OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

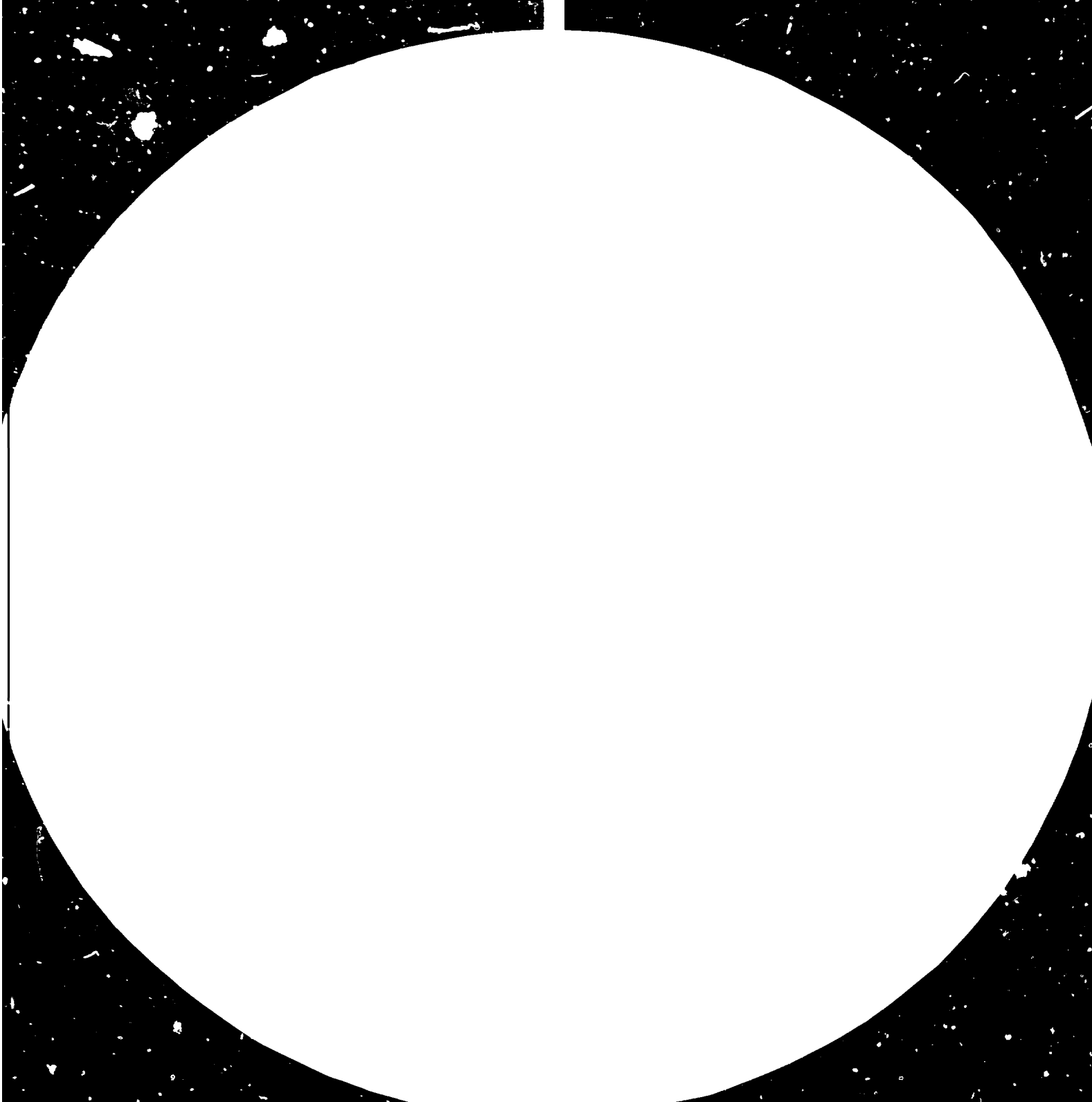
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

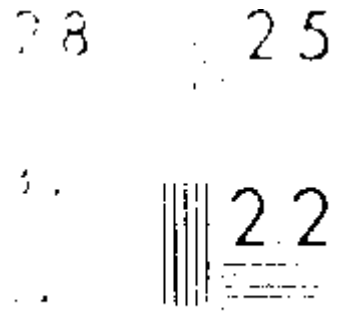
For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

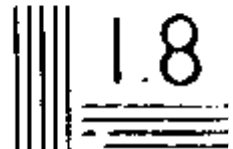


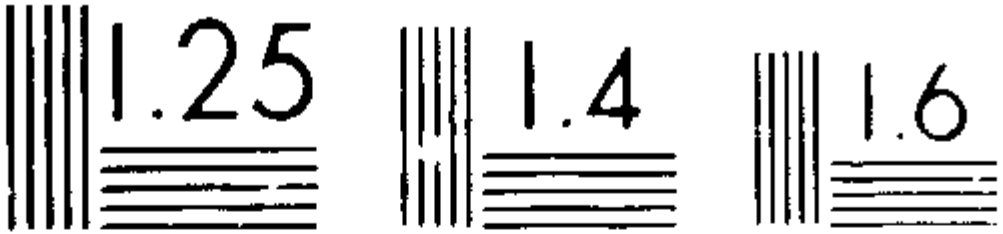

1.0


1.1


2.2


2.0


1.8


1.25
1.4
1.6

Preface

Since 1967, the United Nations Industrial Development Organization (UNIDO) has adhered to its mandate "to promote and accelerate the industrialization of the developing countries" by responding to requests for technical co-operation in all aspects of industry from the Governments of those countries.

This commitment to industrialization as a means of improving the living standards of nearly three quarters of the world's population, which was first outlined in November 1966 by the United Nations General Assembly in its resolution 2152 (XXI), has since been intensified. The Lima Declaration and Plan of Action on Industrial Development and Co-operation, which was adopted by the Second General Conference of UNIDO in 1975, called for an international effort to increase the developing countries' share of world industrial production to 25 per cent by the year 2000. This goal was further emphasized at the Third General Conference of UNIDO, held at New Delhi, India, in early 1980, with the adoption of the New Delhi Declaration and Plan of Action on Industrialization of Developing Countries and International Co-operation for their Industrial Development.

In the series of booklets *UNIDO for Industrialization*, of which this is one, an attempt is made to describe briefly the contribution of UNIDO, through its Division of Industrial Operations, to the industrialization of the developing world and to give examples of what has been done and will continue to be done to accelerate the process.

FINANCING UNIDO ACTIVITIES

The bulk of the costs of UNIDO administration and research, now approaching $US 48 million annually, is met from the **regular budget** of the United Nations, as are some lesser expenditures reserved for certain advisory and training activities. Once UNIDO achieves the status of a specialized agency within the United Nations family, it will cease to be funded from central sources of the United Nations and will rely on its own budget based upon contributions from its member States.

Technical assistance programmes for projects in developing countries, however, are funded from varied sources, the most important of which are summarized below.

By far the largest share of the field activities of UNIDO, some 70 per cent of the total, is funded from the **United Nations Development Programme (UNDP).** Thus, a high proportion of UNIDO field projects are subject to UNDP approval before implementation. Since the ultimate source of this money is the contributions of the member States themselves, both developed and developing, it can truly be said that UNIDO field activities are self-help programmes, initiated only at the request of Governments of developing countries and using funds to which many developing countries themselves contribute. These funds are allocated to particular countries from UNDP sources up to a predetermined amount known as the indicative planning figure (IPF). They cover the whole spectrum of United Nations assistance to those countries, industrialization being only one of many programmes needing financial support.

Country programmes normally have a five-year span; and the available funds, which vary from country to country and are weighted in favour of least developed countries, must be allocated to specific projects within a country during the five-year period.

Special Industrial Services (SIS) funds are confined to a narrow range of expert services provided for unexpected high-priority projects that are called for from time to time. The programme is restricted to short-term projects of limited cost, and during recent years $US 3.5 million has been set aside annually to support it.

The **United Nations Industrial Development Fund (UNIDF)** was created to finance innovative projects, preferably projects having a multiplier effect. The Fund consists of contributions pledged by individual Governments, and in some cases the purpose of the contribution is specified. Pledges are made in convertible and non-convertible currencies.

Trust funds are provided by participating Governments for specific projects to be executed by UNIDO in accordance with agreements reached with the contributing countries. They are used, typically, for technical assistance, expert services and specialist training.

The small **regular programme of technical assistance** provides funds for types of technical assistance that either complement other programmes or do not lend themselves conveniently to alternative means of financing. In particular, this type of funding permits a certain degree of flexibility in spending, since the allocation of the funds available is entirely under the control of the principal policy-making organ of UNIDO, the Industrial Development Board. Programmes are designed to reflect the emphasis on special measures for the least developed countries, on technical co-operation among developing countries and on establishing and strengthening industrial training facilities in developing countries.

Agricultural machinery and implements

NEEDS OF DEVELOPING COUNTRIES

The economies of most developing countries are predominantly agricultural, with little industrialization in general and inadequately developed metalworking and engineering industries in particular. The changing agricultural pattern over the past few years has, however, created an increased demand for industrial inputs for agriculture, necessitating the local production of suitable agricultural tools, implements and machinery to meet the demand.

Population projections up to the year 2000 indicate that the rate of growth in the agricultural sector, especially in developing countries must be increased. That this is possible has been demonstrated by intensifying crop production through increased energy inputs into agriculture. In addition, to achieve the goal of the Lima Declaration and Plan of Action, increased industrial production in the developing countries is vital. The production of agricultural tools, implements, machinery and allied equipment will help attain both these goals – more crops and more industry and consequently more employment.

The agricultural machinery industry is special in that it offers a wide choice of technologies appropriate to local circumstances. However, agricultural mechanization is erroneously identified with "tractorization" in many developing countries. Similarly, local production is often viewed as being confined to the output of rural artisans and blacksmiths working without supporting industrial infrastructure and common facilities.

Although one of the reasons for local manufacture of agricultural machinery is to save foreign exchange, a more important reason in predominantly agricultural countries is to establish a balance between industrial and agricultural development with the former providing support to the latter where necessary, and vice versa. Developing countries should avoid costly errors in importing equipment that by its power, size or other characteristics is inappropriate for a country's agricultural sector. In this context, there is a strong need for co-operation among the developing countries themselves, with the more developed countries giving to those countries still in the early stages of industrialization of agriculture the benefit of their experience and other assistance where possible.

PRODUCT RANGE

What is needed in most developing countries of the world is a full range of appropriate tools, implements, machinery and equipment that

takes into account the size of holdings, the farm income, the agricultural technology at the present farming level etc. The need is for machinery that can be produced locally, i.e. simple agricultural tools, animal-drawn implements, manually operated equipment and low-cost, power-drawn machinery and implements. The following broad-based categories can be defined:

Category I: (simple)	*Hand tools:* hoe, machete, spade, weeder, knife, sickle, axe, pick-axe, shovel etc.
	Manually operated equipment: pedal thresher, hand sprayer, corn sheller, cassava puller and chopper, hand pump, chaff cutter, storage bins etc.
	Animal-drawn implements: plough, cultivator, leveller, ridger, seeder and fertilizer drill, pump, sugar-cane crusher, reaper, cart etc.
Category II: (intermediate)	*Tractor-drawn basic implements:* plough, cultivator, harrow, leveller, seed drill, reaper, trailer etc.
	Simple, low-cost low-power equipment: power thresher, pump, chaff cutter, corn sheller, peanut decorticator, rice mill, hammer mill, power tiller, low-power engine etc.
Category III: (standard)	*Power-operated equipment:* tractor, pump, harvest and post-harvest equipment (may be manufactured in a few developing countries)
Category IV:	*Specialized machinery:* complex high-power tractor, combine harvester, special crop machinery (at present not suitable for manufacturing in most developing countries)

PRODUCTION LEVELS: TYPES OF PRODUCTION UNITS

At least three distinct types of units for producing agricultural machinery and implements are possible: the rural family unit, the small-scale enterprise or a unit in an industrial estate and a medium-size or large plant.

Rural family-owned units are primarily either smithies or artisan workshops employing 1-5 persons, where production is carried out manually and where power-operated machines are seldom used. The basic characteristics of these units are family ownership and management in material procurement, production, marketing and financing. Production is carried on in self-contained, simple facilities; and except for basic raw material, nothing is purchased from outside.

Small-scale workshops or enterprises on industrial estates are production units with a mix of manually operated machine tools and simple power-operated machinery with a degree of engineering management systems, primarily situated in urban areas or on the edge of towns and employing 15-100 persons. They may be owned by a single person, may be

a partnership or co-operative or may be aided or owned by the Government. Production is carried out on a "bread and butter line" (selected products on a continuous basis) with some organized outside jobs or in batches, or the workshops provide services (repair and maintenance, *ad hoc* outside jobs, fabrication of spare parts etc.).

Medium-size or large industries normally manufacture a specific product or product group and employ 100-500 persons (sometimes more). The manufacture is based on larger volume, and both conventional and semi-automatic or automatic special-purpose machines are used. Supporting industries such as foundry, forge, heat treatment, tool room or quality-control laboratory normally exist within the industrial complex or the necessary products or services can be procured from outside sources. Production is based on import of selected components, local purchase of components through ancillary industries and production of selected components within the factory and production of final products.

TECHNO-ECONOMIC ALTERNATIVES IN PRODUCTION PROGRAMME

Accepting that there are three categories of product groupings – *(a)* simple, *(b)* intermediate and *(c)* power-operated – and three production levels – *(a)* rural family-owned units, *(b)* small-scale units and enterprises on industrial estates and *(c)* medium-size and large industries – the production programme can be varied.

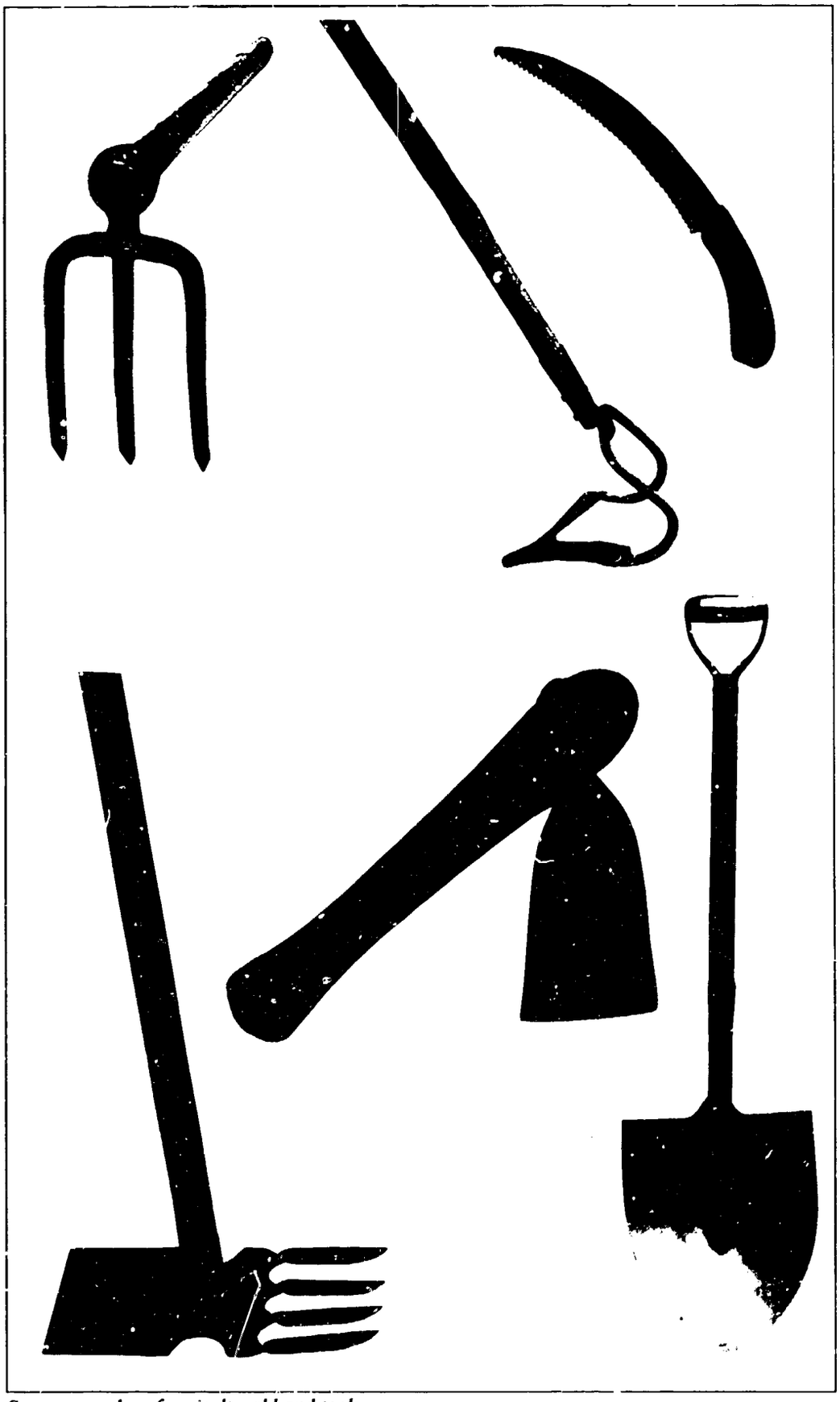
Simple engineering products, including simple agricultural implements, can be manufactured in all developing countries in rural family-owned units or in small-scale enterprises on industrial estates.

Small-scale industries should be promoted and encouraged to manufacture intermediate agricultural implements and equipment and to act as ancillary suppliers of components to medium-scale and large industries.

In promoting medium-scale and large-scale industries manufacturing powered agricultural machinery, measures should be taken to develop ancillary and supporting industries that would establish a solid industrial base and links with small- and medium-size industries.

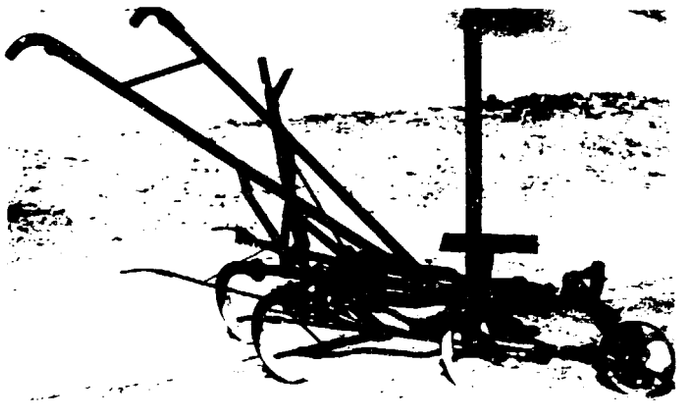
NEED FOR ENGINEERING SUPPORT SERVICES

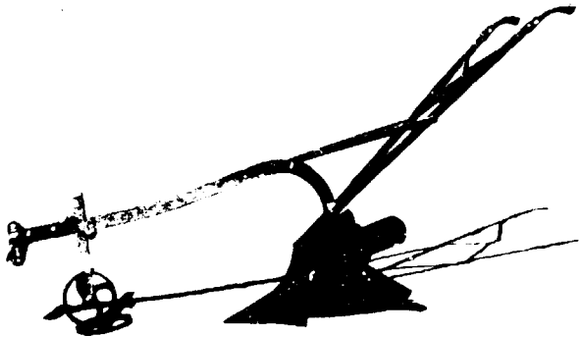
The basic facilities of the agricultural machinery sector are generally classified under the engineering and capital goods industries. The most simple facilities are simple welding and fabrication shops, ancillary woodworking shops, heat-treating installations etc. More complex facilities include treatment plants, tool rooms, sophisticated heat-treating equipment etc., with ancillary plants producing rubber, electrical, plastic and other

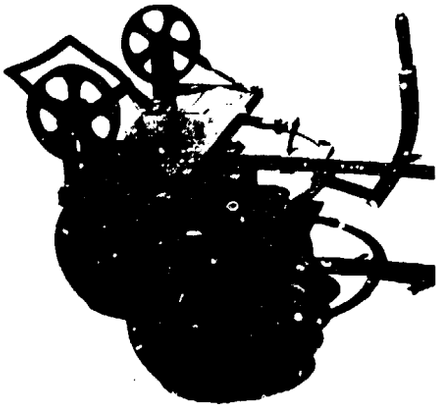


Some examples of agricultural hand tools

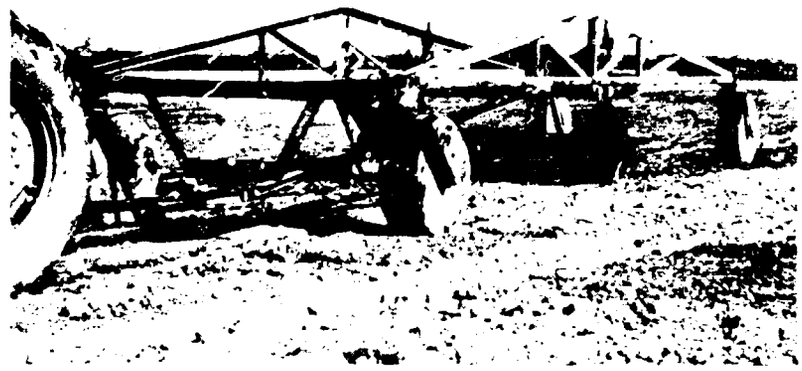
Some examples of manually operated agricultural equipment







Some examples of animal-drawn implements



Some examples of standard machinery and equipment

components. Where several rural small and medium-size factories are in the same locality, it is usually possible to set up some common facilities. The establishment of manufacturing units throughout the countryside can create new possibilities for employment.

In general, the technical or engineering institutional support required lies in the areas of:

(a) Engineering design, development, adaptation, with emphasis on a link to industry and transformation of applied research and development into commercial products;

(b) Common engineering services, including raw material bank, tool room services and industrial engineering and technical services, including engineering design, machinery selection, process planning and trouble-shooting.

NEED FOR INTEGRATED APPROACH AND REQUIRED GOVERNMENT ACTION

If developing countries are to adopt an integrated approach towards promotion of local manufacturing of agricultural tools, implements and machinery, a relationship between agriculture and industry must be encouraged, together with the interdependence of agricultural mechanization and local manufacture of the machinery.

This approach will require the Government to develop the necessary basic facilities and services. The following measures should be undertaken:

(a) Broadening the concept of agricultural machinery manufacturing by shifting the emphasis away from the specialized process towards one based on the broader aspects of purchasing, production and assembly;

(b) Widening the range of end-products from agricultural machinery to associated sectors;

(c) Increasing the volume of production;

(d) Reaching the industrial stage in the production of semi-finished or complete components or subassemblies;

(e) Providing training in the specific technical skills required for the production of agricultural machinery.

If the promotion of the agricultural machinery sector is to be successful then a programme of action to be implemented by the Government must be defined and initiated. Even though such a programme would provide details on technical aspects and on policy planning, it would not be so inflexible as to exclude the introduction of upgrading actions at a later date.

NATIONAL BASIC INSTITUTIONAL SUPPORT

In developing countries, rural small and medium-size workshops and the engineering sector could make a substantial contribution to the devel-

opment of industry, in particular the agricultural machinery industry, if they were given the appropriate techno-economic support, e.g. the provision of suitable production machinery, raw material and critical components, hardware and heat-treatment facilities and the establishment of quality control measures. For fuller exploitation of their potential, they must be given greater access to training facilities and to improved prototypes, appropriate raw material, concessional credit, and research and development facilities. The formation of co-operative marketing arrangements should be encouraged, with governmental institutional support on standardization.

PROPOSED DEVELOPMENT UNIT FOR AGRICULTURAL MACHINERY AND ALLIED ENGINEERING INDUSTRIES

A development unit for the agricultural machinery and allied engineering industries should be established, preferably by strengthening appropriate existing national institutions. Non-governmental institutions that would participate in such a development unit include national and regional professional agricultural engineering institutions and associations of manufacturers of agricultural machinery, implements and allied equipment. If such professional bodies or associations do not exist, they should be formed. Governmental institutions that would participate in the proposed unit include industrial extension services, project financing agencies, industrial estates, co-operatives, regional and subregional departments for industrial promotion and standards institutes.

Such a development unit not only would benefit the agriculture machinery industries in various localities, whose performance could be expected to improve, but also would encourage sectional integration, through exchange of experience, and thereby affect the national development effort.

The policy of UNIDO is to recommend reinforcing existing agricultural machinery institutions, reorienting their work plans and establishing links between the ministries involved in the functioning of a development unit.

UNIDO ACTIVITIES AND PROGRAMMES

Over the past years, UNIDO has undertaken a number of technical assistance programmes in the agricultural machinery and implements sector in many developing countries. Special attention is now being paid to this sector's technology, including the development and transfer of appropriate manufacturing technology, selective importing, testing and evaluation, and the acceleration of the expansion of local production.

Many countries produce agricultural tools and implements at the artisan or small-scale level, but the quality is often poor because of a lack of common engineering services and basic facilities. Although a few developing countries are assembling or manufacturing standard tractors, engines and pumps, there is almost a complete gap in the local development and manufacture of equipment in the intermediate category, such as improved agricultural implements and simple low-horsepower machines. Accordingly, UNIDO emphasizes the need to develop self-sufficiency in the local manufacture of agricultural machinery, including post-harvest equipment and equipment for irrigation and storing grain. Assistance is also rendered for establishing small workshops to manufacture agricultural implements, tools and allied equipment, with emphasis being placed on local design and development and maintenance and repair services.

UNIDO has established a substantial programme in the field of agricultural machinery, based on short-term assistance. Only a few examples of such assistance can be mentioned here.

Assistance has been provided to some countries in developing and manufacturing small, low-cost tractors. One small tractor, developed in Swaziland, is now being tested for potential use in other countries. A project in Ethiopia to develop water pumps and windmills for rural areas has resulted in the design and batch manufacture of a hand pump that other developing countries could equally copy or adapt to their needs. Assistance in setting up a pilot plant for the manufacture of sprinkler irrigation equipment has been provided in the Sahelian region. Projects have also been initiated in other regions to restructure and make maximum use of existing plants for the development and manufacture of agricultural tools, implements and machinery. Projects concerned with testing and the provision of technical services to the agricultural machinery industry are also under way.

Also in Africa, UNIDO has been instrumental in developing a national agricultural machinery network for Algeria, which is expected to lead to the establishment of regional and subregional agricultural machinery networks in the country. UNIDO experience in this field is based on the setting up of such a network in Asia and the Pacific in 1977 in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the Economic and Social Commission for Asia and the Pacific (ESCAP) and the executing agency for this project.

With the aim of furthering co-operation and exchange of experience among developing countries and promoting "twinning" of appropriate programmes between developing and industrialized countries, UNIDO is involved in proposals for an international centre for the promotion of the agricultural machinery industry in developing countries. It has prepared a project proposal for such an international centre to be established in Beijing, China, which, if approved and finances are made available, could become one of the most significant projects of UNIDO in this field.

Other programmes on which preparatory work has been carried out include rehabilitation of national workshops with a view to manufacturing agricultural tools and allied products; the establishment and operation of

agricultural machinery repair workshops; the promotion of agricultural machinery development and entrepreneurship; and projects that integrate the development of agricultural machinery with promotion of manufacturing.

To assist developing countries further in the development of their agricultural machinery industry, UNIDO organizes meetings, disseminates information and carries out studies.

Upon request, UNIDO is always ready to provide assistance to developing countries, either alone or in co-operation with FAO, in expanding existing agricultural machinery plants or in establishing new ones. Emphasis will be given to appropriate product lines; technology and level of manufacturing; training; and the development of local engineering and technological capabilities.

UNIDO is also able to offer assistance in developing appropriate projects, including the preparation of the initial project proposal so as to obtain funding.

For further information on UNIDO activities in the field of agricultural machinery and implements, contact:

Engineering Industries Section
Division of Industrial Operations
UNIDO
Vienna International Centre
P.O. Box 300
A-1400 Vienna, Austria

Current booklets in this series

Agricultural machinery and implements (PI/82)
Building materials and construction industries (PI/76)
Foundry industry (PI/87)
Leather and leather products industries (PI/79)
Metallurgical industries (PI/83)
Petrochemicals (PI/75)
Pharmaceuticals (PI/77)
Shipbuilding and ship repair development (PI/80)
Wood processing and wood products (PI/78)