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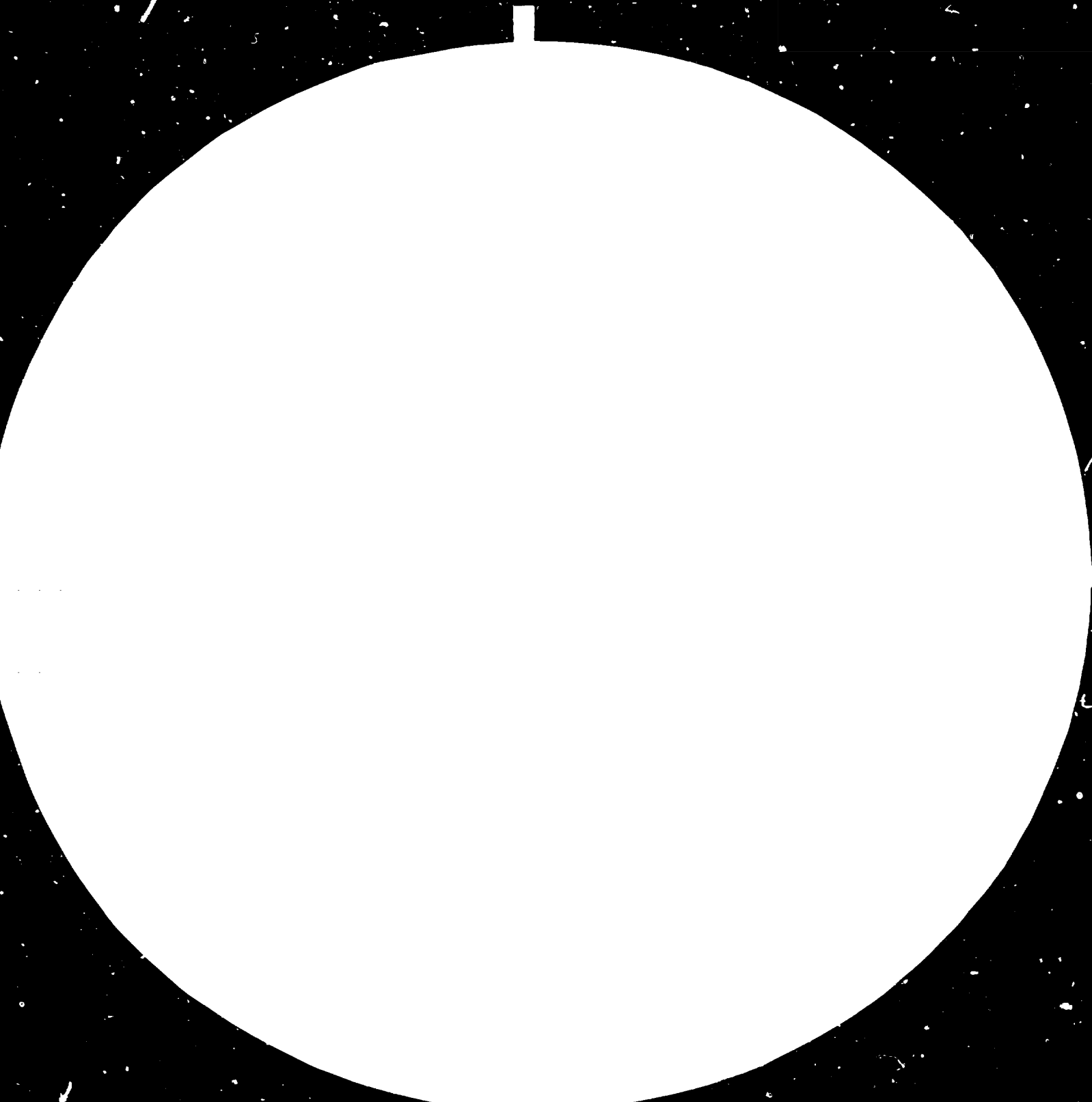

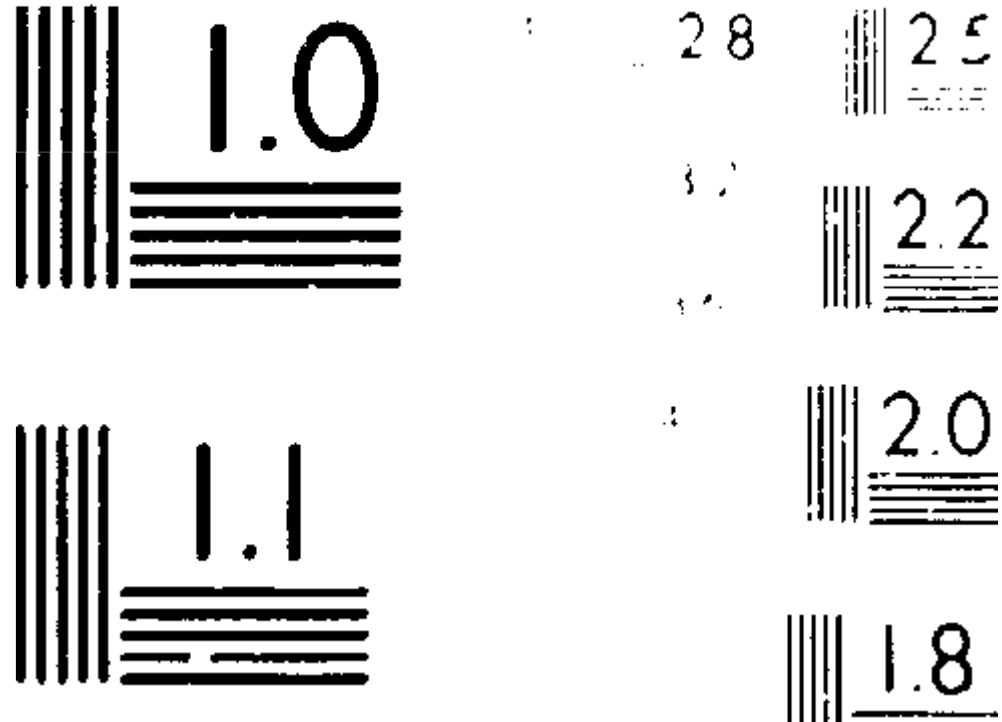
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Meeting on Exchange of Experiences and
Co-operation among Developing Countries in the
Development of Agricultural Machinery Industry

Beijing, China, 20 - 27 October 1980

A TIME FOR NEW APPROACHES TO MEET THE NEEDS OF THE DEVELOPING COUNTRIES IN AGRICULTURAL MECHANIZATION FROM THE VIEWPOINT OF THE DEVELOPING COUNTRIES*

(Main Discussion Document)

submitted by the UNIDO Secretariat

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TABLE OF CONTENTS

PREFACE

The purpose of this main discussion document, which was drafted from the viewpoint of the developing countries, is to draw the attention of the participants at this meeting to the unique opportunity it offers to devise new approaches through an exchange of experiences. Through the active contribution and co-operation of all parties it is expected:

1. To formulate, for the short/intermediate-term specific co-operation proposals between two, three or more participating developing countries and/or industrialized countries with similar types of crops, climate, agricultural implements and machinery. The products involved could be:
   - Hand-tools;
   - Implements (animal and tractor drawn);
   - Machinery (tractors, power tillers and engines);
   - Specialized equipment (combine harvesters and equipment for specific crops).

   Subsequently, to prepare project proposals for their implementation and financing either from the United Nations Development Programme, multi-lateral or other sources.

2. To agree, on the different types of other mutually beneficial co-operation programmes which would constitute long-term aspirations of the participating developing countries in this sector. Actions to be taken at the national, sub-regional, regional, inter-regional and international levels could be suggested with emphasis on self-help, enhancement of technical and mainly practical co-operation among developing countries. Progress achieved, it is hoped, will be periodically examined at all fora dealing with this sector. The first opportunity to do so at the regional level will be during the first Regional Consultation on Agricultural Machinery for Africa to be convened by UNIDO in November 1981.

It is recalled that this meeting is organized by UNIDO in co-operation with the People's Republic of China in response to a specific offer made to that effect by the delegation of China, which was endorsed by the First Consultation* Meeting on the Agricultural Machinery Industry, held in Stresa, Italy (15-19 October 1979).

It is further reminded that the Plan of Action of the United Nations Conference on Technical Co-operation among Developing Countries, adopted in Buenos Aires, in September 1978, called upon all the organizations of the United Nations development system to take expeditious action within their respective fields of competence. This meeting-combining technical and practical discussions with demonstration visits in the host country of China - represents UNIDO's first contribution in this sector to this still very new, unexplored and challenging assignment to assist the developing countries.

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* The origin of the System of Consultations is to be traced in the Lima Declaration and Plan of Action, adopted by the Second General Conference of UNIDO in Lima, Peru, in March 1975. This was consequently endorsed by the UN General Assembly in September 1975. Its overall objective is to assist the developing countries in achieving the maximum share in world industrial production by the year 2000 and as far as possible not less than 25 percent of that production. The Declaration stressed, inter alia, the development of efficient agriculture-related industries in order to achieve a high degree of integration between the expansion of agriculture and industry in the developing countries. In this context, the creation of integrated production units like agricultural machinery plants, appropriate engineering industries and repair and maintenance services was emphasized. Accordingly, the Industrial Development Board, the policy-making organ of UNIDO, authorized at its twelfth session in May 1978, preparations to convene the First Consultation Meeting on the Agricultural Machinery Industry. This is the sixth industrial sector to be covered by consultation meetings and is preceeded by iron and steel, fertilizers, leather and leather products, vegetable oils and fats, and petrochemicals.

INTRODUCTION

The entire developing world faces a crisis of self-confidence today. Economic growth rates are falling monotonously behind targets, invariably pitched at ambitious levels of 6 - 10%. At the same time, with spread of mass communication and tourism, aspirations of the people are rising exponentially. The fast widening gap between aspiration and fulfilment is only escalating frustration and anger.

For economic growth in the narrow sense or for development in its wider prospective, we of the developing world have always looked to the West for its economic models, its technology and its capital. Every country has a long string of projects based on this approach and each country can also proudly boast of some eminently successful show-pieces. But if one were to see the total spectrum, successes are scattered islands of prosperity, in an otherwise unchanged, barren and poverty-ridden land-scape. The much talked about and sought after economic 'take-off' stage remains as elusive as ever. In this background, is not time that we of the developing world examine critically our approach and then tried to chart out new directions based on our individual and collective experience?

Technology, organization and industry are products of a culture and environment. They change, but only such changes as a society accepts take root and flower. Totally alien transplants, if not outrightly rejected, are unlikely to flourish despite artificial nursing. A study of the environments in the developed and developing worlds, would perhaps help us in evolving new options.

THE DEVELOPED AND DEVELOPING WORLDS - THE CONTRAST

Looking around it is easy to appreciate that the contrast between the two worlds, and yes, let us be clear that we are in two totally different worlds, lies not only in per capita incomes or living standards. It extends far

deeper into every facet of human thought and endeavor. And let us also admit that the contrast is only getting sharper day by day. Let us examine some of the contrasts which have a large bearing on growth.

Markets:

Developed countries are all characterised by large markets, a sequel to growth over an extended period of time. Expanding markets enabled these countries to generate cash resources, which were ploughed back for larger production volumes. Larger production volumes themselves resulted in cost reduction. Surpluses also enabled them to improve wage levels, a trend accelerated by labour shortages and unionisation in the post-war period. With cash surpluses, also came consumer credits. Escalation in demand enevitably followed.

In marked contrast, developing markets are small. Even countries where large populations should theoretically mean infinite markets, purchasing power is so low that even food is out of reach for large segments of the population. In this situation, demand constraints restrict production and the position can only improve gradually. If costs have to be kept low, production facilities must be set up for low volumes initially and expanded as demand picks up. This brings up the crucial issue of appropriate technology for low volume production without sacrificing quality.

Products:

Labour shortage and dual member working families, in a situation of rising purchasing power, brought about a revolution in product design in the developed countries: reduced physical labour, increased power for enhancing productive capacity of an individual, simplicity and ease of operation, attractive styling and packing, throwaway concepts, etc. The new generations of products were more expensive, but the consumer in the developed countries could afford them.

Products manufactured by developing countries with western technology naturally follow designs prevalent in the West when production is taken up, sophisticated and expensive. A natural consequence is that products are within the purchasing power of only a small minority. Production volumes remain small and production costs high. With low returns, production of a model is continued till such time as it becomes obsolete, at ehich stage another cycle of borrowing know-how starts.

Production Technology:

In a situation of labour shortages, the necessity for high production volumes of defence equipment during the war followed by the sudden boom in demand for consumer goods in the post-war period, brought automation to the developed world. Later automation was increasingly adopted to off-set rising labour costs. This process of automation, which required large capital investments, could be afforded as these economics were generating adequate cash surpluses for investment. An offshot of automation was closer control of production processes which led to product refinement, reduced material and production costs and better product performance. On the other hand, production facilities became highly capital intensive and totally tailored for large production volumes.

In borrowing western technology, developing countries perforce adopt the same capital intensive production methods. Automation is today taken for granted in the developed world and despite all efforts at down-scaling to low production volumes for developing countries, sub-conscious bias towards automation remains. The glamour of computer controlled factories with no headaches of labour, only adds to the desire of developing countries to automate.

Research and Development:

Because of cash surpluses, the developed world has been able to invest heavily not only in R+D of new products, new production processes and new raw materials, but in their subsequent commercialisation. The result: cost reduction and improved products.

The developing world has no such capacities as there are neither production volumes nor cash surpluses. Product designs and manufacturing methods consequently stagnate and steady rise in product costs is inevitable. We totally forget that the only way to reduce product cost is new technology, whether in product design, or manufacturing. But then this capability to innovate has to be created and nurtured.

Infrastructure:

Because of steady investment over a longtime, infrastructure facilities in the developed world are reliable and are freely available: Power, roads, transport, communications, raw materials etc. Surplus capacities in these sectors provide assured supply. Assured availability reduces production costs at every stage: speedy project implementation, better asset utilisation, lower inventories etc.

Infrastructure in the developing countries on the other hand is always stretched to the limit and break downs are chronic: Power failures and trippings, breakdown of telephone services, uncertainty of transport, shortage of raw materials etc. Can any developing country dream of inventories of half a day producing complex products like automobiles and tractors, a fact taken for granted in developed world. In such a situation production costs are necessarily higher and capital intensive equipment only adds to the burden of fixed costs.

Public Policy

Every one from the developed world gets completely frustrated by licenses and procedures in a developing country. While they may be frustrating, when input supply to at least the priority sectors has to be ensured, rationing becomes inevitable. Centralisation, multi-level appraisal to co-relate demand and supply with priority, automatically ensue. The un-intended but seamy off-shoots are patronage, favouritism, lobbying and corruption. Additional cost burdens are also imposed at every stage, directly and indirectly due to delays.

Another irritant is the frequent and often drastic change in public policy, a situation aggravated by oil crisis and the volatile economic situation around the globe. While uncertain economic conditions make future planning with any degree of confidence difficult, so long as major imbalances exist, there appear no solutions.

Criticism is also voiced by developed countries against the protectionist policies of most developing countries: sheltering inefficiency, protecting obsolescence and disregard of consumer interest. It has to be recognised that the first priority of the developing country is to create a local industrial base and generate local employment. With the additional cost burden which local industry has to incur, such protectionist policies are essential to help these industries to find their feet. And then aren't developed countries also following protectionist policies, though not as openly in all cases?

Entrepreneurship and risk capital:

Entrepreneurship is the ability to make risk investments to provide new products/services, for future profits. Entrepreneurship developed in the West through the years, starting with small risks in small businesses. As confidence, capability and financial resources grew, larger risks were willingly taken and the size of business increased.

Entrepreneurial capability in most developing countries is limited to small business. Financial capacity at making risk investments is also small. In their anxiety at speedy growth, the developing countries however, do want to enter large business. The consequences are performance guarantees, long drawn CKD imports and a host of checks and counter-checks at every stage, safe-guards which are meaningless, when and if the final crunch comes. In the process initiatives, the most essential ingredient of entrepreneurship, are lost.

Organisation and Management:

With growing size and complexity of business, organisations in the West have not only become large, but also highly oriented to specialisation. Management systems have also been developed to a fine pitch. These organisation structures and their managers are the product of many years of evolution, during which the size of the business and capability of managers grew parallely through a process of experimentation and trial. Complete servility of labour and absence of labour welfare legislation, simplified the task of the managers in the nascent years and left them free to devote their entire energies towards systems and technology.

The experience of developing countries on the other hand is so far confined to small and simple business. Most developing countries have also legislated liberal policies for labour rights. The total environment is also rough and difficult. In this background, the task of managing complex organisations and business runs into serious difficulty.

Education:

Since industrialisation came to the West many years ago, it is the uneducated who found employment in industry. Education for them came later. While education spread, economic pressures also mounted, thus

forcing them to continue their habit of manual work. In this background, manual work has been an accepted component of the life and education of the developed world. The result has been a far more intimate knowledge of the working conditions on the shop floor. It is this intimate knowledge, which has been largely responsible for the growth of industrial engineering, as a practiced philosophy in every area involving human effort.

In marked contrast, education in most of the developing countries started before industrial employment. The education system, a relic of the colonial past, was also designed to breed a "white collar" elite, above and separate from manual worker. White-collar is thus the fashion and blue-collar work considered low and undignified. The educated elite which forms the management group thus tends to remain divorced from the shop floor and innovations to reduce "work content" rarely emanate.

Alternatives:

When the total environment is surcharged with such striking contrasts in every aspect, the shock which transplants from the West have to withstand is indeed severe. Any unbiased analysis would show that it is this shock which is responsible for the gross under-utilisation, if not idling, of a substantial portion of the investments which each one of the developing countries has made over the years, investments of resources which were scarce and precious. Either the product selection was wrong or manufacturing technology or management itself. Can we afford to continue this luxury of waste? Let us also not forget that this shock will only become severer in future, as the gap widens.

For our limited investments to be made productive and regenerative, would it not be wiser to reduce the shock, which transplant from a totally contrasting environment is bound to be? Would it not smoothern the way of developing countries turned to each other? Environments being similar, the probability of success at transplantation is most likely to be higher. In their experiementation over the years, each developing country has developed some strengths, whether in appropriate products, or in manufacturing technology or in building dynamic and responsive

organi-ations. Shouldn't we assess these strengths and cooperate, not only to enhance these mutual strengths, but to duplicate them for our own betterment? Agriculture is the highest priority in most developing countries, it would be in the fitness of things for agriculture to take the lead in this direction. Some examples would perhaps highlight the chain of thought.

Simple Agricultural Implements:

Even simple agricultural implements like shovels and seed drills are produced in quantity in the West: Heavy presses with progressive stamping dies and roller infeeds, deepdrawn components from corrosion resistant steels or from injection moulded PVC, conveyorised heat treatment, pre-treatment and paint lines etc. Quality is high and final finish attractive, but the facilities are highly capital intensive and the product expensive.

On the other hand, in a developing country much as India, such implements are being manufactured by road side workshops with investments of around $1000: hand-shearing, simple dies on fly-ball press and, a local welding set. Heat treatment is on an open fire and the paint brushed. This small shop serves a local community. Admittedly the product is not very durable and the finish poor, but farmers prefer them as they are far cheaper than products made by the largescale manufacturers with all their overhead cost of high capital investment, packing and transportation, distribution etc. To the rough reckoning of the farmer, the cost-benefit of his investment on the so-called sub-standard product far outweighs the additional durability of the standard product. There is also the larger question: do they even possess the capital to invest in the more expensive product? What is cited is a living example from one country, where roadside mechanics have actually driven out largescale manufacturers from the market, negating all theories on advantages of quality products and centralised production.

Would it not be preferable for developing countries to think of this approach, perhaps with improvements in heat treatment through a low investment process, standardisation of designs and even tooling?

Small HP Diesel Engines and Pumps:

Globally, small diesel engines and pumps are made by a few large manufacturers and Wisconsin, Briggs and Stratton, Yanmar, Lister are house-hold names. India also started with the same approach and four largescale manufacturers came up. As the market picked up, a totally new development took place and a whole generation of small shops took up their manufacture and assembly. Critically high techology items like fuel injection equipment, pistons, valves etc. were purchased from a few largescale manufacturers and manufacture of the easier remaining components and assembly undertaken in the small shops with investment of around $3000. These local engines and pump sets were nearly half the price of these manufactured in the largescale. In the earlier stages, their performance was erratic, but the price advantage was a large attraction, and slowly the large manufacturers were forced to pull out from these lines.

Paddy Transplanters:

Paddy transplantation is a labour intensive operation and developing countries have been thinking of improving labour productivity during transplantation, through mechanisation. Japan was the first to introduce paddy transplanters, a sophisticated machine and a capital intensive technology package. Japanese transplanters ideally suited the Japanese environment, and soon enough 100% of their crops was mechanically transplanted. Some developing countries also tried to adopt this technology, but efforts were unsuccessful, primarily because of the capital intensive technology.

On the other hand, the recent Chinese and Korean Rice transplanters are relatively simple machines. They are cheap and the total technology package is a half-way house between manual methods and the Japanese.

Would it not be correct for the other developing countries to adopt these transplanters, initially through import, so that the scale of Chinese/Korean production increases and later through domestic production?

Power Tillers:

Power Tillers were the Japanese innovation for mechanisation of their agriculture. Starting with a simple machine immediately after the war, power-tillers became increasingly sophisticated as Japanese agriculture prospered. India tried to introduce Japanese power-tillers in the mid-sixties and four manufacturing units were set up. Power-tillers were however not accepted by the farmers, primarily because of high price and all these four units are in financial distress.

On the other hand, the simpler and cheaper - IRRI power-tiller has found fairly wide acceptance in South-east Asia and its production is reaching the level of 10,000 per year. A further advantage is that manufacture is being undertaken in small units. It is not the right technology to promote by other developing countries?.

Tractors:

All developing countries have adopted tractorisation as a large component of their strategy to improve agricultural productivity. Some of them have also established their own manufacturing facilities in collaboration with advanced countries. With Western designs moving towards higher horse-power and sophistication, tractors introduced/ produced in the developing countries are expensive and their costs have been rising steadily, with the result that tractors are outside the reach of large segments of the farming community.

In the last few years some interesting developments have taken place in some developing countries on small low-cost tractors: the Indian SWARAJ-SARTAJ, Thailand Buffalo, Tinkabi etc. These small tractors provide the much needed mechanical muscle to the farmers, albeit not as comfortably as Western designs, but then their price is only 50-60%.

Would these tractors not be more appropriate for the developing world, both from the point of view of the market, as well as the lower-cost production technology?

The Difficult Areas/Constraints:

While manufacturing technology and product designs evolved in some of the developing countries could be profitably adopted by others, issues are not simple and straightforward. Areas which present difficulties are:

1. Capital

One of the attractions of borrowing technology from the West lies in the capital assistance which is received as a part of the package in the form of equity participation, loans, long-term purchaser credit etc. Collaborators also provide CKD components, which helps the local entrepreneur to produce without capital investment and make profits without taking risks. This is an ideal situation from the point of view of individual entrepreneurs, but in the long-term, this premium on virtual trading saps initiatives, which are the essence of entrepreneurship. It must also be realised that investment alone does not produce growth and large investments put up purely because of the attractive package of credits and associated benefits, often end up becoming millstones round the neck of borrowing countries.

Perhaps not by Western scales, some of the developing countries today are in a position to provide credit, capital equipment and CKD components to other developing countries. There is the added advantage that the technology is more appropriate.

2. Managerial Support

Another advantage of borrowing technology from the West has been the managerial assistance which one receives: experts, systems etc.

There is also the easy convenience of referring even the smallest problem to the collaborators, whether it relates to production processes, component designs or materials

The more advanced among the developing countries today can also provide this managerial support, perhaps not to the same extent as the West but certainly more in tune with the conditions of the borrower. Should the borrowing countries not supplement this support through building up their own managerial strengths, by advance planning and training with their partnering industries from the developing countries?

3. Salesmanship

Salesmanship in the West has been refined to an art and developing countries cannot escape high pressure salesmanship: glamorous products, impressive plants, attractive displays etc.

This is one area where developing countries will find it extremely hard to match the developed world for a long-time to come. The solution perhaps lies only in the sagacity and long-term perspective of the decision-makers in the developing countries.

Considerations for Decision Makers:

If one were to search deeply, the above issues do assume overriding importance during final decision making and short-term attractions completely override long-term considerations. The additional advantage favouring short-term attractions is that they are all tangible, while long-term considerations are of untangible nature, their effects only becoming visible after many years.

A predominant factor underlying decision-making when selecting products/technology is the basic attitude and approach of the decision-makers in developing countries. This attitude and psychology derives from

the total environment starting from childhood and continuing through education and subsequent working. Isn't it heavily loaded in favour of the West with all the odds against other developing countries?

The only solution would perhaps lie in conscious recognition of this inherent bias while taking decisions, so that the product/technology offered by other developing countries is viewed in its larger perspective.

A Time to Act:

Over the last few years, mutual co-operation has been discussed extensively, not only in developing countries, but in various international fora. It is unfortunate that issues have mostly ended in polemics and debate, actual physical implementation being extremely slow. Let us not forget that time has a value, and every day the gap between the developed and developing worlds is only widening.

ACTION PROPOSALS FOR INCREASED MUTUAL BENEFIT CO-OPERATION

As stated in the Preface to this paper, it will be the participants in this meeting themselves who, hopefully will take advantage of this unique opportunity to agree on the basis of their requirements and what they have to offer, in principle, on co-operation arrangements of different types. These arrangements could cover any of the following constraints which, at present, are still being faced by many of the developing countries in terms of: lack of feasibility studies and manufacturing policy; lack of technical know-how for large-scale production; lack of market research and statistics on available product types and comparative prices; lack of research, design adaptation/development, testing opportunities; lack of repair and maintenance, extension service facilities; lack of assurance of timely procurement of spare parts; lack of training opportunities at all levels; lack of financing; lack of standardization of production.

With respect to more long-range co-operation, the following proposals constitute suggestions for which financing could be sought under different sources of financing:

- Preparation of a compendium of alternative products/technologies available in developing countries, from where other developing countries could explore alternative options. Since agriculture is the top-most priority in practically all developing countries a start could be made with a compendium for agricultural machinery.
- Organization of regional seminars to be followed by a Fair on agricultural machinery, tools and equipment produced within the specific region in order to promote practical exchange of information and transfer of technology among the interested participating countries.
- Sharing of design and manufacturing know-how of simplified agricultural implements and machinery developed in countries which share similar socio-economic, climatic and soil conditions;
- Adaptation/modification of design to suit local conditions; for this purpose a catalogue of optimal designs could be prepared;
- To elaborate a proposal for a "network" approach for the training of young scientists in this sector; this requirement could be built in by using existing agricultural research and development institutes and centres to provide complementary training facilities for the whole region;
- Organising an International Group of practicing experts from developing countries whose services could be drawn from by a developing country for the selection of products/technologies. Experts from developing countries are specifically suggested, as their understanding of the environment will be more relevant.
- To enlarge markets, which is an essential for economies of scale in production. Regional co-operation for shared markets/production should also be actively encouraged. While the concept of regional

co-operation has found acceptance in ASEAN, the ANDEAN PACT, etc. physical action on the actual practical implementation of programmes has hardly got moving. This constitutes an area where thought needs to be given as to measures to be undertaken to gradually achieve progress.

- There exists already an increasing degree of co-operation among the developing countries in the field of education. Shouldn't it be extended into industrial training and even industrial employment? This process would improve cross-fertilization of ideas and remove the inbuilt biases that exist today. Here again, proposals for implementation in the near future would provide a start.
- Creation of preferential tariff arrangements (PTA) among neighbouring countries for greater export of agricultural machinery among developing countries, is a further area;
- Arrangements to ensure the supply of the essential raw materials, e.g. steel, cast iron, etc. at intercountry levels, are further considerations.

The above lists of areas in which mutually beneficial co-operation could take place could be expended consideraly. In view of the limited duration of this meeting, if a practical and tangible, down-to-earth start can be made to assist the developing countries in the long-term goal to achieve self-reliance in this sector, much will have been achieved. The role, which in this respect the more developed among the developing countries and those participants from the industrialized countries who represent the small and medium-scale manufacturers, can play is not a negligible one. With the changing world economic pattern, self-help and increased co-operation among the developing countries themselves and in the second instance with the industrialized countries on different more equitable terms can only be seen as a welcome and natural process in the development of the agricultural machinery, respective tools and implements field.