used by farmers.
6. Seed industry and farmer credit sources, use and costs.
7. Sources and release frequency of improved varieties.
8. Existing seed infrastructure, facilities and staff.
9. Seed infrastructure constraints and needs.
10. Existing seed laws, decrees and other regulatory measures.
11. Existing laws affecting private-sector seed business.
12. Existing incentives to encourage seed or other private investment.
13. Areas with suitable climate, agriculture and infrastructure to produce seed.
14. Sources of equipment, supplies, etc.
15. Potential for exporting high-quality seed.

FIGURE 9. ***Phase 2 of developing an efficient seed supply industry: determining existing infrastructure, what is needed, how it can be obtained. paid for, and operated.***

PHASE 2. SEED INFRASTRUCTURE REQUIRED: DETERMINE AND IDENTIFY:

1. Potential use and need for high-yielding seed.
2. Potential yield increases from high-yielding seed.
3. Seed infrastructure needed.
4. Seed facilities needed.
5. Trained seed staff needed.
6. Available sources of technical training.
7. Seed quality control systems needed.
8. Seed operating needs.
9. Budgets needed and potential sources.
10. Potential private-sector participation.
11. Government participation required.
12. Sources and cost of credit for private-sector seed operations.
13. Legislative/support measures needed to attract the private sector.
14. Local and foreign potential investors.

FIGURE 10. ***Phase 3 of developing an efficient seed supply industry: implementing the needed infrastructure and improvements.***

PHASE 3. INSTALLING AND IMPLEMENTING THE INDUSTRY/SYSTEM TO SUPPLY HIGHER-YIELDING SEED: PLAN, DESIGN, SET UP, INSTALL AND OPERATE:

1 Implementing agencies.
2 Implementing organizational structure.
3 Financing, budgets, and fiscal procedures.
4 Staffing and staff training.

5 Procurement, construction and installation.
6 Technical assistance.
7 Operating, records and reporting systems.
8 Credit for farmer seed-users and seed programs.

9 Incentives for private-sector investment.
10 Basic legal and long-term policy support.
11 Government technical support operations.
12 Required legislation, decrees, etc.

13 Training programs, facilities, manuals, staff, schedules.
14 Information flow systems.
15 Seed Law implementation system.
16 Certification implementation system.

17 Seed extension promotion system.
18 Seed export/import system.
19 Germ plasm exchange system.
20 Stock (Breeder, Foundation, Registered) seed supply system.

In actual practice, a seed industry never develops from a "zero point"; some infrastructural components always exist already. They must be incorporated into the overall infrastructural development. Thus, some activities from all three developmental phases can be carried out at more-or-less the same time.

ORGANIZATION OF A BI-SECTORIAL NATIONAL SEED PROGRAM

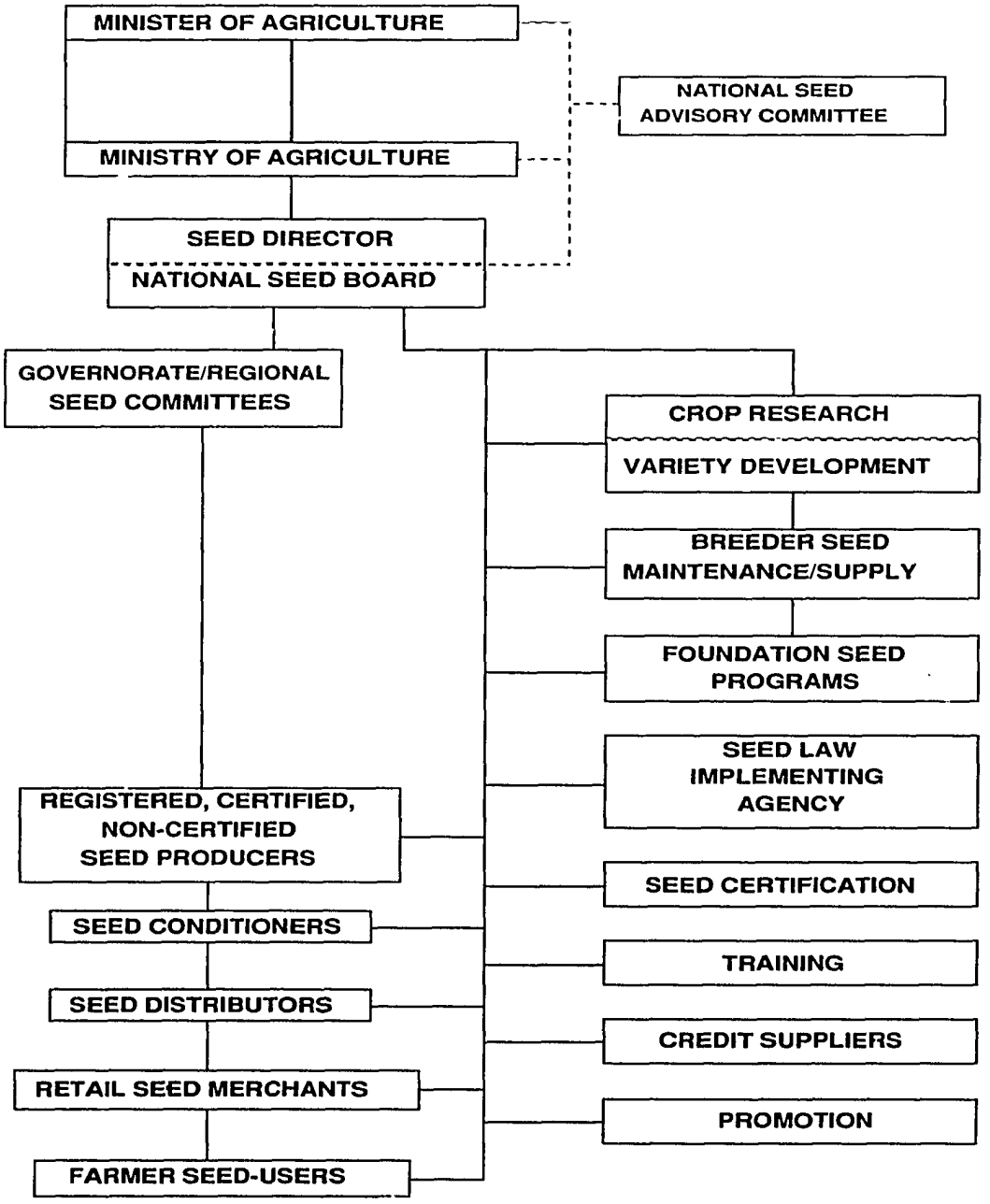
OVERALL SEED INDUSTRY STRUCTURE

Although it is not centrally controlled, the entire seed industry infrastructure—government and private sector—must be organized and structured so all agencies can cooperate and all operations fit in a cost-efficient time sequence, support each other, and function profitably. Government must plan an overall infrastructural relationship so it can direct its own activities most effectively and best-support private-sector participation. Figure 11 shows a function-oriented infrastructure suitable for Egypt. Figure 12 shows an infrastructure of detailed activities, with possible implementing agencies. The concept followed is to have the minimum number of government agencies involved in seed, in order to maximize emphasis on the private sector. Their internal structural organization is designed to allow them to conduct technical operations independently, so that field and seed quality is the sole factor involved in accepting/rejecting them.

Organizing Seed Testing Labs

The essential Service Seed Testing Laboratories can be organized (1) within the Seed Law Enforcement Agency, or (2) separately, but with close operating ties. Within the Seed Law Enforcement Agency is perhaps most efficient, as it requires only a single administration, staff, facilities and administrative overhead. A major benefit is that lab analysts and field/seed inspectors can exchange work—i.e., analysts make inspections and draw samples, inspectors analyze samples—so each understands the conditions and problems of the other. Also, staff can do double-duty during rush seasons.

FIGURE 11. *Function-oriented organizational structure of a National Seed Program, with government providing essential support services and the private sector handling market-oriented activities*



ORGANIZING SEED LAW AND SEED CERTIFICATION IMPLEMENTATION

SEPARATE OR SINGLE AGENCIES

Both Seed Law Enforcement and Seed Certification are quality control systems; they handle somewhat different aspects, but have many similarities and some overlapping activities. Both may be implemented by the same agency, or each implemented by a separate agency. So long as their technical activities can be implemented completely, properly, and at the right time, the organizational structure depends on what is most efficient under local conditions. Separate organizations require separate staff, budgets, and equipment; a single combined organization can use the same staff, budgets, and equipment, but more are required (Figure 13).

RELATIONSHIPS WITH PRODUCTION

In early development stages of a seed industry and quality control systems, it is fairly common for the Certification agency to be a unit in the same government agency which organizes seed production. Concentrating seed activities within a single agency is good management and is done in a number of countries; quality control works well so long as inspectors are free to accept or reject fields and seed solely on quality. This organizational approach is especially good management under conditions such as in Egypt, where the agency (CAS) which coordinates seed production does not actually produce seed, but rather contracts with farmer-growers and supervises their operations; it is not a producer, but an organizer/controller.

Completely-separate organizations require higher investment in trained staff, vehicles, operating funds, etc. Complete separation is neither wise nor possible in a developing seed industry until adequate budgets, trained staff, and facilities are available, and the volume of work is adequate to justify the necessary costs.

ORGANIZATION IN A DEVELOPED SEED INDUSTRY

As the seed industry develops and more firms are involved, the Seed Law and Certification can be separated into a distinct unit, although still within the government seed development agency, which has different and operationally-separate units for variety release, stock seed maintenance, quality control, production of "non-profit but essential" seed, etc.

GETTING STARTED

Outside technical assistance is essential to develop and transfer adequate technology, and should be available from early stages. However, it must be planned and implemented by local staff (with full support and cooperation of technical specialists) who understand how the technical operations can be fit into local contexts, modifications required in existing regulations, and how—and how much—can be changed. To initiate development, the main first requirements are (1) **active local managers** who initiate studies, **take action**, and implement improvements; and (2) **high-level administrators** who recognize the need for improvements, and **support/assist** development efforts. Essential steps in getting started include:

A. Send promising younger staff abroad for in-depth academic technical training; send middle-level managers abroad for intensive short-term training. When they return, give them maximum freedom in helping plan, install and implement improvements.

B. Appoint competent, active committees of local management/ technical leaders to study each aspect of the seed supply infrastructure (from variety release to extension promotion) and make recommendations. Technical consultants may work with and advise them, but local staff should make up the committees.

C. Combine committee recommendations into a plan of action, and secure government approval. Get government and foreign development assistance in financing, organizing and implementing the program.

D. Re-organize the program—in a workable way—to establish an improved infrastructure, and begin implementing improvements in staff/equipment/facilities/operations. The final organizational structure cannot be established immediately; it seldom works until all required components are in place. Rather, organizational structure should be an evolving process, regularly improved as technical and operational developments permit.

A WORD OF CAUTION!

Sometimes impatience and enthusiasm—especially from expatriate consultants familiar with advanced industry conditions but lacking understanding of local operating requirements—result in changes and moves toward privatization before people and conditions are ready. These seldom are effective in the long-range.

Privatization cannot be "force-fed"; premature responsibility dumped on the private sector, before support activities and agro-economic conditions are ready and in activities they are not free to plan, can only disrupt seed supply and food production. Premature or forced privatization causes inefficiencies, increased costs in national resources, and disruptions in seed supply and food production. Government must first lay the base for successful private-sector seed supply with supportive laws and policies, training, technical support services, creating farmer awareness, and many other activities. Then, active governmentsupport and encouragement can develop effective private sector seed supply.

Go; go fast, but go carefully!

FIGURE 12. *Infrastructural organization showing possible agencies to implement different essential activities.*

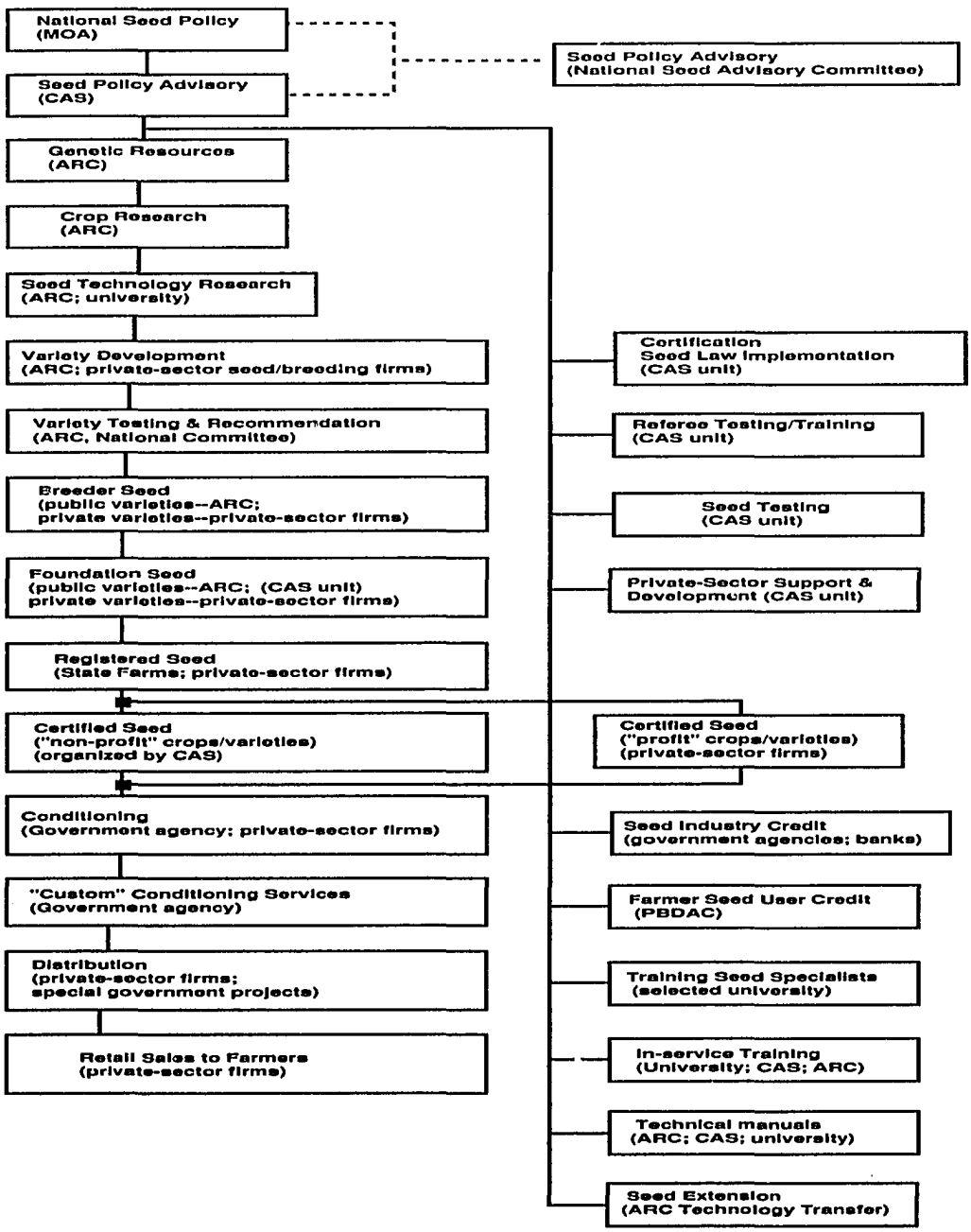


FIGURE 13. *Alternative organizations for the Seed Law and Seed Certification.*

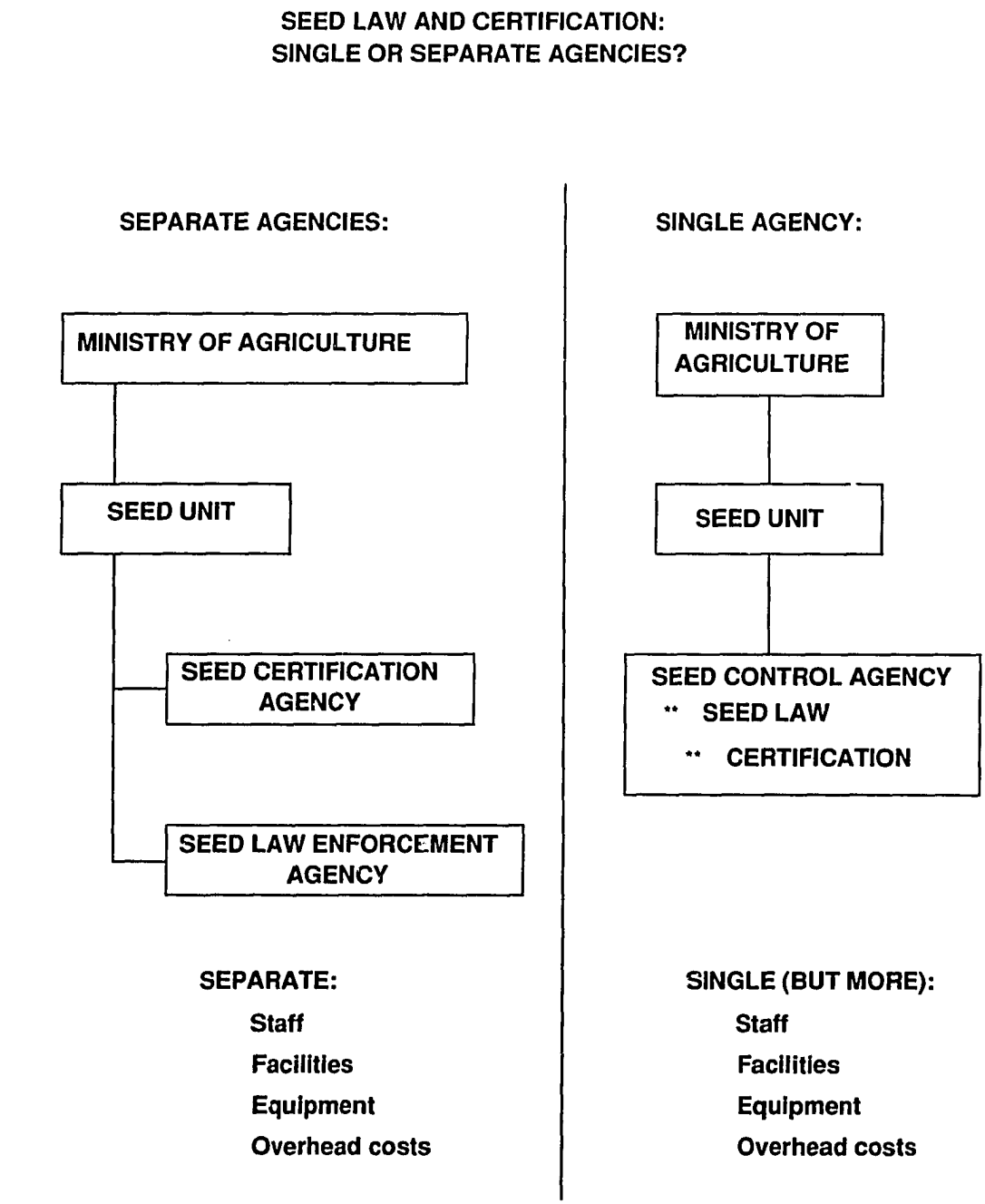
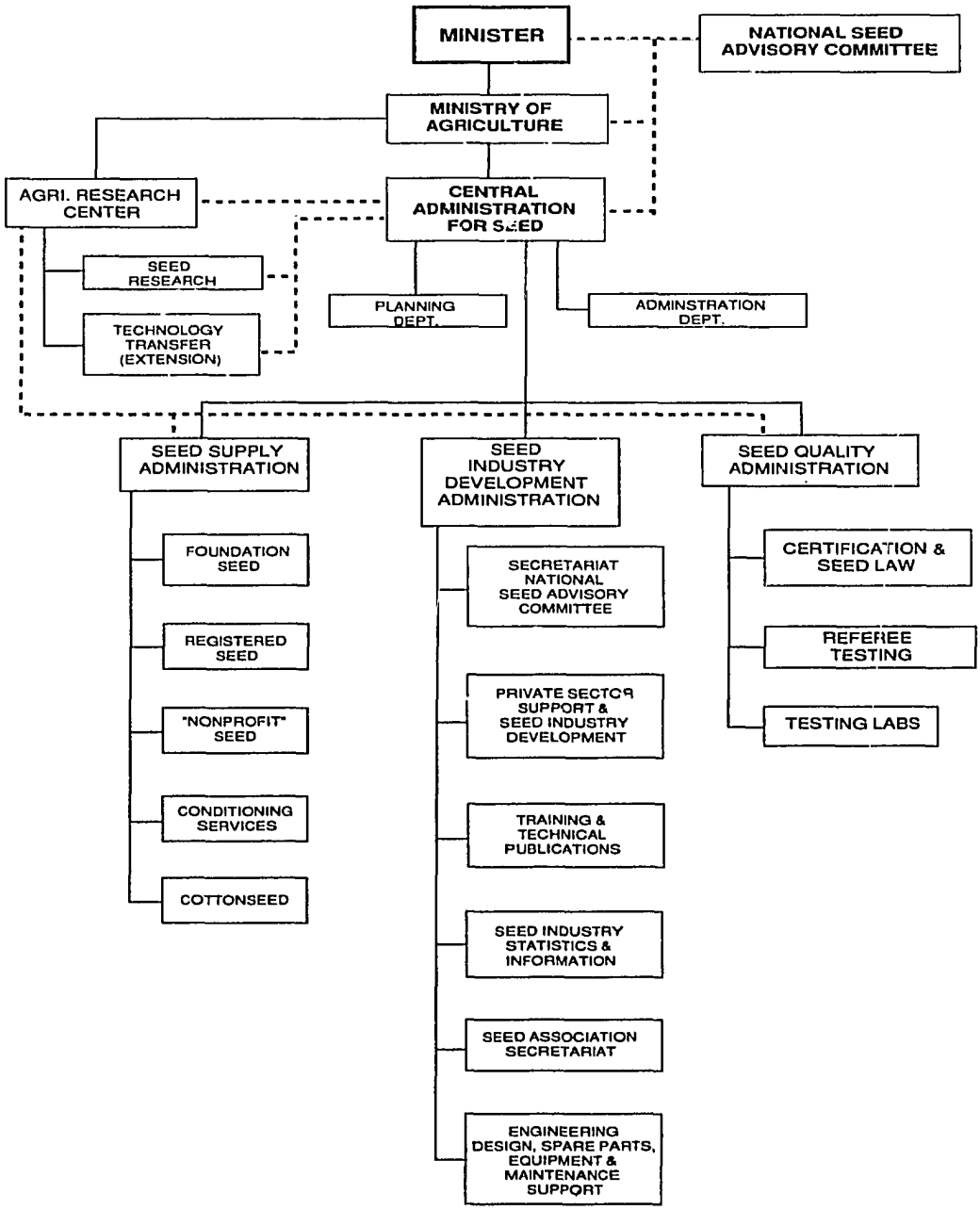


FIGURE 14. ***FUNCTION-ORIENTED NATIONAL GOVERNMENT SEED ORGANIZATION, USING CAS AS THE NATIONAL SEED BOARD WHICH IMPLEMENTS GOVERNMENT'S SEED POLICY AND SUPPORTS THE SEED INDUSTRY.***



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- *Quarterly Report* (January - March, 1987)	2
- *Implementation Workshop - Proceedings* February 9-17, 1987	3
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