

## **SESSION 2**

*On the agricultural mechanization development in African Countries.  
Strategies and roles of the private sector and Governments*

# **On the agricultural mechanization development in African Countries. Strategies and roles of the private sector and the governments.**

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## **1. Introduction**

Tools, implements and powered machinery, are essential and major inputs to agriculture; it can be argued that they are one of the most important. The term “*Mechanization*” is generally used as an overall description of the application of these inputs. There are three sources of farm power utilized for these tools, machines and equipment; manual (human), animal draft and motorized power. In many developing countries up to 80% of farm power is provided by human beings. In most developed countries human beings are used less and less as a source of power and more for machine operation and control.

The level, appropriate choice and subsequent proper use of mechanized inputs into agriculture has a direct and significant effect on achievable levels of land productivity, labour productivity, the profitability of farming, the environment and, last but not least, on the quality of life of people engaged in agriculture.

In most cases, in a situation where the expansion of agricultural land is limited, the application of advanced tools and machines does not, by itself, lead to increased unit yields. However, the full benefit achieved through the use of many advanced crop husbandry inputs such as improved seed, fertilizer, and pesticides, as well as increased use of irrigation water cannot be realized without the use of improved tools and machines. Only under certain conditions, where production increases achieved through the use of other improved inputs has come to its limits, can improved tools and equipment by themselves lead to production increases, cost reductions or improvements in the environmental sustainability of farming. In situations where land is not a constraint, increased farm power can lead to direct increases in production by simply increasing the land area or animal numbers that one man can handle.

In the past, misunderstood concepts and inappropriate selection and use of certain mechanization inputs (mainly tractors and heavy machinery) have, in many parts of the world, led to heavy financial losses and lowered agricultural produc-

tion as well as contributed to environmental degradation. In many developing countries, ambitious politically motivated tractor schemes have often become a burden to the national budget and the farming community rather than being a productive input. This has also been the case in some centrally planned economies, where mechanization was heavily subsidized through the provision of government planned and operated machinery services. Similar models of government provision of services have been tried in many developing countries. In every case these government run services have failed to provide timely and profitable mechanization inputs to farmers.

The development of “appropriate” or “intermediate” machinery, tools and equipment is also a favourite subject for development assistance. The activities of these projects has generally taken place in the relative isolation of government and university departments and workshops. The resulting prototypes only occasionally find their way into commercial production and onto the market. Displays of improved machines and hand tools which have never been developed and marketed beyond the prototype stage can be found in virtually every workshop in University and Government Departments of Agricultural Engineering in developing countries.

Further examples of misapplied mechanization inputs can be found in many technical co-operation projects, which were mostly planned and implemented with the best intentions but in an uncoordinated way and without due consideration of sustainability and economic aspects. It is an unfortunate fact that only a very few mechanization projects aimed at “transferring” technology to developing countries can claim to have been completely successful.

## **2. The Role and Place of Mechanization**

In many developing countries as well as in previously centrally planned economies, what is very often not clearly understood or accepted is that, despite its high cost and high profile, mechanization is an input like any other such as fertilizer, seed and crop protection chemicals. It is one of a number of management tools a farmer has available to maximize production and profit. Therefore, as more and more governments have turned to a free market economy, it is no longer appropriate to have a separate *policy* to mecha-

nize except as a policy instrument contributing towards the realization of broader agricultural policy. To have a policy to 'mechanize' would imply that the introduction and expansion of mechanized inputs is an end in itself. In reality it is only one of a number of inputs that a farmer uses for the purpose of agricultural production.

However, there are many other Government policies which affect the way in which mechanization inputs are made available and will determine the effectiveness of the sub-sector. Examples of such policies are those which affect privatization and the market. In a free market economy the amount and choice of mechanization inputs is demand driven, whereas in a planned economy it is supply driven. Mechanization should not be an end in itself and therefore, in a free choice situation, Governments should refrain from making policies which will stipulate by which means or by how much, agriculture will be mechanized. ***The type and degree of mechanization should be decided by the producer to best suit his business and his own particular circumstances, and the choice of suitable methods will therefore be just one of a number of choices that the farmer has to make.*** The decision on if, and how to mechanize is often a complicated mix of reasons with economic reasons paramount.

### 3. Agricultural Mechanization Strategy

Within general agricultural policy, governments develop strategies to achieve policy objectives. A strategy on mechanization should be just one of a number of strategies leading to the achievement of overall government policy. The Agricultural Engineering Service (AGSE) of FAO commenced work several years ago in the field of Agricultural Mechanization Strategy formulation and studies have been carried out in countries in Latin America, Africa, Asia and Eastern Europe. Over time, with the changes occurring due to the implementation of structural adjustment programmes, the concepts of Agricultural Mechanization Strategies have been further developed and adapted.

The philosophy behind the Agricultural Mechanization Strategy work of AGSE is that national governments should provide the basic conditions for a largely self-sustaining development of the agricultural sub-sector of mechanization within a policy of minimum direct intervention.

The purpose of any interventions should be clearly identified and should fall within the objectives of the strategy. However, that does not mean that agricultural mechanization can be neglected in the formulation of national policy. On the contrary, very special attention should be paid to the effects that other policies have on the level and use of engineering inputs in agriculture.

All the parties involved in strategy formulation as well as those parties subsequently affected by it, should be clear about the purpose of the strategy. Strategy is basically a plan of how to move from one situation to a new situation. It is therefore fundamentally important that everybody is clear what the new situation should be.

A typical formulation of Agricultural Mechanization Strategy will be comprised of several logical steps. The first step to be carried out is an analysis of the existing national farm mechanization situation. This will include national inventories, domestic manufacturing and assembly (tools, implements, tractors etc.), importation of farm tools and machinery, as well as descriptions of farming systems in relation to the use of farm power and their respective changes over time. This should lead to a statement of the ***existing situation***.

Secondly, ***policy issues*** which impact on farm mechanization are identified and an analysis of problem areas and constraints is made. This work is generally carried out in close co-operation with officials from the Ministry of Agriculture as well as other Ministries. Thus an awareness can be created of the implications of political measures on agricultural mechanization and further on agricultural production.

Thirdly, prior to formulating a strategy, it is important to define an (ideal) ***future situation***. The resulting strategy will be the definition of the actions required to move from the existing situation to the future situation. This will generally be divided into defining the respective roles of the private and government sectors. This is dealt with in more detail later in the paper.

Finally, the strategy document should clearly define ***follow-up actions and activities*** to assist policy makers and planners to implement the strategy. These follow-up activities generally consist of policy adjustments to correct distortions in the sub-sector, investment plans to develop manufacturing, commercial companies and farm mechanization, and definition of realistic and realizable government actions and activities required for the development of the sub-sector. For all the inter-

ested and involved parties involved in mechanization, there are several fundamental requirements for a thriving and sustainable sub-sector. The main groups of directly interested parties in the private sector are:

- Farmers
- Retailers and Wholesalers
- Manufacturers
- Importers

Virtually all mechanization inputs have to be paid for by the farmer and all have to be repaired and/or replaced on a regular basis. “Regular” might mean every year for a hoe or it might mean 10 to 20 years for a tractor. Also the farmer will have a requirement for “services”. This might mean something so simple as a nut and bolt, or repair of his hoe or a spare handle, or it might mean an oil and filter change for a tractor. On a similar basis, a retailer or small manufacturer (village shop or artisan) has to have access to supplies from a wholesaler; large scale manufacturers will need regular access to supplies and other inputs.

The fundamental requirement for a sustainable sub-sector is a strong linkage between these different parties and that all of them must be able to make a livelihood from their businesses. If one of these parties is not making a livelihood then the whole sub-sector will be adversely affected. In extreme cases there will be a total collapse. This has unfortunately happened in a number of developing countries; in others the sub-sector is barely functioning. The main objective of defining a Mechanization Strategy is to establish conditions which will ensure the free and undistorted development and operation of these linkages and the definition of actions which will allow this to happen. The role of government is to define a suitable policy environment as well as provide support activities in order to create these conditions.

### 3.1. The Existing Situation

#### 3.1.1. General Agricultural Situation

Generally speaking, the farmer level should be looked at first with a detailed analysis of the profitability of farming. If the farmer is not making money then he will have no surplus cash resources to purchase mechanization inputs nor any means of paying back any credit taken out to purchase farm machinery. It is necessary to identify the major farming systems in each of the regions of the country and the importance of farm mechanization in those systems and its potential to increase

productivity. The final stage in the preliminary analysis of farming systems is to collate the available statistics and studies for each of the farming systems indicating:

- the number of farms in each system;
- average farm size;
- dominant crop/livestock production systems, including types of crops and method of production;
- input use and production;
- farm power and equipment use;
- crop and livestock budgets;
- average farm incomes; and
- off- and non-farm income which should enable a preliminary identification of those systems where farm power is, or has potential to be, important.

#### 3.1.2. General Economic Situation

The collection of a selected number of general indicators of the status of a country’s economy, and its rate of development is also important. Typical data to be collected would be:

- Population and demographic trends
- Gross Domestic Product
- Wage Rates
- Rural Poverty
- Existing Goals, Objectives and Policies Relating to Mechanization
- Annual sectoral development plans
- Macro-economic framework - planning rules and procedures, foreign exchange regulations, trade regulations, pricing regulations, taxes, levies export and import regulations, quotas, tariffs, estimates of domestic demand or consumption.

Because most developing countries are predominantly agrarian societies, most national development goals, objectives and policies impinge on agricultural development and thus are likely to exert some effect on the sub-sector. A variety of documents should be requested at an early stage so that an evaluation of the impact of government policies can be made. In particular, it will be necessary to review the medium-term development plan and supporting documents.

In addition to the basic farming systems and the general economic situation, several related items should be examined wherever possible. These include gender issues and environmental issues.

#### 3.1.3. Supply Chains

It is important that the existing **Farm Machinery and Equipment Supply Chain** should be thoroughly investigated, clearly understood and

analysed. This will mean an in-depth collection of data about manufacturers, importers, artisanal activity, and national, regional and local distribution and retail systems. The analysis will lead to an understanding of the constraints and problems faced by the different individuals, companies and organizations engaged in these activities.

Constraints in the supply chain should be identified as well as the reasons for the existence of those constraints. If constraints exist, they will often be caused by the effects of one or more government policies. The identification and recognition of the effects of policy therefore forms an important part of strategy formulation. Special attention should be given to government activities and interventions in the sub-sector, particularly subsidies both direct and indirect and their effects. Other government activities in such areas as training, education, extension, credit, research and development as well as any external interventions (projects, NGO's, bi-lateral gifts, etc.,) should be identified. From this, a clear picture of the sub-sector and what affects it should emerge.

### 3.1.4. *Gender issues*

Women (and often children) play a very important role in many farming based communities; in some countries up to 80% of the total farm labour comes from women. Therefore gender issues should comprise an important part of any study, particularly in connection with farming systems and post-harvest processing. The analysis must include an initial breakdown of the major labour inputs on the basis of whether they are carried out predominantly by male, female or child labour and whether the labour source is the farm family, exchange labour, or hired labour.

### 3.1.5. *Environmental issues*

Mechanization can have both positive and negative impacts on the environment although it is the negative ones that tend to be most frequently highlighted. The positive effects include more timely field operations which will allow farmers to avoid having to work in fields when conditions are poor, more efficient use of water particularly in rice production, and better weed control. At the same time mechanization must be recognized as having the potential to create a negative environmental impact. Examples are the potential of mechanized agriculture to extend arable cropping into soils and climates which are unsuitable and the negative impact of land preparation technologies that are

easy to implement but result in soil erosion. The availability of machines also makes possible such practices as the mass promotion of the use of potentially hazardous chemicals for pest control. During the initial study it will not be possible to consider all of the potential environmental issues. However, those relating to specific types of mechanization should be identified, and possibilities for their amelioration considered.

### 3.1.6. *Supporting Institutions*

An identification of the various institutions associated with the agricultural sector in general, and farm machinery and equipment in particular should be carried out. A list of the types of institutions and likely available information is:

Credit - credit for farmers for the purchase and use of machinery but also commercial credit for companies to develop and manufacture machinery, as well as credit to finance cash flow for retailers. Credit terms, duration and collateral requirements should also be investigated.

Research and development institutions - including universities, regional centres, national centres and international centres; programmes, staffing, facilities, and budgets; crop and livestock conditions, practices, production performance, and research; agricultural engineering research, development, testing and evaluation.

Education and training programmes - courses, student numbers, curricula, staff, facilities, student follow-up, budgets, and development plans. Matching education and training facilities to the number of trained people required by government and industry.

Agricultural and industrial extension - public and private sector activities, structure of systems, staff numbers and qualifications, contacts with farmers and manufacturers, effectiveness.

Consumer Protection - legislation regarding protection of the consumer from undesirable and illegal business practices, information dissemination, credit protection etc.

### 3.1.7. *Policy Issues*

A comprehensive review and evaluation of government policies which impact on the sub-sector should be carried out. This will lead to an understanding of:

- what the government expects to achieve;
- how the government plans to go about it and the time frame for achievement;
- what and how national resources are to be mo-

bilized and what mechanisms are to be adopted to promote their efficient allocation; and

- where, when and how the government's policies impinge on agriculture in general, and farm power and machinery supply, in particular.

To achieve this effectively, current development policies will need to be analysed. This will include laws, rules and regulations that reflect those policies, and particularly those which have an impact on agricultural mechanization. They must also develop an appreciation of the potential for encouraging changes in existing policies. The policy instruments that most frequently need to be considered are listed later on in this paper.

#### **4. The Future Situation - The Roles Of The Private Sector And The Government**

Earlier it is stated:

“Mechanization should not be an end in itself and therefore, in a true free choice situation, governments should refrain from making policies which will stipulate by which means or by how much, agriculture will be mechanized”, and, “The philosophy behind the Agricultural Mechanization Strategy work of AGSE is that national governments should provide the basic conditions for a largely self sustaining development of the agricultural subsector of mechanization within a policy of minimum direct intervention.”

If the government does not decide on types and levels of mechanization and that the sub-sector should be largely self-sustaining, then one might reasonably ask “What then **are** the respective Roles of Government and the Private Sector?”. There is a generally held misconception, particularly amongst those who have advocated Structural Adjustment Programmes and who generally have little understanding of the sub-sector and its importance, that governments should adopt a total “laissez faire” attitude to farm machinery, tools and equipment (as well as to other inputs). This arises from the belief that the production and selling of farm tools and machinery should be left totally to the private sector, and that Governments should pull out of all activities concerned with manufacturing, importation and retailing.

In principle this is correct, however, in reality, as soon as Structural Adjustment has been implemented, it has seldom been the case that entrepreneurs come quickly forward to fill the gap. Even in the few cases where the private sector has

responded, a balanced supply side has rarely developed. This is particularly so in situations where government has been previously heavily involved in these activities and the private sector has for years been discouraged. A balanced development of the private sector requires programmes, incentives and assistance.

Therefore there must be a clear understanding and definition of the roles of the Private Sector and the Government Sector.

##### *4.1. The Role Of The Private Sector*

The fundamental requirement for a sustainable sub-sector is a strong linkage between the different parties and that all of them must be able to make a livelihood from their businesses. As is mentioned previously, there are generally four main groups or levels of interested parties in the private sector: Farmers, Retailers and Wholesalers, Manufacturers, and Importers.

In most free market economies, each of these groups is comprised of small to medium businesses. The **linkage** between the four is of the greatest importance to the successful and sustainable development of the sub-sector. A basic, fundamental requirement is that the “businesses” in each of these groups must be profitable. If farmers are not making money they will not be able to purchase inputs; if retailers cannot sell items at profit then they will not stock them and if manufacturers are not fabricating tools and machines at a price that can be afforded by the farmer, then their business is unsustainable. This may appear to be a simple observation, but the absence of a thriving agricultural machine and tool manufacturing, importing, and retailing sub-sector can often be traced to the lack of profitability in one of these groups. In many countries therefore, a major development goal must be the creation of the linkages between each group and the addressing of issues which affect the profitability of one or more of these groups. The requirements of each group differ:

##### *4.1.1. Farmers [1]*

Farmers require the availability of the widest choice of appropriate farm tools, machinery and equipment at affordable prices as well as access to spare parts and service to allow him/her to make the best choice to suit his/her business and aspirations. They should be able to freely choose the type, size and extent of mechanization inputs from a range of mechanization inputs available

on the market. The strategy of governments should be to **create the conditions** whereby industry and commerce is able to provide this choice at competitive and undistorted prices and at physical distances which are within farmer's reach. Apart from the obvious question of farm profitability, there are several issues and strategy components which will have a direct affect on a farmer's investment decisions.

### **Land Tenure**

Uncertainty of ownership leads to lack of investment and commitment. Governments and other involved parties should refrain from speculating on what size and type of farm is most appropriate or economic. Emphasis should be given to creating conditions whereby it is possible for any person, company or group of individuals to create a farm business. It is vitally important that farmers have title to their land so that they feel secure but also so that they have collateral available for borrowing.

### **Credit and Finance**

Credit and Finance should be available for all sizes and types of farm operation. Collateral requirements should be realistic and physical access to sources of credit should be facilitated, but with the condition that the business plan and cash flow projections appear realistic and attainable. This may mean the development of rural agricultural banks within easy reach of farming communities and/or the promotion of other community savings and credit schemes. The providers of credit should, ideally and if necessary, be in a position to assist farmers in the formulation of investment and business plans. If a high risk element exists (small farms, low collateral, marginal profitability etc) development agencies might be called upon which might be prepared to take on higher risk. This might, for example, apply to marginal agricultural areas. However, in general, credit should not be made available exclusively for farm machinery nor should special conditions be made available for the purchase of farm machinery only. A bias towards particular investments will result in distortions in the agricultural economy and particularly in the rural labour situation.

### **Credit for Contractors and Group Users of Farm Machinery**

Should be made available on the same conditions as for farmers. Contractors and other arrangements for the multi farm use of farm machinery, particularly in certain situations, can make an important contribution to agricultural production.

These arrangements facilitate an efficient use of machinery and make available to farmers machines which they might not be able to afford individually. Cultural and other considerations will determine which contracting and other multi-use arrangements will develop. There are many forms of multi-farm use of farm machinery. In its simplest form this might mean an individual farmer undertaking work for his neighbours or a more a formal group ownership of machines may develop. In some countries there are specialized contracting companies.

### **Choice of machinery**

This is essential in a free agricultural economy. Notable in centrally planned economies was the restricted type and sizes of farm machinery available and the low level of technology available. Different farms require different types and sizes of machines. Also what is generally forgotten or overlooked is that individuals wish to be able to be individual in their choice of what they invest in. One farmer may wish to purchase hand and animal draft equipment and rely on these for his farming; another may wish to purchase a tractor both for his own use and to carry out contracting services for his neighbours. As long as both are viable there is no reason why they should not have the choice. Outside persons and agencies should avoid being prescriptive and should concentrate on being informative and facilitative.

### **Farmgate Prices**

Prices will influence farmers purchasing decisions. Governments should be continually aware of the profitability of farming and how this affects investment in inputs. Market information systems for farmers are essential for this.

### **Subsidies and Price Support**

Subsidies and Price Support are common in many countries in the world. If countries do decide to use subsidies for farm machinery, then the purpose and time limitations of the subsidies should be clearly stated and understood. Capital subsidies for specific technologies (e.g. providing subsidies or preferential interest rates for tractors) should be avoided. Choice of machine then rests under the farmer's control and he is not influenced to purchase a particular type of machine or technology through financial incentives rather than for pure business reasons. Hastily applied and hastily lifted subsidies distort markets for farm machinery and make financial planning by farmers, dealers and manufacturers very difficult. Farmers and businesses wish above all for present and

foreseeable stability.

### **Farmers' Institutions.**

In many countries farmers have associations which can provide services to their members and also lobby government on matters of farming interest. Governments should encourage this as it creates a means of dialogue, however, they should be created and organized by farmer initiative.

### **Technical Assistance**

Technical assistance is required at both farmer level and government level. Farmers require assistance in all aspects of their activities; agricultural advice, financial advice, planning advice. Governments require assistance to develop the above services. This may be through individual ministries or through agricultural banks or other appropriate institutions.

#### *4.1.2. Farm Machinery Importers, Manufacturers, Distributors and Dealers*

The existence of sales outlets which are within easy reach of farmers is essential to the development of a successful and sustainable private farming system. Special attention is needed to create conditions so that importers, distributors and small retail outlets can develop. These commercial units may range from a small, one family shop in a village to a large national distributor for domestically produced and imported machinery.

This group of important commercial companies require a suitable stable, competitive, commercial environment in which to develop their businesses. This will include a stable market in which to sell their products, access to foreign exchange at undistorted rates, foreign contacts, removal of any unfair competition from the state, access to business and marketing development assistance, access to credit for business and cash flow development and removal of any unfair competition from the state.

In addition, manufacturers of machinery and equipment require access to a stable supply of raw materials at stable prices, good communications, contacts with potential overseas partners/licensors, access to market information, assistance with product research and development, and sometimes assistance with production engineering.

Any external or government assistance for financing any farm machinery, tools or equipment should be channelled through a distributor/dealer network and not directly through government or state owned banks or other state organizations. Importers should be allowed free access to mar-

kets. This will create a wider choice for farmers and create a situation in which the domestic manufacturing industry will be stimulated to produce quality and functionally advanced machinery and tools at competitive prices.

The main issues and strategy components are:

### **Business Environment**

Conditions should be created so that businesses can develop. Market conditions, particularly the profitability of agriculture, will determine the extent and technical level of the industry. There needs to be a radical appraisal of domestic manufacturing potential and capabilities so that a realistic picture of a likely future industry can be formed. New companies will develop through joint ventures, through foreign investment or through local investment. Governments should recognize this by creating conditions for positive developments. Generally the most pressing needs are finance and credit, assistance in setting up joint ventures and assistance in commercial aspects such as marketing, export and business development.

### **Finance**

Finance is required for investment and start-up capital, and to finance cash flow and stocking levels. Collateral requirements should be as flexible as possible to encourage small entrepreneurs to take risks in starting up a small business. Development agencies may be able to assist in these business development programmes particularly in area of risk underwriting. Foreign exchange will be required on a regular and constant basis for the importation of raw materials and whole goods.

### **Technical Assistance and Advice**

Technical Assistance and Advice, particularly for smaller businesses, is required for financial and business planning, marketing, stock control, book-keeping, contracts and in making contacts for the formation of joint ventures and manufacturing agreements. It may be necessary for governments to set up special manufacturing development programmes although these should not be subsidized and should have a clearly defined time frame.

## **5 The Role of Government**

The Role of the Government must be clearly defined. In general the traditionally accepted role of government has been in some or all of the following areas. These areas and whether

Governments should be involved in them in a free market situation is discussed.

### 5.1. Policy

Policy instruments that most frequently need to be considered are:

- Exchange rate policy.
- Policies influencing relative agricultural input prices - direct market intervention to manipulate input prices, tariffs and import restrictions, and input subsidies.
- Policies influencing agricultural product prices.
- Policies influencing farm and non-farm employment - employment and wages policy, migration.
- Land ownership and tenure policies.
- Agrarian institutions.
- Farm power research policy - agricultural machinery research and agricultural sustainability, transfer of farm power technology.
- Agricultural extension policy.
- Infrastructure policy - rural transport and marketing infrastructure, irrigation infrastructure.
- Agricultural financial markets.
- Industrial development policy.
- Transport policy and motive power.

Policies relating to agriculture can be divided into two groups: those about which there is general agreement on the need for government intervention, and those about which disagreements still remain [2].

Policy areas in which it is generally agreed that some form of government involvement is desirable include Agricultural Research, large scale Infrastructure Investment (including Irrigation) and Marketing Infrastructure.

Policy areas often subject to considerable disagreement include:

#### • **Exchange Rates**

Governments have often influenced exchange rates by fixing them at artificial levels or limiting their rate of adjustment, often creating shortages of foreign currency. In recent years, most Governments have relaxed foreign exchange regulations so that the market can fix the appropriate exchange rate.

#### • **Price interventions**

Price interventions generally cover three main areas: agricultural input price policy; agricultural product price policy; and agricultural finance policy. In the last case, for farm machinery, the chief price intervention issue is subsidized interest rates in the agricultural credit market.

#### • **Land Tenure**

The key issue in relation to land tenure policy is how it can be used to improve both equity and efficiency. Land tenure policy can have an impact on mechanization by influencing the ability of farmers to make efficient use of certain types of agricultural machinery and equipment as well as the ability to use titled land for collateral purposes.

#### • **Agricultural extension**

Extension has traditionally been considered a role of government. However, it is now being recognized that many governments do not have the resources to provide free extension services to all farmers and that government schemes may not be the most effective in providing extension services. While the solution in many developed countries has been to levy a charge, a more workable approach in developing countries may be to pass the extension role to the private sector, including non-government organizations.

There are other policy areas that are not specific to agriculture but which can have a substantial influence on agricultural machinery and equipment use. These include:

#### • **Employment**

Employment concerns are central to development objectives: levels of agricultural employment are influenced by the substitutability of machinery and equipment for labour in farm operations.

#### • **Industrial Policy**

Mechanical innovations stem primarily from the industrial sector: industry policy can influence profitably in the agricultural machinery and equipment industry.

#### • **Transport policy**

Transport policy is closely linked to marketing infrastructure policy through their mutual concerns for motive power.

Experience with conducting preliminary studies for strategy formulation indicates that the important issues relating to each policy area need to be discussed and clarified with the relevant government agencies. In the light of the discussions, the list of issues may be revised.

### 5.2. Research and Development

Although in general this is best carried out by the private sector because companies are in the best position to judge what is best for their own particular business, research and development is expensive and requires skills and expertise which

may not be affordable by developing businesses. It may therefore be necessary for governments to be involved in R&D. However, if so this should be carried out in close co-operation with the private manufacturing sector to ensure that research and development is closely linked with the identification of markets and subsequent manufacture. Any R&D financed by government (or external agencies) should in general be channeled through private companies. Expertise required should be placed in the company itself. It is not appropriate for governments to run public sector development workshops because they tend to become isolated and with little connection to the private sector.

### 5.3. Testing

Testing of Farm Machinery is a very controversial subject. The main issue is whether governments are able to run a testing programme without preventing the free development of the private sector and restricting the choice which farmers should have available. AGSE has published two Bulletins on this important subject. [3]

### 5.4. Education, Training and Extension

Governments should develop an integrated and inter-linked education, training and extension programme. The type and level of education and training will need to be geared towards the requirements of the agricultural manufacturing and production sectors.

### 5.5. Mechanization Departments - Ministry of Agriculture

With the generally prevailing constraints to government spending, many individual governments' policies are to reduce the amount of national resources spent on the civil service and to remove from it all but the essential policy making functions. Under such conditions, Mechanization Departments should

be primarily responsible for advice to the government on the formulation of mechanization policy, strategy, and programmes for the development of the total sector as outlined above, as well as the collection of data and statistics and the dissemination of information. Once an overall strategy has been defined, governments can easily identify components where resources are required and where perhaps appropriate outside assistance is required

### 5.6. Consumer Protection

The introduction of Laws and Regulations which will protect the consumer. This should include safety regulations, enforcement of contract law, introduction and enforcement of standards, consumer information services, publication of test reports, protection against unscrupulous commercial practices, and consumer credit protection.

## 6 References

- [1] *In this context even the smallest farmer is considered to be a "business" in that he must purchase inputs and sell products, whatever the size of the transactions. Similarly, even the smallest blacksmith is regarded as a "business"*.
- [2] **Timmer, C.P.** (1991), 'The role of the state in agricultural development', in *C.P. Timmer (ed.), Agriculture and the State: Growth, Employment, and Poverty in Developing Countries*, Cornell University Press, Ithaca, 1-28.
- [3] *Reference is made here to two AGSE Bulletins dealing with this subject:*  
*Bulletin 110 - Testing and evaluation of agricultural machinery and equipment. 1994 (E,S)*  
*Bulletin 115 - Selection, testing and evaluation of agricultural machines and equipment. 1995. (E, F, S)*