

BACKGROUND PAPER FOR THE TECHNOLOGY
INITIATIVE FOR THE PRIVATE SECTOR

Prepared for:
Office of Private Sector Development
U.S. Agency for International Development-Sri Lanka

January 1990



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PREFACE

This Background Paper is one of a number of preparatory steps that the U.S. Agency for International Development (USAID) Mission in Sri Lanka is taking in preparation for a possible project aimed at a **Technology Initiative for the Private Sector (TIPS)**. This report is based on approximately three months of in-country discussions with industry representatives, Government officials, research and development (R&D) institute management and personnel, university faculty, industrial consultants, and others (a list of persons interviewed is attached as Annex 1); study and analysis of many documents, reports and a variety of other printed matter; and direct observations of a number of industrial firms.

The analysis leading to this paper has focused primarily on five industrial sectors, namely light engineering, gems and jewelry, rubber products, food processing and ceramics. In addition to this paper, four case studies have been conducted covering the light engineering, rubber products, ceramics and gems and jewelry industries; three workshops have been held with industry representatives from the areas of light engineering, rubber products and gems and jewelry; and a survey of sixty firms, in sixteen industrial sectors, has been carried out.

This paper was prepared under a contract with the Agency for International Development, but the views expressed herein are the sole responsibility of the author and the International Science and Technology Institute, Inc., and do not necessarily reflect the views of A.I.D. or its mission in Sri Lanka.

THE OVERALL APPROACH

Industrial Technology Development

Before competing on the world economic stage, countries often protect their companies and industries with various kinds of trade barriers and subsidies. As Sri Lanka and other developing countries are rapidly discovering, these approaches to assisting industry are becoming more and more difficult to sustain as the world moves toward a global trading community. A more subtle, and perhaps more effective, way of assisting industry is to help it improve its technological competitiveness through the implementation of programs that develop and apply a country's science and technology (S&T) resources to the growth of its productive sector. This approach was first used by Japan and, more recently, was employed by Korea, Singapore and Taiwan with impressive results. Currently, Thailand and Indonesia are rapidly implementing such programs.

Explicit industrial technology development policies, aimed at directly improving technological capability have been implemented because governments have become convinced that there are economies of scale in development activities that require public support if they are to be undertaken, as the risks associated with such activities may inhibit firms from undertaking the optimal level of investment. The international trading community also seems to agree with this position.

Project Goal and Purpose

The TIPS Project Committee has defined the project's goal and purpose as follows:

- The TIPS Project goal is to promote increased and sustainable rates of economic growth and employment in the medium and long term.
- The Project purpose is to increase the international competitiveness of private sector Sri Lankan industry by increasing the ability of firms in selected export-oriented industry to choose, acquire and master technologies.

Potential Project Focus

Sri Lanka's export competitiveness is inhibited by dated and inefficient technology,¹ resulting in problems related to production equipment, product characteristics, human resource capabilities and skills, and legal, policy and institutional structures and practices. The relationship of these problems and their effects on competitiveness vary

¹In this report, when the term "technology" is used it encompasses technical and managerial knowledge and skills, equipment and processes, research, development and engineering, infrastructure, marketing and transportation, and all other factors associated with industrial competitiveness.

from sector to sector, and within sectors. Variations can be found between companies in the same sub-sector as was clearly demonstrated in one of the four case studies conducted as a part of the TIPS planning effort. Some companies do not reflect these problems, but they are the exceptions.²

Most USAID and other donor supported science and technology projects have been primarily oriented toward institution building.³ However, unlike most donor supported science and technology projects, the proposed TIPS Project does not have an institution building emphasis. Perhaps it would be useful to comment on the difference between the TIPS Project and the program proposed for Sri Lanka by the USAID consultant, Charles Weiss, Jr., based on his framework developed in Scientific and Technological Constraints to Economic Development: An Analytic Cross-Country Framework. Weiss assessed science and technology development and its contribution to economic development. He then suggested ways to further develop the S&T infrastructure such that it could contribute further to economic development. The TIPS Project design has conducted needs assessments of selected Sri Lankan industries and, based upon these, has developed a program of "technology" support to meet these needs. As different needs were assessed, it is not surprising that there are differences in the TIPS Project and the one proposed by Weiss.

The focus during the TIPS Project design has been the needs and problems of Sri Lankan industry. It is perceived that in the current Sri Lankan environment, the direct approach of the programs listed below will be more likely to have the targeted effect. That is not to say that institution building can not be achieved within the context of the Project. Indeed it can; but this will depend on the aggressiveness with which Sri Lankan institutions work with industry, or vice versa, to take advantage of the Project and thus contribute to achievement of the overall Project purpose. The Project thus has an

²The state of Sri Lankan technology is described in documents such as the World Bank 1988 "Staff Appraisal Report: Sri Lanka: Third Industrial Development Project;" a 1989 report by the former World Bank Science Advisor, "Scientific and Technological Constraints to Economic Development;" the 1986 RONCO Consulting Corporation report, "A Study of Food Processing and Product Development Technology: Sri Lanka;" and four 1989 USAID case studies focusing on the industrial sectors of light engineering, gems and jewelry, ceramics, and rubber products.

³This includes the USAID and InterAmerican Development Bank (IDB) S&T projects in Brazil in the 1970s, the subsequent USAID S&T projects in Indonesia, Egypt and Thailand and the IDB S&T projects in Columbia and Mexico as well as the current one in Costa Rica. The current USAID S&T projects in India seem somewhat mixed with the Program for the Advancement of Commercialization of Technology focusing on support to U.S.-Indian joint ventures and the Center for Technology Development project having an institution building objective. The S&T component of the World Bank IDP III program in Sri Lanka is predominantly oriented toward institution building.

objective of *institutionalizing practices* in the private sector which could be of major importance to the future industrial growth of the country. These practices include conducting industrial RD&E on a systematic and planned basis within firms, providing in-house company training for employees based on training needs assessments and plans, creating a self-sustaining industrial information unit whose existence would depend upon meeting the information needs of industry, and enhancing and institutionalizing a dialogue between industry and Government.

It is proposed, because of the limited resources available, that the Project focus on a relatively small number of sectors so as not to distribute the activities so thinly that little or no impact will be achieved. In the sectors examined, there is the possibility for the project to have major national benefit. For example, it appears that in the gems and jewelry sector alone, thousands of jobs could be created if the sector can be stimulated to achieve its full potential.

In estimating program and Project costs, it has been assumed here that the Project will focus on four selected industrial sectors and will be a six year project with five effective years of work.

The programs described below are proposed based on an analysis of the problems facing Sri Lankan industry in increasing its international technological competitiveness, the programs of other donor agencies that are focused on these problems, the various technological initiative options available to USAID (See Annex 4) and various factors and considerations that influence the environment of the Project. They have been designed to be mutually supportive and provide a holistic approach to achieving the project's purpose, that is, to increase the international competitiveness of private sector Sri Lankan industry by increasing the ability of firms in selected export-oriented industry to choose, acquire and master technologies. A major concern for overall Project management should be ensuring supportive and synergistic relationships between various programs and program elements. The programs fall into the following five areas:

- Rationalizing Policy, Regulations and Procedures;
- Human Resource Development;
- Company Directed RD&E;
- Industrial Information; and
- Special Projects.

These five areas are discussed in the following sections. Each section discusses current problems, their implication for TIPS and proposed project activities.

RATIONALIZING GOVERNMENT REGULATIONS, POLICY AND PROCEDURES

The Problems and Their Implications for TIPS.

In all four areas in which TIPS case studies were conducted, i.e., gems and jewelry, food processing, ceramics, rubber products and light engineering, sector-specific regulatory, policy and procedural barriers exist to developing the export market and are concomitantly discouraging investment in increasing levels of technology. In addition, there are constraints of this nature that are general to all Sri Lankan industry. Annex 2 provides a preliminary list of descriptions of both general and industry-specific policy, regulatory and procedural constraints to increasing the technological competitiveness of Sri Lankan industry.

As an industry-specific example, it was noted at the gem and jewelry workshop that the State Gem Corporation gold assay is not generally accepted in international trade because the Corporation is a manufacturer and is therefore not viewed as an impartial testing body. (See Annex 3 for summaries of the three industry workshops.)

As a more pervasive example, it was pointed out by participants at the light engineering workshop and also in a USAID note on non-technical factors constraining industry,⁴ that labor legislation is complex and confusing. It virtually prohibits termination of employees except at great expense in time and money for litigation. A large number of non-working days per year (150-160) lowers labor productivity and makes the effective interest rate of money per working day even higher relative to businesses in other countries of the region. Legislation has created a system that does not reward productivity.

Participants in the rubber products workshop discussed examples of Government/bureaucratic impediments in areas such as importing materials or making a change from an agreed-upon Greater Colombo Economic Counsel (GCEC) business plan. These constraints to success were perceived as more important than technology acquisition. It has been perceived that a commitment is needed from the government in order to resolve these problems. One participant noted that in the past, the occasional meetings with government officials have resulted in decisions but there is no follow-up because there is no commitment.

As a final example, a quote is taken from a paper prepared by an official of the Ministry of Finance, "In the public eye, the Sri Lankan economy is relatively free of economic policies that distort the course of technological development. . . . In practice, however, some of the key implementing agencies do not favor such an environment. Frequent agitations have been made to reverse the policy environment in favor of

⁴Hadley, Stephen. Non-Technical Factors Affecting Sri Lanka's Export Competitiveness. USAID-Sri Lanka, November 1989.

regulations and differentiations of various types. Thus, in the eye of the technology user the policy environment is still unstable and unpredictable."⁵

In summary, government policies, regulations and procedures often change. There is a burdensome number of approvals required in day to day operation of business as well as opportunity for special treatment. Government regulatory and approval machinery work on their own schedule and often in an ad hoc fashion. In this environment, management can probably benefit more by manipulating government machinery than through marginal technological improvements. This has the following implications for TIPS:

- Because of company management's preoccupation with manipulating government machinery, for TIPS to have an impact in this environment, an active program offering direct company interventions will be required as opposed to setting up more passive institutional mechanisms which companies could make use of at their own initiative. The Project will most likely have to market itself rather than wait for companies to take the initiative.
- A TIPS program aimed at improving the regulatory, policy and procedural environment, in which companies must operate, could have significant benefits. Such a program would have to be conducted on a sector by sector basis and would include sector analyses, recommendations, and an educational component aimed at key governmental offices. At industry workshops, scheduled as a part of the TIPS planning effort, it was noted, with some disdain, that government officials are more receptive to recommendations of this type if they are proffered by foreigners.

Defining the Problems

The objective of this program element is to identify and clearly define governmental controlled or influenced constraints to Sri Lankan industrial development and competitiveness and propose approaches to mitigate them. Some of the constraints identified in Annex 2 are general to industry as a whole, others are sector specific. Examples are:

- Effective tariff protection for import-competing industries exceeds that for export-oriented industries, thus biasing investment away from exports.

⁵Piyadasa, G.A. Issues in the Development of Industrial Technology in Sri Lanka. Department of External Resources, Ministry of Finance, May 1989.

- Gold may only be imported in strictly controlled quantities and under regulatory procedures that jewelers find so onerous that almost all rely heavily on black-market sources which are about one-third more than the prevailing world price.
- The Central Bank's concessionary financing schemes are not applicable to the specialty rubbers, centrifuged latex and sole crepe, as they are not categorized under non-traditional products. This distorts investment within the rubber manufacturing industry.

Alleged constraints such as these would be studied and analyzed under this program element.

Promoting the Solution

This program element goes hand and glove with defining the problems. It is only separated for emphasis. Too often, major resources are spent on studies leading to reports that only fill bookcases. Within this program, it is expected that at least as much effort will go into "selling the results" of studies as was exerted in conducting them. This effort will start with the Industrialization Commission, or another contact organization, involving it in the selection of issues, their analysis and subsequent advocacy of appropriate approaches.

Activities under this program element will include:

- Publicizing the existence of this program in the media, through industrial association meetings and with Government officials;
- Involving key Government officials and industry leaders in identifying needed studies and analyses, to begin with, and maintaining their involvement in the conduct of these to create a feeling of vested interest;
- Publicizing the results of studies and analyses through the media;
- Conducting workshops with leading industrialists and senior Government officials;
- Individually briefing key Government officials;
- Involving industry associations in publicizing conclusions of studies and analyses;
- Hosting symposia to which leaders of Government and industry are invited; and

- Briefing top level Government officials on the benefit to the nation of maintaining a Government-industry dialogue on ways to achieve agreed upon national goals, using the examples of Japan, Korea, Taiwan and Singapore to demonstrate the validity of the thesis.

It is anticipated that this program will be conducted by a Sri Lankan subcontractor. In light of the importance of this area, however, and because of industrialists' advice that changes in the area of policy, regulations and procedures can often be more readily effected by foreigners, a U.S. member of the overall Project management team should participate in this program. Assuming it occupies four senior Sri Lankan professionals, one in each of the selected sectors of emphasis, for five years, it will cost about \$350,000. This does not include the cost of participation of the U.S. Project manager. In this program area as well as others discussed later, activities similar to those described in the program area have been employed in other countries. Japan, Korea, Taiwan and Singapore have all had very effective government industry dialogues of the type this program is aimed at creating in Sri Lanka. The USAID Science and Technology for Development project in Thailand has a policy studies component. While some of the studies that it has supported have been widely referenced, there is little evidence that it has yet contributed significantly to the development of a government-industry dialogue on important issues to industrial competitiveness and growth in Thailand. However, the current program management is now orienting the program in this direction.

In Sri Lanka, the World Bank is reportedly involved in a review of the tariff and tax structures with a view toward explicit encouragements to industrial technology development. Studies of technological obstacles to the development of the textiles, food and crop processing, chemical, rubber products, plastics, furniture and engineering industries are planned. Also a study for the long-term development of financial mechanisms for industrial technology development is planned by the Bank in early 1990.

USAID-Sri Lanka is in the process of establishing a Policy Support Unit. There should be close cooperation between this Unit and the program being proposed in this document.

The Economics Development Board (EDB) conducts industry sector analyses which explicitly examine Government policy, regulatory and procedural constraints. It also sponsors the Exporters' Forum where Government and industry representatives may discuss issues.

The Natural Resources, Energy and Science Authority (NARESA) of Sri Lanka reportedly conducts policy studies. A tentative impression is that these are fairly academic.

HUMAN RESOURCE DEVELOPMENT

The Problems and Their Implications for TIPS

In the analyses of the gems and jewelry, light engineering, and food processing sectors, specific bottle-necks were noted that require technical training to correct. In the ceramics and rubber products sectors, it is clear that inadequate training of personnel has led to problems in choosing, acquiring, and mastering technology. After surveying the food processing industry, a RONCO report (see Footnote 2) concluded, "Further facilities for training are required for all commodities at different levels of technology, especially with regard to storage and infestation control, sun-drying and village-level fermentations."

The TIPS case study of the gem and jewelry industry's technological practice and potential provided recommendations for USAID. Two of these recommendations were to support ". . . long/short-term technical assistance and training aimed at private-sector firms" and ". . . training/consulting aimed at organizational and management improvement."⁶ Similarly a recommendation of the light engineering case study stated that "During development of the improved technology, training may be required for the professional staff in new skills and techniques needed for the R&D process. After the development of new technologies and the introduction of high technology equipment--computers, monitoring equipment, etc.--training of the work force in their use will be required."

Industry participants in the light engineering workshop stressed the need for training. Specific areas of need for the sector were identified as quality awareness, project management and managerial skills. Assistance with conducting in-house training was strongly recommended. These need to be long-term or continuing programs. Two specific areas in which training is needed by the light engineering sector are on the operation of computer numeric controlled equipment and in foundry technology.

The Chairman and Chief Executive Officer of what is considered by some to be Sri Lanka's best managed company also mentioned the need for better management skills. He noted that management and employees of Sri Lankan firms often have difficulty in jointly working toward common goals. In his company, a management by objectives system has helped overcome this difficulty. In his opinion a training program that would assist other Sri Lankan firms in implementing such a system would be a major contribution for a project such as TIPS.

⁶Baldwin, Pamela. Colored Gemstones and Jewelry: A Case Study of Technological Practice and Potential. USAID-Sri Lanka, October 1989.

At the gem and jewelry industry workshop, "There were mixed views among participants about the desirable mix of public and in-house training. About half of the participants suggested that there should be an increase in Government sponsored training. . . . Others insisted that the private sector needs its own training programs and that short training programs in specialized areas should be conducted in individual companies."

Also, a shortage of engineers and scientists in fields relevant to Sri Lanka's economic development will be a constraint to human resource development. Universities have been closed for three years and there has been a substantial loss of faculty to other countries. A World Bank consultant has noted that in ". . . fields such as computers and electronics, the upgrading of Sri Lankan industrial technology is already inhibited by a lack of professional personnel." The report proceeded to provide an example where ". . . a major electronics manufacturer declined to invest in Sri Lanka because of a lack of electronics engineers, depriving the country of a major opportunity to develop technological capacity in this explosively expanding industry." Also at lower levels of technology, industrial constraints due to a lack of skilled personnel have been noted. For example, industry representatives have reported that a lack of skilled lapidarists is an impediment to growth of the gemstone industry. The implications of this for TIPS are:

- TIPS should place a low priority on activities that would involve universities.
- TIPS should look for opportunities to support technological and engineering training through other mechanisms, for example by subsidizing company in-house training programs that meet a set of USAID requirements.

Proposed TIPS Program Element

It is proposed that the TIPS Project experiment with a leveraged approach to meeting the nation's industrial manpower requirements that will not depend upon the university system. The proposed program focuses on encouraging companies and industrial associations to provide internal training programs for their staff. Also in other TIPS program areas, described in this report, additional human resource development activities are suggested.

Industrial firms should be in a position, possibly with some assistance, to identify their training needs and may have some of the expertise for such training. TIPS will encourage firms to set up their own in-house training programs, where the training may be conducted in-house or at existing training institutions, by providing grants to cover some of the associated costs. These may include trainee living expenses, instructor salaries, training aids and materials, and tuition for institutionalized courses. TIPS will encourage small and medium sized firms to systematically plan for the training of their work forces by providing grants to partially cover the cost of hiring consultants to assist them in conducting training needs analyses leading to worker training plans.

Similar grants and assistance will be provided to industry associations which wish to initiate training programs for their member firms in skill-intensive areas. In addition, large firms with local suppliers may wish to initiate training programs for staff and management of supplier firms. TIPS will encourage and support such technical training.

It is expected that TIPS will provide 40 such training and planning grants over the life of the project. Assuming the average grant will be for \$25,000, this program will cost \$1,000,000. This does not include the cost of managing this program which will include close interaction with Government ministries concerned with human resource development.

The Ministry of Industry's "Strategy" statement has called for the initiation of a program similar to the one described here. Therefore, a program consideration will be the possible transfer of this activity to the Government once USAID funding comes to an end. This could include providing the Government a long range plan at the program's conclusion.

A program of this nature has been supported by the government of Singapore for many years.

COMPANY DIRECTED RD&E

The Problems and Their Implications for TIPS

Technology Choice, Acquisition and Mastery

There is a need within Sri Lankan industry for assistance with risk assessments associated with technology acquisitions, and the process of choosing, acquiring, efficiently operating and mastering technology. Much of the problem appears to lie with the management of the above activities but it is also clear that inadequate information on available processes and production equipment as well as on product markets contributes to management problems.

An extreme case of these problems is described in the USAID case study, "Rubber and Rubber Products Industry: A Case Study of Two Sri Lankan Companies in Liquid Latex Rubber Based Products," where a firm that had been set up to produce rubber thread had been placed in liquidation. The problems were summed up in the case as follows. "On reflection one may identify several pitfalls that [the company] may have avoided. First, . . . [the company] should have refined their upstream technologies (production of high quality latex concentrate) prior to committing themselves to a more sophisticated downstream technology. Second, [the company] did a poor job in choosing a new venture. Their new venture had no technological synergies with their existing operation. Consequently, they were not merely tackling a marginal increment in technological sophistication but a quantum leap. Third, they made critical mistakes in choosing the vendor. Clearly they did not have the ability to sieve the information on different technologies and choose the right one. Fourth, they did not react to the line problems in adequate time. Clearly they were ill equipped to experiment and adopt the technology to suit operational conditions. Additionally, they should have obtained some external assistance at an earlier date, with a greater sense of urgency. Finally, both the management and the board had no inkling regarding the time-span required to handle a technology- intense project. The method by which they funded the program with high gearing without hedging against currency risk, and the lack of a contingency plan for funding the growth pains of the project indicate that the technological hiccup came as a major surprise to the management."⁷

A further example was supplied by the USAID case study of the ceramics industry: "The record of technology management in the ceramics industry is, on the whole, no better (but probably no worse) than in other industrial sectors in Sri Lanka. Joint ventures (notably Ceylon Ceramics with Noritake) have done alright, but efforts to 'go it alone' have been plagued by what one would imagine are preventable problems. For example, Dankotuwa was started with experienced personnel from Ceylon Ceramics/

⁷Nanayakkara, Manohan. Rubber and Rubber Products Industry: A Case Study of Two Sri Lankan Companies in Liquid Latex Rubber Based Products. USAID-Sri Lanka, November 1989.

Noritake. Their expertise was of course in Japanese technology. The management decided, however to purchase German kilns and technology. The result was predictable: although the supplier provided some training and technical assistance, the quality record in the early going was dismal, with reject rates running at about 95 percent. The record has improved since, but the reject rate remains too high."⁸

Industry's need for better information on technology, equipment and international markets was a consistent theme in workshops, held with industry representatives from the light engineering, rubber products, and gem and jewelry sectors. Typical of the comments is the following quote from the report on the latex product manufacturers workshop. "Several participants complained about the difficulty 'accessing' overseas technology, specifically:

- What products are available?
- What consultants and skills are available for hire?
- How do you find these things out cheaply?
- Once you find out, how do you get it cheaply?

At least one person said that what you really need is a rep overseas (U.S., Japan, etc.) to find things out for you and be discreet about it."

A survey of 60 exporters by the Sri Lanka Business Development Center, conducted as part of the TIPS planning activities, showed that over 90 percent of industry believes there is a lack of institutional support in the country for screening technologies. Despite this perceived lack of institutional support, two-thirds of those surveyed believe that they are using the best available technology to meet aspects of market demand such as quality standards and consumer taste. In general, this is in contrast to the findings of the USAID cases, World Bank findings, and assessments of industrial consultants. Company management perceptions so divergent from expert opinion may be further evidence of the lack of information in Sri Lanka on what technology is available globally.

Quality Control

Quality control, related to efficiently operating and mastering technology, is a problem in the rubber products, ceramics, gems and jewelry, and food processing sectors. It may also be a problem in light engineering as there is perceived to be a need for introducing computer numeric controlled equipment.

⁸Ernst, Ulrich F.W. Case Study of the Ceramics Industry--Lessons for STIPS Design. USAID-Sri Lanka, September 1989.

From the reject rate noted in the previously cited ceramics case, there was clearly a massive quality control problem. Also in the rubber products case it was noted, "From the inception the plant experienced serious problems in quality resulting in a massive rejects rate."

In the USAID case study, "Colored Gemstones and Jewelry: A Case Study of Technological Practice and Potential," it is noted, ". . . the technologies now in use in Sri Lanka are, for the most part, not fully responsive to the standards set by global markets and competing suppliers. In addition, where up-to-date technologies are in place, they often are not being properly managed; they are not used to capacity or according to the specifications of the equipment manufacturers, and are not properly maintained. Quality control is often poor, and the necessary skilled labor is not being developed and applied in sufficient number."

A report of the former World Bank Science Advisor, referenced in Footnote 2, had this to say on the subject, "The immediate problem of Sri Lankan industry is to gain access to the higher quality segments of world markets--the segments where the most rapid growth is being experienced--by upgrading its standards of quality, quality control and reliability of delivery. Deficiencies in these areas are widespread in small and medium industry."

Proposed TIPS Program Elements

This program is aimed at increasing the technological sophistication of Sri Lankan industry through direct financial support. To stay, and in some cases to become, competitive, the Sri Lankan productive sector is going to have to rapidly build its technological sophistication including increasing dramatically the amount of RD&E which it conducts. This program provides Sri Lankan companies a very large and direct incentive to move in this direction. Competing countries to the east and north of Sri Lanka are all actively stimulating industrial RD&E through programs such as the ones proposed here. In India and Thailand these programs are being stimulated with USAID funding. Sri Lankan industry has to proceed swiftly in face of such competition; and this program of direct financial support to individual companies is a straightforward way to bring about an increase in the technological sophistication of Sri Lankan industry.

The program will have two methods of funding company RD&E projects, namely via grants for:

- Choice, acquisition and mastery of technology
- Improved and new products and processes through R&D

The first program element will bring industrial technology into the country primarily through international transfers of technology. The second focuses on the local improvement and development of technology.

Grants will be made in response to industry proposals. It is anticipated that the Project management will have to devote considerable effort to working with firms in developing their proposals. Once grants are made, however, the recipient firms will manage their projects; although the Project management team will monitor and be available for support where needed.

Both of these program elements will require large amounts of technical assistance. One among many sources of such assistance is the International Executive Service Corps (IESC). USAID-Sri Lanka has been funding this organization to conduct about fifteen consulting activities per year. Where appropriate IESC could be used to provide technical assistance under this program. It is assumed that this will maintain IESC's current level of activity in Sri Lanka.

Choice, Acquisition and Mastery of Technology

This program element is designed to facilitate, expedite, and encourage the process by which Sri Lankan firms gain increasing expertise and experience in the acquisition and assimilation of technologies important for the continued success and growth of the firms. The activities which the program element will support are:

- The analysis and assessment of technological options
- The mastery of technology embodied in new capital equipment

The first of the two activities encompasses systematic efforts to acquire and generate technical information needed by senior managers of firms to arrive at appropriate investment decisions, regarding:

- Whether to make a major new capital investment
- Whether to purchase, lease or to develop locally a production technology or certain components of a production technology
- The nature and source of technology and related technical services to be procured and the terms on which these technical elements should be procured

It is anticipated that the industrial technology and market information unit, described later, will be a significant resource for conducting this activity.

The second major activity encompasses efforts aimed at assimilating a technology recently acquired or to be acquired by a firm, including efforts to seek and absorb knowledge and expertise for securing an efficient production operation and for effecting technical changes and improvements in products, production procedures, processes and systems. In some cases, shop floor or administrative management training may be required to make this activity a success.

An example of a project under this program element would be a tea processing plant that wishes to install ultrasonic technology for rupturing tea leaves instead of crushing them between rollers. Such a process would provide greater rupturing the tea leaf pores and thus provide more tea per leaf. Assistance could consist of steps such as the following:

- Providing the plant engineer basic information on ultrasonic technology and its use in tea processing;
- Providing information on equipment and equipment manufacturers;
- Providing technical assistance for an economic feasibility study;
- Covering the costs of laboratory tests of sample tea leaves;
- Financing technical assistance to the firm's engineer in assessing equipment options;
- Covering the engineer's travel costs to observe tea processing facilities which use such technology;
- Financing visits to manufacturers facilities to assess first hand their technologies and to initiate negotiations;
- Providing technical assistance to the firm management in the negotiating process with manufacturers, including providing advice on options such as whether to buy the technology outright or obtain it through a lease or royalty agreement;
- Covering extra costs of having the selected manufacturer provide the plant engineer training in the process technology (not just how to operate the technology);
- Financing extra costs of having the plant engineer and his staff participate in the installation of the technology;
- Providing additional training for the engineering staff in the process technology as they gain operational experience;
- Covering cost of test equipment required to determine optimum operational characteristics of some aspect of the ultrasonic equipment; and
- Providing technical assistance to engineering staff in making minor modifications in the equipment to optimize it to specific plant conditions.

These could be typical of the activities associated with this program element. It is anticipated that most of a grant in this area would be used for items such as travel, information, training and technical assistance. While special testing equipment specifically related to mastering technology but not part of and beyond the normal operational or production equipment could be covered by this program element, it is thought that this will be a small fraction of project costs. Grants would require partial firm support for approved projects. It is likely that many will be placed and funded in phases.

An estimate of the average grant under this program element is rather arbitrary as technology acquisitions can involve efforts of almost any size. However, the USAID Science and Technology for Development project in Thailand has an activity similar to this one and they estimate that the average effort will cost about \$60,000. For planning purposes, we will use the same amount. Three new projects per year for four industries over a five year period would cost \$3,600,000. This does not cover the cost of program management which is anticipated to be substantial as it will include assistance in preparing complex proposals which will often entail bringing in short term consultants for project design purposes.

As just noted there is an activity of this type planned as a part of the USAID S&T project in Thailand. This activity, called Support for Technology Assessment and Mastery Program (STAMP), has been approved but not yet initiated. Reportedly, thought is being given by USAID/Dominican Republic to designing a project such as STAMP. Most of the components of this program element are supported by the governments of Singapore and Korea to good effect.

EDB advertises that it can support such activities as a part of an overall sector development program.

Improved and New Products and Processes

The objective of this program element is to increase the amount of industrially relevant R&D in the country as well as to commercialize new and improved industrial products and processes. Improved processes may include the introduction of new quality control procedures, techniques and systems. In the latter case, the Project will elicit the support of the Sri Lanka Standards Institute (SLSI) to seek firms to work with to develop proposals which will require its support, thus bringing it increased funding. The project will fund industry proposals from Sri Lankan or U.S.-Sri Lanka joint venture firms for projects aimed at commercializing new or improved products or processes.

The R&D may be conducted within a company or the company may propose to have part or all of the work performed by a local R&D institution; but the proposing firm must have a commercialization plan for the institutional results. Indeed, an effort will be made to enlist R&D institutions' interest in this program element by encouraging them to team up with companies to make proposals for projects. If required, some support may be obtained from foreign sources. Projects may be proposed by an individual company or by a group of companies. A company or group of companies that

proposes a project will receive any relevant proprietary rights to the results of funded projects.⁹ Companies would be unlikely to participate in this program element with their ideas and resources if they were not provided the rights to any proprietary property that might result from projects. USAID's principle objective under this program element is to increase the amount and level of sophistication of industrial R&D being conducted in the country. Allowing the companies to hold the fruits of their projects will not adversely affect this objective.

This program element could be used to support one or more potential supplier companies of a multinational or other large firm to upgrade technology to produce inputs acceptable to the bigger company. In such cases, TIPS would elicit the active involvement of the large firm. In some cases it may be appropriate to partially fund an activity of a large firm which is aimed at upgrading supplier companies' products or processes.

The program element will give priority to U.S.-Sri Lanka joint venture firm proposals. To promote and advertise this aspect of the program element, the Project will enlist the support of the Greater Colombo Economic Council (GCEC) and the Foreign Investment Advisory Commission (FIAC). Projects that offer a major increase in a company's R&D capability or which offer promise of a substantially increased industrial capability for the country will also be viewed with high favor.

A requirement for obtaining these grants will be that the companies make an investment in the R&D project themselves. This program element should significantly increase Sri Lankan private investment in R&D.

An example of a project which could be supported under this program element was proposed by one of the participants in the light engineering workshop and identified in the "Case Study of the Sri Lanka Tea Machinery Industry." Small amounts of smoke which are sometimes produced by tea processing driers can ruin the quality of an entire batch of tea. It would be valuable to have a very sensitive smoke detector to alert operators of the presence of minute amounts of smoke so corrective action could be

⁹USAID-Thailand supports a similar program element which is administered by a Thai state enterprise. Originally, companies were offered low interest loans to cover part of the cost of their R&D projects. Participating companies maintain all proprietary rights to project results. Because of poor response to the loan program, a new company directed R&D grants program has been designed. It likewise provides for all proprietary rights to remain with the company proposing the project.

It has been suggested that if the Thai company directed R&D program becomes very successful and the demand is significantly greater than the supply of funds, the state enterprise managing the program may wish to initiate a cost recovery mechanism such as providing for a royalty or equity position for the state enterprise in commercially successful ventures. This would not appear to be a likely consideration for the R&D program directed by the USAID-Sri Lanka Company.

taken immediately. The development of such a device could be the focus of a company directed R&D project. It is possible that the company wishing to develop this device would need outside help. Potential Sri Lankan sources of support are the Tea Research Institute and the Arthur C. Clarke Center for Modern Technologies. Technical assistance from abroad may also be required.

Another example was suggested by the participants of the gem and jewelry workshop. It likewise was identified in one of the USAID case studies. Dull corundum stones, called "geudas," as well as some other stones such as zircon, aquamarine, cat's eyes, can be treated with heat in various reduction or oxidation environments to enhance color, increase clarity, or bring out other desirable features.¹⁰ A heat treatment R&D project could be proposed by a U.S.-Sri Lanka joint venture company or a wholly Sri Lankan owned company and supported by the TIPS project; or a consortium of interested

¹⁰The problem and possibilities associated with the heat treatment of gemstones in Sri Lanka are well described in the following excerpts from "Colored Gemstones and Jewelry: A Case Study of Technological Practice and Potential."

"Probably no technological aspect of the gem industry is more controversial -- or more significant in its potential impact on both the local industry and on world market trends -- than that of heat treatment. In this area, above all others, Sri Lanka lags behind other countries -- not so much in ability to carry out the basic process, but in its development to an acceptable degree of reliability and its broad dissemination and use within the industry. It is estimated that only 10-15% of finished sapphires exported directly from Sri Lanka have been heat treated, while elsewhere in the world the majority of stones are treated, and wholesale buyers generally assume that treatment has been administered."

"The basic technology of heat treatment involves the use of a ceramic kiln capable of maintaining very high temperatures (generally between 1600 and 1800 degrees centigrade) over a period of several hours.... It is the presence of iron, titanium and/or chromium in corundum that causes the familiar blue, red or yellow colors. In the case of geudas, these elements have not achieved the necessary 'chromophoric' state. Heat, combined with oxidation or reduction, permits a chemical reaction that dissolves the trace elements and converts them to their color-causing states."

"The major technological challenges in heat treatment are to correctly identify the characteristics of a particular geuda stone, to predict accurately how that stone will react to a specified treatment approach, and to carry out such treatment in a manner effective in producing the desired results without causing cracks or other damage to the stone. The knowledge required to accomplish these tasks reliably is held by only a few persons in Sri Lanka, and thus gem dealers lack sufficient confidence in most cases to place their stones at risk by seeking heat treatment from others or trying it themselves. Heat treatment here is at an experimental stage, and even the level of current experimentation is very low."

companies could propose a project. The latter could take the characteristics of a major industry R&D project with one or more of the world's experts in gemstone heat treatment being brought in to help with the design. R&D institutions such as the Ceylon Institute for Scientific and Industrial Research (CISIR) and the University of Moratuwa, both of which have conducted research on the heat treatment of gemstones, could be brought into the project as well as possibly other local institutions. It could also be desirable to obtain other selected foreign support and technical assistance.

An adjunct to the company directed R&D funded projects will be technical assistance to organizations wishing to take advantage of other sources of R&D funding where the R&D would be supportive of this program element's objective to increase the amount and level of sophistication of industrial R&D conducted in Sri Lanka. There are at least three other such sources of funds available. These are the A.I.D. Program in Science and Technology Cooperation (PSTC) and the U.S.-Israel Cooperative Development Research Program both managed by the Office of the Science Advisor of A.I.D. in Washington, and the World Bank SMI III and IDP III R&D grants program managed by the Ministry of Finance through several Sri Lankan banks.

R&D projects of the type described can vary immensely in costs. However as reference points, typical projects funded under USAID's PSTC run between \$100,000 and \$150,000, and R&D projects funded under Thailand's Science and Technology for Development project tend to cost about \$200,000. If typical TIPS projects cost in the neighborhood of \$100,000 and four industries are targeted for support, this would mean that if two projects per industry were supported each year for five years, this program element would cost \$4,000,000. This does not cover the cost of managing this program element or for the provision of technical assistance in the preparation of proposals.

There has been considerable experience with activities similar to this program element. Most notably, a program of this type in Korea has greatly stimulated industry's investment in R&D. Investment in R&D in Korea now exceeds 2.3 percent of the GNP, the highest level of any other newly industrialized country and exceeding many developed countries. Based on industry driven R&D, Korea now projects that it will be investing over five percent of its GNP in R&D by the year 2000. This compares with the United States' current investment of 2.6 percent of its GNP in R&D. Sri Lanka is estimated to invest 0.18 percent of its GNP in R&D.

Both Singapore and Taiwan have similar government supported programs. There is also an activity of this type in USAID's Science and Technology for Development project in Thailand. It was initially started as a loan program but has now been supplemented with an R&D grants program. Reportedly, the loan program was not highly subscribed for two reasons. First, banks which were administering the program had little incentive to actively market the loans. Second, in addition to the terms not being significantly better than normal bank loans, the "paper work" associated with obtaining the loans was significantly greater.

The USAID Program for Advancement of Commercial Technology in India is a company-directed R&D conditional-grants program specifically targeted at creating U.S.-Indian joint ventures. Under this program, U.S.-Indian joint ventures can obtain up to \$500,000 for cost-shared R&D. A mid-term review of the Program was generally favorable.

There are company-directed R&D grant elements in Sri Lanka's World Bank SMI III and IDP III programs, totaling \$875,000. The program is less than a year old and has apparently not yet been extensively used. In addition to the recent initiation of the activity, part of the reason for the lack of use could be that no assistance is provided the companies in preparing proposals and they may be having difficulty in doing this on their own. Also according to the Ministry of Finance, who administers the program, it has not been well advertised as yet.

The EDB reports that it can support an R&D effort directed toward an industrial sector but would not be able to provide a grant to an individual company. The MOI "Strategy" statement calls for a program such as the one described in this program element.

INDUSTRIAL INFORMATION

The Problems and Their Implications for TIPS

One of the most commonly heard concerns from industrialists in Sri Lanka is their lack of access to information on technology and markets. This was a theme of the industry workshops, the USAID case studies and the sixty-company survey. This program will also be of significant importance to the Company Directed RD&E program element.

RD&E institutional support seems weak in all the areas examined with strong evidence pointing to the lack of linkages between commercial and RD&E interests. However, there are a few possible exceptions. The SLBDC survey suggests the Sri Lanka Standards Institute (SLSI) may be an institutional exception to the general situation. Impressions obtained on visiting SLSI lend credence to this. Other possible exceptions are the Tea Research Institute, the Rubber Research Institute and the Arthur C. Clarke Center for Modern Technology.

An example cited from the ceramics case study suggests part of the reason for the weak linkages. The case found, ". . . further confirmation of the need for strengthening ancillary technical services. I was told that plant managers cannot rely on the results of chemical and physical tests conducted on raw materials (clay, feldspar, etc.) by a single laboratory, and therefore often resort to parallel tests--for example, giving samples of a particular batch to both the Ceramics Research Laboratory and the CISIR."

A memorandum on the light engineering industry workshop summed up the industry views of the participants as follows: "Neither the Government research institutes nor the universities are responsive to industry's needs. . . . Some thought that an AID program that would support institute researchers to work on industry problems may be useful. Others disagreed, stating that these organizations were completely useless. It was noted, however, that the more focused institutes like the Rubber Research Institute and the Tea Research Institute were more effective than the broader institutions such as NERD and CISIR."

In agreement with these views, the SLBDC survey of 60 firms found that, ". . . a significant majority of those surveyed were of the view that the availability and quality of different types of institutional services in Sri Lanka was, in general, inadequate or lacking."

Market Isolation

Sri Lanka's isolation and lack of international business recognition as a significant market puts firms at a disadvantage in trying to initiate dialogue with suppliers of technology and equipment, particularly when the Sri Lankan firm does not know exactly what it needs. The implications of this for TIPS are:

- Sri Lankan industry needs a data base or some other mechanism to inform managers about technology, equipment and parts including up to date specifications and prices so that they will be able to be more specific in their searches for technology, equipment and parts. This will also help Sri Lankan firms in locating markets.
- An in-country resource for interacting with foreign suppliers of technology, equipment and parts as well as potential joint venture partners and markets, on behalf of Sri Lankan firms, is needed.

Proposed TIPS Program Elements

Technology and Market Information

This service, to provide Sri Lankan businesses with a one-stop technology and market information unit, will be set up in an existing Sri Lankan organization. The service will help industrialists locate export markets; patent information; and needed technology, equipment and parts from Sri Lanka as well as abroad. The service will offer information such as basic market requirements, trade contacts and detailed market studies obtained from local and international data bases. It will provide information on sources of foreign technology, equipment, and parts, as well as their specifications and costs. The service will also maintain information on Sri Lankan technologies and products.

Possible homes for an information unit of the type envisioned would be the Sri Lankan Business Development Center, the Arthur C. Clarke Center or the Export Development Board. The unit will likely subscribe to data bases, maintain hard copy information and participate in electronic bulletin board and mail services. It can make arrangements with the commercial offices of Sri Lankan embassies to have trade and joint venture enquiries sent to the unit. One of its first activities would be to conduct an industry information needs assessment. It is estimated that this program element will cost \$160,000.

Science and technology information programs have been supported under many USAID projects. The results have been mixed but have probably produced more failures than successes. One reason for this is the tendency of these programs to focus on their own operating technology rather than on the information needs of a well-identified clientele. USAID has spent a large sum on a science and information center under its S&T project in Egypt. Statistics several years after the center had been in operation demonstrated little usage of the facility. A similar facility is being created under the USAID S&T project in Thailand with what will likely be a similar result. In both of these programs the focus has been the technology of the center and electronic linkages with other "information professionals."

One centrally funded A.I.D. information project which was considered a success, focused on supplying information to industry. It also had a liaison component similar to the next program element described in this document. Most of the information industry was interested in dealt with equipment specifications, prices and sources.¹¹

Perhaps the most successful industrial information service aimed at linking business interests between countries is the Japanese private organization JETRO. This organization assists business people in Japan and the host country exchange information on equipment, markets and potential joint venture partners. This is done through publications, exhibits, industrial missions and the maintenance of information centers in host countries which supply extensive information on Japanese products and companies. Reportedly, this organization receives financial assistance from the Japanese government. Sri Lankan industrialists have been highly complimentary of the service here.

In Sri Lanka there are several information centers that maintain information that may be of interest to industry. These include the EDB, the Arthur C. Clarke Center, CISIR and the Industrial Development Board. Reportedly, Canada sponsors a Centre for Industrial Information Services.

Under the World Bank's SMI III project there is \$25,000 provided to develop an industrial technology data base for lending institutions and small and medium sized firms. The funding includes a provision for a feasibility study of a Sri Lankan organization modeled after the Korea Development Technology Corporation.

U.S. Liaison Office

Sri Lankan industrialists have difficulty in getting U.S. companies to respond to enquiries. Even the largest companies, for example Hayleys, report having this problem. This lack of responsiveness may result from U.S. industry's perception of Sri Lanka as a small distant market. To assist Sri Lankan industry further in obtaining technology and market information, a small U.S. liaison office is proposed. This is envisioned as a mechanism of limited duration to initiate better communication between Sri Lankan and U.S. firms.

This office will make telephone contact with markets, and sources of technology, equipment and other products of interest to Sri Lankan businesses. It can provide support to Sri Lankan business representatives coming to the States by helping locate and make arrangements for meetings with relevant U.S. business people. Finally, it can serve as an information source on the Company Directed RD&E program element under which U.S.-Sri Lankan joint ventures may be supported.

¹¹This was a project funded by the old Office of Science and Technology and was part of a contract with the Denver Research Institute aimed at increasing the effectiveness of industrial research institutes world wide.

It is expected that this activity will start off slowly; but as it and the information center become better known to the Sri Lankan business community, usage is expected to grow rapidly. Two days of support per week, on the average over the five year active life of the Project, is envisioned. For reasons of synergy and economics, it would probably be best to have this activity provided as a part of the U.S. Project management contractor's responsibilities. The cost of a five year activity is estimated to be \$260,000.

Under the USAID-Thailand S&T project there is a liaison office run by the National Research Council's Board on Science and Technology for International Development. This appears to be a helpful and effective activity.

SPECIAL PROJECTS

Competition and Demand for RD&E

Due to the historical inward looking economic environment and to past protection of domestic firms, there is a lack of company competition based on product cost and quality. This means services of RD&E institutions are not in great demand. Also as management of these organizations are more academic than client oriented, generally there will be little industry use of their services. However, specific exceptions will occur when exceptionally client oriented management or staff happen to be in an organization. Export oriented industries will be more receptive to technological change because of the more competitive environment in the international market, than those which only market domestically. Also, because of the security environment, multinational and other large firms have a greater than normal motivation to be socially conscious. The implications for TIPS are:

- For RD&E needed from institutions by firms, give the funds to the targeted companies to spend where they can get desired results.
- For institutions which wish to move toward an environment where there is a "client-sensitive" situation, consider providing these institutions technical assistance in devising, as well as promoting with their controlling bodies, the implementation of such systems.
- General institution building support for these institutions would likely not contribute to achieving the Project's goal.
- Focus the Project on export-oriented industry.
- There is an opportunity for "backward linking" with local supplier networks which can be organized and given technical assistance and other support by TIPS. This would assist in diffusing technological improvements to smaller firms.
- There is also an enhanced possibility for multinational firms to establish technology skills training programs open to the public in new areas of technology emerging in Sri Lanka such as the operation of computer numeric controlled devices, advanced lapidary techniques, rubber processing technology and precision engineering.

Also, undoubtedly, opportunities or problems will arise during the course of the Project that it will be desirable to respond to those that do not fit neatly into any of the program areas described in the section above. For example, the Sri Lankan Embassy in Washington is seeking support to establish a Sri Lankan expatriate association for the purpose of identifying expatriate sources of technical assistance for Sri Lanka. This could also be useful to the Project as a way of identifying potential sources of technical assistance needed in the Project. Several larger possibilities follow.

Proposed TIPS Program Elements

Special Emerging Technology Training Programs

Under this special project USAID could encourage multinational firms as well as large local firms and business consortiums to set up training centers. These centers could offer diplomas to high school graduates who successfully complete a curriculum oriented toward skill-intensive industry as well as continuing education courses for practicing engineers, technicians and managers. Courses would be encouraged in technologies and concepts of emerging importance to Sri Lankan industry such as automation, advanced lapidary skills, precision engineering including computer numeric control, CAD/CAM, just-in-time inventory systems, value engineering, industrial management and biotechnology. Singapore has been quite successful in arranging such programs with multinationals like IBM and Philips. Recently, Toshiba-Thailand announced that it was going to set up a technology management training center in Thailand. In Sri Lanka, Mitsubishi Motors Corporation and United Motors Lanka Ltd. have opened a course on passenger car and four wheel drive vehicle maintenance with support from the Japanese government.

A Sri Lankan Industrial Contract RD&E Organization

Under this special project, assistance could be provided to a private organization to become a viable RD&E business. Such an organization could be a spin off from a large firm. The organization could be a profit or a non-profit firm. This situation could be particularly attractive if the new RD&E organization had RD&E capabilities that were in demand by other TIPS program elements. The Project could, for example, help by providing technical assistance to set up a management information system as well as providing management consulting and training support.

A Technology Business Incubator

The purpose of this program is to provide necessary facilities and support to new technologically oriented companies to help them reach the stage of being successful businesses. The Arthur C. Clarke Center is taking the lead in an effort to establish such an incubator as an independent company in which the Clarke Centre and others would hold an equity position. At present, investment is being sought from Sri Lankan and foreign private sources as well as other Government entities such as the Greater Colombo Economic Commission, the Employees Trust Fund, the National Development Bank of Sri Lanka, the Export Development Board, the University of Moratuwa and the Computer and Information Technology Council of Sri Lanka.

Incubators for scientifically and technologically oriented businesses would normally offer facilities and services such as office and laboratory space; access to computer technology and support; consulting support on project assessment, investment proposal preparation and sources of financing; patent and other information searches; access to specialized equipment and technical facilities; and product and prototype evaluation and testing.

The TIPS Project could support the development of Sri Lanka's first technology business incubator by providing it a matching grant to meet some of its start up costs.

To enable response to such special project activities, \$1,000,000 is proposed to be set aside for this purpose.

THE PROJECT OVERALL

Technical Assistance

It is assumed for determining Project costs that Project management will be conducted as a joint venture between U.S. and Sri Lankan firms. A total of 10.3 U.S. person years and 25 Sri Lankan person years has been programmed. Of this, 2.3 person years of U.S. time and ten years of Sri Lankan support is estimated to be needed for short-term technical assistance in addition to that which can be provided by the resident team.

Part of this support will be to conduct local industry needs assessments and international technology and market forecasts for each of the four industries selected for Project emphasis at the beginning of the Project. These assessments and forecasts will be of importance to Project management in assisting industry design activities under both the Company Directed RD&E and Industrial Human Resource Development programs. Additional specialized technical assistance will be needed on occasion for assisting in project planning and proposal preparation under the Company Directed RD&E program.

The joint venture team will, in addition to conducting the proposed initial four industry needs assessments and forecasts and providing overall Project management, manage the two program elements of the Company Directed RD&E program and provide the majority of technical assistance needed in proposal preparations. It will also interact with Government organizations such as the GCEC and the FICA to promote the joint venture commercialization of new and improved products and processes. It will encourage RD&E institutes to work with industry to commercialize results they may already have or to help firms with their own company identified RD&E; manage the Industrial Human Resource Development program and interact with relevant Government agencies during the program and at its conclusion transferring the program with a long range plan to a Government agency; coordinate the two Industrial Information tasks with other Project elements; participate in and coordinate the Government Policy, Regulatory and Procedures program; and develop and manage the Special Projects program.

As the Project is designed in this report, it is envisioned that the Project management team will supply technical assistance to firms in the preparation of their plans and proposals. Once a grant is provided a company, however, it will obtain the technical assistance from other sources and with money that is allocated to the various grant funds. The Project manager will need additional technical capability to monitor the grants and if the in-country management team happens to have the necessary technical capability to supply needed technical assistance, this may be done. However, it would have to be funded out of the management contract and not from the grant funds which would not be available to the Project management contractor. This is somewhat arbitrary. However, separating the two forms of technical assistance should guard against a bias the Project manager could have to influence firms to design projects that would utilize the staffing capabilities of the Project manager's company rather than what is best for the firm being assisted. It does not prevent the Project manager from giving

needed assistance, but as there are limited funds in the contract, the tendency will hopefully be to use the grant funds to find the best available technical assistance to meet the grantee's need.

The estimated total cost of the joint venture contract is \$2,857,500.

Contingency and Total Project Costs

To cover inflation, salary increases and contingencies an amount of 15 percent of the sum of the above costs is programmed. This amount is \$1,984,125. This brings the total Project cost to \$15,211,625. The following table presents estimated costs by program element:

ESTIMATE OF TIPS PROJECT COSTS	
<u>PROGRAMS</u>	<u>COSTS (\$)</u>
POLICY, REGULATIONS AND PROCEDURES	350,000
HUMAN RESOURCE DEVELOPMENT	1,000,000
COMPANY DIRECTED RD&E	
Choice, Acquisition and Mastery	3,600,000
Improved and New Products and Processes	4,000,000
INDUSTRIAL INFORMATION	
Information Unit	160,000
U.S. Liaison Office	260,000
SPECIAL PROJECTS	1,000,000
PROJECT MANAGEMENT & CORE TECHNICAL ASSISTANCE	2,857,500
CONTINGENCY	1,984,125
PROJECT TOTAL	15,211,625

Potential Industry Focus

TIPS has \$10,000,000 to \$15,000,000 available. This compares with the approximately \$200,000,000, in current dollars, that was required to establish the Korea Institute of Science and Technology and \$400,000,000 called for in current proposed legislation in Thailand to develop and marshal that nation's national S&T system in support of Thai national productivity. Some degree of focus needs to be incorporated in the TIPS project--possibly by industrial sectors--to assure that the impact is not so diluted as to be imperceptible.

Five criteria are proposed for consideration in selecting industries on which to focus the TIPS:

- Probability that technological inputs can contribute to the industry's competitiveness;
- Demonstrated willingness of industry owners/managers to work with USAID in support of the TIPS program;
- Potential for value added foreign exchange earnings;
- Potential for employment generation; and
- Potential for contribution to national economic growth.

The gems and jewelry sector would score high on all five of the criteria. The first criteria, probability that technological inputs can contribute to the industry's competitiveness, is particularly significant because of the potential for heat treating Sri Lankan corundum and other stones to produce high quality gems and the relative early stage of development of this technology. The potential for generating employment in this sector appears to be dramatic.

Food processing should also score high on most of the criteria. Biotechnology is an area experiencing explosive scientific and technological growth and is of direct relevance to the food processing sector. On first look, it does not appear to be a very labor intensive area in and of itself, however, it is an area that must be developed if the food crops sector is to grow, and this is labor intensive. So far, there is little basis for an estimate of this sector's reaction to a TIPS Project; but there is no reason to think the sector would not be receptive.

Biotechnology is also relevant to the rubber products sector. With the opening of Ansell Lanka, Ltd., the possibility arises for significant transfers of international technology in this area. The sector should rate high on most of the other criteria.

Ceramics is an area with large employment potential. The USAID case study has noted the potential for the development of product design capabilities in Sri Lanka. Most of the raw materials for the industry are available here. One drawback that has been cited is that there is large public sector involvement.

The Sri Lankan light engineering sector is one that is supportive of most other manufacturing sectors or theoretically could be. During the TIPS background analysis, we have seen that it is supportive of three of the four sectors in which case studies were conducted. In terms of net foreign exchange value added, it would likely rate lowest of the five sectors examined.

Security Environment

The security situation mitigates against major technology investments for technological advantage. Incremental factory floor and shop room improvements as well as technology adaptation rather than development from scratch are more likely to receive management approvals. USAID should consider making factory floor technical assistance a priority.

REMAINING ISSUES TO BE RESOLVED AND SOME SUGGESTIONS

Industry Focus

It is suggested that four industry experts be brought to Sri Lanka in the areas of gems and jewelry, food processing, rubber products, and light engineering to conduct preliminary industry needs assessments and forecast international market and technology trends. The purpose would be to gain confidence that these are reasonable industries for a TIPS focus. Assuming the answer is affirmative, the experts should be asked to prepare a sample first year plan which would include identifying potential industrial technology acquisitions and R&D projects, likely industrial information needs, and possible companies to initiate in-house training programs and what kinds of programs these would be. One person month should be adequate for each of these assessments with reasonable USAID advance preparation. This would include the availability of World Bank reports on studies planned for the engineering, rubber products and food processing sectors.

Program Management

A decision has to be made as to what overall form the Project management will take. If the heavy grant orientation is maintained, this may affect the types of organizations or combinations thereof that will be able to manage the project and comply with USAID regulations.

Relationship with the Sri Lankan Government

Assuming the decision is made not to have a Sri Lankan Government organization manage the Project, there are still needs for Sri Lankan counterpart or cooperating organizations for a number of the programs and program elements. They include:

- With what Government entity should the program aimed at rationalizing regulations, policy and procedures interact? What form should the relationship take?
- As the MOI's "Strategy" statement calls for a program such as the proposed TIPS human resource development program, there should be a reasonable chance that this program could be passed on to the Government, assuming it is successful. The appropriate Government entity needs to be identified, however, and the nature of the relationship determined.
- Similarly, the "Strategy" calls for supporting company directed R&D. This again suggests that if the appropriate Government entity were identified and kept appropriately informed or involved, this program element could be passed on at TIPS conclusion. Possibly, likewise, the technology transfer element of the program could be taken up by the appropriate

Government unit also. Again appropriate relationships would need to be determined.

An attempt could be made to institutionalize the technology and market information in either a private or Government entity. Experience suggests that it would be unlikely to support itself with user fees. The issue of where to place this needs to be resolved.

Grants

There are several issues to be considered:

- How will proposals be evaluated in the various programs using this mechanism? Who will evaluate them? What are the criteria to be used?
- To qualify for a grant, what does the contribution of the grantee have to be?

It is proposed that the evaluation capability be incorporated into the Project contractor's team, including its available short term resources. The reason for this is it will allow a much faster proposal evaluation. In most of the R&D grants programs there is criticism of the amount of time it takes to get a decision on a grant. This has been the case in Thailand with the USAID S&T project. It was also a criticism of the PACT project in India. TIPS could develop criteria for grants during the preparation of the project paper or it could alternatively leave this to be done during the Project.

It is suggested that the grantee's contribution to a grant project be left flexible. After all, firms' financial ability to contribute will vary considerably as will the potential value of projects to the Sri Lankan economy. However it would be appropriate to have general guideline that approximately 25 percent of a project's cost should be covered by the grantee. In the government sponsored programs of Korea, Taiwan and Singapore, reportedly grantees cover about 50 percent of the R&D project costs. In Thailand, criteria were being established for the company directed R&D grant program in September of this year and there seemed to be a consensus that they would use a 25 percent grantee contribution. After the Project has been in progress for a while, say a year, TIPS should reevaluate this issue.

Finance

Two finance related constraints were identified during the course of this analysis. The first constraint is a result of banks failing to adapt procedures to accommodate special requirements of some industries. The second concerns a lack of finance available for new product development.

For example, in the first category, trade financing is reported to be a problem in the gems and jewelry sector. Participants at the gem and jewelry workshop said they were constrained because banks would not accept raw materials (gold, gems, diamonds, etc.)

as collateral for short term working capital. Also, in the USAID note on non-technical factors that inhibit industry, it is cited that short-term working capital finance for perishable fruit and vegetable exports is poorly developed.

Representatives of the light engineering sector noted they too had problems with trade financing. Such financing is provided for only three months. In the light engineering industry it is normal to have to import materials to fill an order. Therefore, the financing period begins at the point of ordering. The long lead times for procurement and shipping of material coupled with the processing time for job orders reportedly creates serious working capital problems in the sector.

There are conflicting reports on the availability of and need for venture capital funding in Sri Lanka. However, in the gems and jewelry sectors, and in the light engineering sectors, there are promising product development ideas that are not being pursued apparently because of the lack of available project funding. For example, in the light engineering case study prepared for TIPS, the chief engineer of one equipment manufacturer described 11 new products that his company would like to develop but could not because of a lack of capital.¹²

¹²Pinney, John J. Case Study of the Sri Lanka Tea Machinery Industry. USAID-Sri Lanka, August 1989.

ANNEX 1

PERSONS INTERVIEWED

PERSONS INTERVIEWED

	<u>NAME</u>	<u>COMPANY</u>
1.	i. Dr. C. Anton Balasuriya Managing Director	Sri Lanka Business Development Centre 4-1/22, Sir Mohammed Macan Markar Mawatha Galle Face Court 2, Colombo 3 T'Phone: 541170, 25610, 34952 Telex: 22397 SLBDC CE
	ii. Dr. Romesh Bandaranayake Executive Director	- do -
	iii. R.P.C. Rajapaksa	- do -
2.	i. Chris de Saram Country Director	International Executive Service Corps 52, Galle Face Court 2, Colombo 3 T'Phone: 546667
3.	i. Dr. N.R. de Silva Director General	Sri Lanka Standards Institution 53, Dharmapala Mawatha, Colombo T'Phone: 26051, 26055
4.	i. Nihal de Silva Managing Director	Environmental Laboratories Ltd 135/1. Old Kottawa Road P O Box 14, Maharagama T'Phone: 551070, 551071 Fax: 941-546535 - Attn. Env'Labs Telex: 21494 GLOBAL CE
5.	i. A.C. Gunasinghe Managing Director	Lankem Ceylon Ltd No. 760, 762 Baseline Road P O Box 919 Colombo 9 T'Phone: 598292-6 Fax: 596350 Telex: 21359 LANKEM CE
6.	i. Nigel D.C. Austin Managing Partner/Director	Nidro Agencies Nidro Supply (Pvt) Ltd Nisol Furniture (Pvt) Ltd Nisol Corrugated Cartons Ltd Phildiam Lanka (Pvt) Ltd Nisol Diamonds (Pvt) Ltd No. 129, Reid Avenue Colombo 4 T'Phone: 589266, 587383, 502284, 50285 Fax: 94-1-502-423 Telex: 21376 NIDRO CE
	ii. Dawn Austin Partner/Director	

7. i. U. Hurugalle
Partner
Chairman
Hulugalle Wickramanayake & Co.,
Chartered Accountants
Diamond Cutters Ltd
Serendib Lapidaries Ltd
Lanka Garments Manufacturing Ind.
(Pvt) Ltd
21, Joseph Lane, Colombo 5
T'Phone: 586522
8. i. Prema J. Fernando
Chairman
Ceylon Diamonds (Pvt) Ltd
67, Dharmapala Mawatha
Colombo 7
T'Phone: 25952, 540901/3
Telex: 21585 CARSONS CE
Fax: 941-599790
Factory - Lanka View Mills
55/20, Vauxhall Lane
Colombo 2
T'Phone: 20362
Telex: 2115 CARSONS CE
9. i. G.A. Piyadasa
Additional Director
External Resources Dept
Ministry of Finance
Galle Face Secretariat
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Telex: 21409 FINMIN CE
10. i. Mrs. Manel Pandithasekera
Director
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Telex: 21457 EXDEV CE
- ii. L.F. Yapa
Director of Policy &
Planning
- do -
T'Phone: 573074
- iii. Mr. Kulatunga
Former Director General
- do -
- iv. Ayantha Fernando
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11. i. Mrs. Mallika Hemachandra
Managing Director

President
Hemachandra Ltd
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Sri Lanka Jewellery Manufacturing
Exporters Association
12. i. Anil Ratwatta
Managing Director
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Paradise Diamonds Ltd
Paradise Trimming (Pvt) Ltd
Paradise Jewels & Lapidaries Ltd
Paradise International Ltd
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21931 PARADISE CE
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Factory Add: Dehigahapitiya
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Resident Engineer
- do -
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Resident Engineer
Communications
- do -
- iv. Padmasiri de Alwis
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- do -

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27. i. D.B. Illapperuma
Consultant
Formerly of Assoc. Rubber Products
231, Stanley Tilakeratne Mawatha
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28. i. Pierre Pringers
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29. i. Karu Jayasuriya
Managing Director
C.W. Mackie & Co. Ltd
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- iv. Mr. Adams
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- iii. Kin Bak Siew
- do -
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Director
-do -

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ANNEX 2

SAMPLE POLICY, REGULATORY AND PROCEDURAL CONSTRAINTS

SAMPLE POLICY, REGULATORY AND PROCEDURAL CONSTRAINTS

The following provides a very preliminary list of descriptions, that others have given, of both general and industry specific policy, regulatory and procedural constraints to increasing the export competitiveness of Sri Lankan industry.

A. GENERAL

1. Labor legislation is complex and confusing. It virtually prohibits termination of employees except at great expense in time and money for litigation. There are a large number of non-working days per year (150-160) which lowers labor productivity and makes the effective interest rate of money per working day even higher relative to other businesses in the region than what it already appears to be. The legislation has created a system that does not reward productivity. (Hadley, Non-Tech Factors...+ Light Engineering Workshop)
2. The banking system is oriented to conservative collateral-based lending. Reportedly, bank cautiousness is exacerbated by lack of adequate debt recovery legislation. (Hadley, Non-Tech Factors.....; also see Weiss SL case, p. C-14)
3. Effective tariff protection for import-competing industries exceeds that for export-oriented industries thus biasing investment away from export. (Hadley, Non-Tech Factors...)
4. The Government monopolizes training opportunities from abroad for its own employees even though they may not benefit from the training due to their lack of technical understanding of the subject area. (Light Engineering Workshop)
5. There is inadequate technical education available in specialized areas, such as textile technology or furniture technology, and that what little technical education there was was too theoretical and insufficiently geared to the practical needs of industry. (SLBDC Survey, p. 5)
6. There is a bureaucratic preference in favor of joint ventures and against licensing arrangements. a strong

prejudice against second-hand machinery, and an unwillingness to allow marketing skills, which are badly lacking in the Sri Lankan private sector, to be the basis for equity in a joint venture. (Weiss SL case, p. C-10)

7. Most R&D institutions are severely hampered by their status as government departments and by the civil service status of their staff. (Weiss SL case, p. C-21)
8. In the public eye, the Sri Lankan economy is relatively free of economic policies that distort the course of technological development. In practice, however, some of the key implementing agencies do not favor such an environment. Frequent agitations have been made to reverse the policy environment in favor of regulations and differentiations of various types. Thus, in the eye of the technology user the policy environment is still unstable and unpredictable. (Piyadasa May 89 paper, p. 6; also Rubber Products Workshop)
9. Government has recently made exporting more difficult by making the documents very complicated and by lowering the export rebates received on duties paid for imported components used in manufacturing exported machinery. (Pinney's case)

B. GEMS AND JEWELRY

1. Banks will not accept raw materials (gold, gems, diamonds, etc.) as collateral for short term working capital. (Gem and Jewelry Workshop)
2. Gold may only be imported in strictly controlled quantities and under regulatory procedures that jewelers find so onerous that almost all continue to rely heavily on black-market sources which are about one-third more than the prevailing world price. (Baldwin's case, more detail there)
3. The State Gem Corporation gold assay is not generally accepted in international trade because the Corporation also is involved in trade. (Gem and Jewelry Workshop, also see EDB Plan, p. 287)
4. The mixed regulatory and commercial functions of the State Gem Corporation impinge on quality standards and on industry's ability to respond quickly and flexibly to orders from overseas clients. (Baldwin's case)

5. Gem stones are licenced items and exporters are permitted to import a limited quantity of stones based on their 15 percent entitlement scheme which has to be utilized for the import of stones as well as precious metals. Few manufacturers have made use of this facility because of the procedural difficulties in making use of it. (EDB Plan, pp. 285 & 286)

According to industry sources, as of November 1989 only synthetic gemstones must be licenced. (Ellawala, Generating Rural...)

6. Diamonds which are cut in Sri Lanka may not be made available to the local jewelry industry even for exports. (Gem and Jewelry Workshop)
7. The Government's negotiated agreement with Thailand for exclusive rights to geuda exports has seriously impeded the industry's technological advancement and economic performance. (Baldwin's case)
8. Government agencies, other than EDB, are more adversarial than supportive of the industry. Likewise, they do not cooperate with each other, fight over turf and have or assume overlapping responsibilities. This presents industry with severe problems particularly in meeting export commitments. Agencies involved in regulating the industry include Customs, Import Control under the Ministry of Trade, Exchange Control under the Central Bank, and The State Gem Corporation. (Gem and Jewelry Workshop)

C. RUBBER PRODUCTS

1. Central Bank's concessionary financing schemes are not applicable to the specialty rubbers, centrifuged latex and sole crepe, as they are not categorized under non-traditional products. (EDB Plan, p.40)
2. The centrifuged latex producer is paid as a function of the depot price of RSS 1 quality raw rubber. This seems to produce little incentive for the development of centrifugal operations. (Nanayakkara Note)

D. LIGHT ENGINEERING

1. Well equipped state organizations such as the Steel Corporation, State Hardware, IDB, SEC, and CISIR are not responsive to industry's needs. (Light Engineering Workshop and Wijesinghe's paper)

2. Export orders to Africa have been lost because Sri Lanka is not a member of the African Development Bank. Only suppliers from member countries may compete. (Light Engineering Workshop)
3. Inflexibility in the Government's trade financing program causes major difficulties. For example, financing is provided for three months which in the case of imported materials, begins at the point of ordering. The long lead times for procurement and shipping of material coupled with the processing time for job orders creates serious working capital problems in the sector. (Light Engineering Workshop)
4. Government delinquency in paying for equipment purchased under the WB/ADB project is causing severe financial difficulties. (Pinney's case)
5. In Government tenders for machinery, through technical analyses of bids are not made. Awards are made to the lowest priced bidders--who often can not perform. This leads to the need for additional tenders and concomitant costs for qualified bidders. (Pinney's case; also see Weiss SL case, p. C-6)
6. Government does not protect local industry from dumping of light engineering products below production costs from countries such as China, Taiwan, India and some East European countries. (Wijesinghe's paper)

E. CERAMICS

The Ceylon Ceramics Corporation, a state enterprise, monopolizes the supply of raw materials to the ceramics industry. As a result, reportedly, prices for raw materials are significantly higher than would be expected in a free market. (Interview with a private manufacturer.)

F. FOOD PROCESSING

1. Air Lanka's control of landing rights for other airlines reduces available cargo space and increases costs and risk for high value perishables such as fresh fruit and vegetables. (Hadley, Non-Tech Factors....)
2. Short-term working capital finance for perishable fruit and vegetable exports is poorly developed.

(Hadley, Non-Tech Factors....)

ANNEX 3

SUMMARIES OF THREE INDUSTRY WORKSHOPS

Note

October 20, 1989

To: Talbot
Mano
Ron

From: Steve ^{SJK}

Subject: Comments of Latex Product Manufacturers

Lest we forget, I've summed up below - as best I can from scratchy notes - the comments of the latex guys on Wednesday. Please add, delete or change anything you think is significant and return to me.

A. Government and Bureaucracy:

1. government/bureaucratic impediments for such things as importing materials or making a change from an agreed-upon GCEC business plan are perceived as more important constraints to success than tech acquisition
2. local (non-GCEC) firms are at a disadvantage - there is no one-stop shop such as the GCEC for resolving bureaucratic problems. There should be one. Alternatively, there should be fewer bureaucratic problems to begin with.
3. government needs to be educated to these problems but bureaucratic problems cross ministerial lines so any forum to address them must cross ministerial lines too.
4. there is a need for "commitment" from government to resolve these problems. In the past, the occasional meetings with e.g. a minister have resulted in decisions but no follow up because no commitment.

B. Tech Acquisition:

1. although established firms feel comfortable appraising tech, new ones just starting out could be given "in situ" experience on the shop floor in well-run plants so that they get a feel for the technology and processes involved
2. several participants complained about the difficulty "accessing" overseas technology, specifically:
 - what products are available?
 - what consultants and skills are available for hire?
 - how do you find these things out cheaply?
 - once you find out, how do you get it cheaply?

At least one person said that what you really need is a rep overseas (U.S., Japan, etc.) to find things out for you and be discreet about it.

SJK

3. participants had mixed feelings about the willingness of firms as a group to invest or run a common facility to provide these services to members

4. participants would like AID to subsidize certain costs of tech such as quality control equipment. They claimed they "get by" without it now but seem to feel its in the industry's long-term interest even though they as individuals won't make the investment.

Brainstorming Session: Rubber Products Sector

Participants

N G Wickremaratne
Managing Director
Dipped Products

Dennis White
Manager, R&D
Richard Peiris & Co.

Annesly Gunawardene
Managing Director
Elastomerics Engineering

H Narangoda
Managing Director
Rivertex Rubber Industries (and IDB)

D B Illapperuma
Consultant
(formerly of Assoc Rubber Products)

Pierre Pringers
Load Star Pvt Ltd
(formerly of Bergougnon)

Karu Jayasuriya
Managing Director
C W Mackie & Co. Ltd.

Dr. L M Tillekeratne
Acting Head
RRI

Observers/Facilitators

Romesh Dias Bandaranaike
SLBDC

R P C Rajapakse
SLBDC

Ajantha Dissanayake
SLBDC

Rienzi Soysa
SLBDC

Steve Hadley
USAID

Mano Nanayakkara
USAID

Ron Black
USAID Consultant

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MEMORANDUM

Date : October 26, 1989

From : Ron Black/Mano Nanayakkara:PSD

Subject : 20th October meeting with Light Engineering Manufacturers

To : Project Committee

A meeting of seven participants from the private sector; mostly CEO's was conducted by the SLBDC on October 18. The objective of the meeting was to identify key problems faced by the Sector, especially in relation to the acquisition adoption and use of technology; to identify possible project interventions; and to evaluate existing intervention programs. The meeting was conducted by Romesh Bandaranaike of SLBDC, and also attended by Mano Nanayakkara and Ronald Black. Romesh Bandaranaike will be preparing a report on this session based on the written responses of the participants. The following notes are based on personal recollections of the USAID participants.

A. Problems of Scale

1. Orders of materials are often too small to attract a response from foreign suppliers. Access to information on alternative sources especially "factors" who break bulk and handle small quantity orders may be useful. When asked about the possibility of EDB managing such a data base, the response was that it would be of little use if it were managed by EDB or any other government agency. Such a data base should be managed by a private organization like SLBDC.
2. Accompanying such a data base, it would be useful to have a liaison in the country where materials or equipment are being sought to assist in communications with the suppliers.
3. Companies will be willing to pay for such a service. One participant suggested that a commission on orders may be appropriate.

B. Training

1. Participants stressed the need for training. Specific areas of need for the sector was identified as quality awareness, project management and managerial skills. Protectionism of foreign companies who jealously guard their technology and the unavailability of training equipment due to scale problems were mentioned as constraints.

2. There are many foreign training opportunities that could be of value to the Sri Lankan industry. However, opportunities are monopolized by government employees who often do not benefit from the training due to their lack of technical understanding of the subject area. Some thought a data bank on available scholarships would be useful. Others were of the opinion that these were government perks for its employees and will never be made available to the private industry.
3. An opinion was expressed that the effectiveness-cost ratio was greater for providing training in Sri Lanka as opposed to sending Sri Lankans abroad.
4. Participants noted that the IESC was not especially suited for providing training because of the short term duration of the volunteer assignments. In contrast, for the light engineering sector the Sri Lankan-German technical Training Institute was mentioned as a model training program.
5. Assistance with conducting in-house training was strongly recommended. These need to be long term or continuing programs. Two specific areas in which training is needed by the light engineering sector are on the operation of CNC equipment and in foundry technology.
6. Lack of available time prevented the group from being probed on training of 'general' skills (such as say welding) versus company specific skills required for incremental improvements in specific process; and alternate mechanisms to handle the two.

C. Research Institutes

1. Neither the Government research institutes nor the Universities are responsive to industry's needs. Additionally, Universities are not a practical resource at the current time.
2. Some thought that an AID program that would support institute researchers to work on industry problems may be useful. Others disagreed, noting these organizations were completely useless. It was noted, however, that the more focused institutes like the Rubber Research Institute and the Tea Research Institute were more effective than the broader institutions such as NERD and CISIR. The latter were considered as far too general in their interests and lacking in focus.
3. The Arthur C. Clark Center's Technology Park concept for providing a mechanism to make university talent and facilities available to industry was considered promising. The group felt that if it was made possible for the universities to accept

fees, and motivate the researchers through the use of payments, these institutions may be made to be more responsive. A company designed program to work together with the universities for specific applications were considered practical. An alternate view point was that the better strategy is to facilitate the purchase of specific technologies from outside with the institutions providing only the basic understanding of the technology.

4. It was noted that there were many good government policy and strategy statements. However, there was no will to implement the policies. The EDB was singled out as being more positive in attitude than most government agencies.

D. Technology Information

1. This was noted as a critical problem area and the strong need for information on alternative technologies, technology assessment and utilization was expressed. However, most of the discussion on this problem area focused on markets.
2. It was stated that light engineering as an industrial sector is stagnant. Statistics from EDB showing substantial growth are misleading due to a large portion of export volume being in ad-hoc ship-breaking activity. The limited size of the domestic markets for light engineering firms prevent them from making investments in more advanced equipment. There were a few exporters among the participants.
3. Joint venture may offer an important possible mechanism for increasing the light engineering industry's market and technological sophistication. Some expressed that an AID program to get joint venture partners together would be useful. Others noted that the efforts of this type in the past had not been particularly successful. It was noted that the Sri Lankan parties attending joint venture discussions must be better prepared. Technical assistance may be useful in getting them ready for such a meeting in terms of substance as well as form. The participants felt that it is preferable to have potential joint venture investors brought to Sri Lanka rather than sending the Sri Lankan partner to the discussion abroad.
4. Markets of other developing countries could be very useful to the light engineering sector. This may be a 'niche' that could be usefully exploited by the local firms. Lack of information on these markets compounded the inability of the sector to pursue export growth. It was noted that orders for boats and tea equipment from Africa had been lost due to Sri Lanka not being a member of the African Development Bank.

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However, it is reportedly easy and inexpensive to become a member.

E. Finance

1. We were running out of time at this point but participants noted this as a significant problem area.
2. Inflexibility in the Government's trade financing program causes major difficulties. For example, financing is provided for three months which in the case of imported materials, begins at the point of ordering. The long lead times for procurement and shipping of material coupled with the processing time for job orders creates serious working capital problems in the Sector .
3. Because of the number of official holiday's Sri Lankan firms pay a much higher 'effective' rate of interest for each working day than their foreign competitors.

F. Concluding Comments

1. The light engineering industry is just about coping with the local market. To seriously go after the export markets will require additional heavy investments. The participants are reluctant to make such investments in the current political environment. However, there was some consensus that to survive the industry must export.
2. The current tariff system is inconsistent in application by the bureaucracy. The Sri Lankan tariff system must be tied to value added to products in Sri Lanka as opposed to the current basis used on imports in this sector; that is based on whether the goods are assembled or disassembled.
3. The Sri Lankan players must be exposed to world markets, but on an objective, planned basis, especially given that they have to compete with international giants. The AID project will be useful during this process of adjustment.

AID:PSD:MNanayakkara:iv:10/26/89

Brainstorming Session: Friday, October 20

Light Engineering Sector

Douglas Wijesinghe
Managing Director
Samuel Sons & Co. Ltd.
(formerly GM, Walkers)

Nihal Jinasena
Managing Director
Jinasena & Co. Ltd.

Padmasiri Dias
Managing Director
Somasiri Hullers

Arjun Deraniyagala
Colombo Commercial Co. Ltd.
(formerly of Browns)

Neil Fernando
Managing Director
Neil Marine Co.

T M Jayasekera
General Manager
Hayleys Engineering

Nihal Cooray
Factory Engineer
Ceylon Tobacco Co.

MEMORANDUM

Date: 20 November 1989

From: Ron Black

Subject: 17 November Meeting with Representatives of the Gem and Jewelry Industry

To: Project Committee

A meeting of eight participants, six CEOs from the private sector and two officials of EDB, was conducted by SLBDC on 17 November. A list of participants is attached. The objective of the meeting was to identify key problems faced by the sector, especially in relation to the acquisition, adoption and use of technology; to identify possible project interventions; and to evaluate existing intervention programs. The meeting was conducted by Romesh Bandaranaike of SLBDC, and also attended by Mano Nanayakkara, Steve Hadley, Pamela Baldwin, Talbot Penner and Ron Black. The following notes are based on Steve Hadley's and my personal recollections.

The participants identified a variety of problems constraining their successful utilization of technology. These were grouped in six categories, namely gems and jewelry machinery, marketing, training, raw materials, finance, and "government." These were not prioritized. Of the categories identified, only equipment, government, training and finance were discussed. The main points are summarized below.

A. Gem and Jewelry Machinery

1. Some specialized gem processing equipment is not available in the market, eg. automated lapidary equipment for cutting stones less than two mm in diameter. One participant believes he can develop such machines here. Designs are available but he stated that the cost of developing the equipment is quite high and the question of how to finance development is currently the stumbling block.
2. Most participants claimed there is a general lack of knowledge in how to use tools, particularly those of a

specialized nature such as the one used for cutting a heart or cleft shaped gem. They stated that technical assistance is needed by the industry in the use of such tools. About half of participants felt the problem goes deeper, that the local industry is not even aware of the tools or techniques available elsewhere. Others responded that this was the industry's fault, that almost all equipment used in the industry and available on the market can be seen at the Brussels, Hong Kong and Tucson trade fairs. There clearly was a difference of opinion on this point: some firms obviously attend such fairs while other do not. One participant explained how he had been reluctant to go to such fairs until the EDB subsidized his travel -- now he goes every year at his own expense. Another participant stated that some directors of small companies know little English and thus do not understand trade magazines and are afraid to attend trade fairs. An EDB representative stated the EDB could help in such circumstances.

3. Some equipment, eg. that for casting, is too expensive and specialized to warrant any one company purchasing. Participants felt that a facility should be established to purchase, maintain and make such equipment available to the industry including training industry staff in the use of the equipment. However, they noted that two such approaches have been tried and found wanting. Gold casting equipment was purchased by the State Gem Corporation for use by the jewelry industry but because it was not maintained it was useless to the industry. The EDB bought casting equipment and placed it in a private company, Paradise Ltd., but other companies would not go to a competitor to use the equipment, being afraid their casts would be copied.

It was noted that there are discussions going on with the Government about setting up a Gem and Jewelry Exchange and that this might be an appropriate mechanism to manage such a facility. This is to be a joint public-private managed facility. It was originally conceived as a marketing mechanism for exporting gems and jewelry, having showrooms and facilities for processing paper work required for exports. Participants hoped to see its scope expanded, however, to include such functions as a depository for special equipment. (See further comments on the Exchange below.)

When asked if such a venture could not be started as a profit making enterprise, the participants were

pessimistic but did not entirely rule out the possibility if financial assistance could be provided during a start up period. It was estimated that it would take a couple of years for such a facility to become self supporting and that with the cost of money what it is today in Sri Lanka, it was unlikely investors would find such a venture attractive without some additional inducement. It was further estimated that such a venture would require an investment of about \$1 million. All agreed that they, as potential users, would be prepared to pay commercial rates for the services of such a facility.

When asked if such a facility would be appropriate for providing heat treatment to geudas, one participant expressed the opinion that this should best be handled in some other way. No one disagreed with this and it was later explained that this should be done in the context of a Gem Bank.

4. One participant said development of the heat treatment segment of the industry was of the highest priority. He went on to add, however, that this was closely tied with the development of the lapidary and jewelry segments, and stocking stones.
5. One participant suggested that there should be a mechanism for topaz cutters to have the stones treated abroad and then brought back here for cutting and marketing.

B. Government: Policy, Regulations and Procedures

1. One participant explained that for about 25 years, into the early 1980's, there were extreme restrictions on the gem and jewelry industry. To survive required great caution and some illegal practices such as smuggling. This had two consequences. First it led to great distrust of the private sector. The attitude that the activities of the private gem and jewelry sector must be tightly controlled is still strong. Second it created very conservative older business persons in the trade. The old timers in the industry are extremely cautious and not prone to invest in innovative ideas such as the facility discussed in the previous section or even in areas such as heat treatment which would require much less capital. Unfortunately, the younger people in the industry, who are not a product of the restricted period and who are more innovative, do not have the financial capacity to innovate.

2. Francesco dal Zennaro, Managing Director of Trans Continental Gem Trades Ltd., an Italian, U.S., Sri Lanka joint venture, noted that the Sri Lankan Government has not supported the industry well in comparison with what other governments have done. He gave Thailand as an example. He pointed to problems in Sri Lanka such as excessive red tape and restrictions on the availability of materials such as gold and even locally cut diamonds for local jewelry manufacture.
3. Another participant cited the specific case of gold and noted that the Central Bank did not support the jewelry industry in obtaining gold. An EDB representative explained that a proposal is now before the Central Bank to permit banks to sell gold over the counter to jewelers for export.
4. There was general consensus that Government agencies, other than EDB, are more adversarial than supportive of the industry. They do not cooperate with each other, fight over turf and have or assume overlapping responsibilities. This presents industry with severe problems particularly in meeting export commitments. There are too many permits and too many departments involved in every transaction. As a result transactions are slowed, problems fall between the cracks and orders are lost. Agencies involved in regulating the industry include Customs, Import Control under the Ministry of Trade, Exchange Control under the Central Bank, and The State Gem Corporation.
5. There was unanimous agreement that the State Gem Corporation should be abolished and any useful functions, such as assaying and gem certification, which it is suppose to carry out be placed somewhere else. Problems with the Gem Corporation cited by the participants included the following: it is staffed by political appointees who do not understand how the industry works, either domestically or internationally; it attempts to compete with the private sector by running its own production operations; its assays are not accepted overseas because an assay must be performed by a neutral party, not one that also produces jewelry or stones for sale.
6. Participants explained that the GSL is about to open a new Gem and Jewelry Exchange. This was planned years ago under a World Bank project to assist the gem and jewelry industry but has not gotten anywhere until now. That World Bank project is now over. The idea of an

Exchange, however, has been resurrected. Plans are being developed jointly by the Central Bank (under the Governor's leadership), an Action Committee of the Gem Traders Association and the State Gem Corporation. The Exchange is intended to provide a one stop location where exporters can exhibit their wares to foreign buyers, have all necessary export related paper work completed and house the assaying and gem certification functions of the State Gem Corporation. It was, however, noted that if the new Exchange were headed by a political appointee, it would turn out to be as bad as the State Gem Corporation.

7. It was noted that there are two reports that have been prepared which describe policy, legal and procedural constraints facing the industry. One, prepared by the Gem Traders Association, is waiting for the Association to publish. The other, prepared by a Parliamentary Committee, is not being published because the Committee could not reach a unanimous position (there was one dissent). The later case was cited as an example of the Government's lack of commitment to resolving the industry's problems.
8. One participant noted that it was hard to effectively insert a technical aid package when the Government's policy toward industry was wrong.

C. Training

1. There is Government training for gem cutting at the State Gem Corporation and at EDB. There is a program for jewelry training at the Technical College but this is closed when the university is closed (often).
2. There were mixed views among participants about the desirable mix of public and in-house training. About half of the participants suggested that there should be an increase in Government sponsored training. It was later noted, however, that people coming out of Government programs want to supervise but do not care for bench work. Others insisted that the private sector needs its own training programs and that short training programs in specialized areas should be conducted in individual companies.
3. One participant said that traditionally trained goldsmiths pick things up faster than do graduates of training programs.

4. It was noted that setting is the most difficult function in the jewelry business and that there is not training specifically for this function available in Sri Lanka. Training in purifying gold is another area of need.

D. Finance

1. Banks will not take gold or stones as collateral. For example, they say they don't know the difference between gold and brass or diamonds and glass. This restricts lending to parties with significant immovable assets to offer as collateral (e.g. a house in Colombo 7!). Participants stated there was no significant difference between the attitude of government and private banks in this regard.
2. Participants explained that the amount of loan that is allowed on equipment is less for movable than for immovable equipment. Since most equipment associated with this industry is movable, less funds are available.
3. Participants explained that whereas in the U.S. and other countries there are banks that are specialized in dealing in gold, a facility like that is not available here.
4. Participants claimed that a Gem Bank which would accept treated stones as collateral is needed. It could also buy geudas and use them as "loans" to lapidarists.
5. Participants also explained that banks do not understand the international industry well enough to provide loans against firm orders. Ninety percent of U.S. orders, for example, are made by phone, fax or telex. U.S. buyers do not deal with letters of credit. They work on D/A 90 day terms; but banks in Sri Lanka insist on L/Cs. This means Sri Lankan companies must have considerable working capital in hand and trust to do business with the U.S. firms.

E. Additional

1. There were mixed views among the participants concerning the past and future effectiveness of their own trade associations in dealing with common problems. On the one hand, when asked if a gem and jewelry association would be an appropriate body to manage the facility described in A.3. above, skepticism was expressed. It was noted that association members are very busy with their own affairs and would be

unlikely to put in the effort required to operate such a facility.

A lack of information relevant to the industry was noted as a constraint. When asked if the Association could manage an information center for the industry, some reservation was expressed noting uncertainty over the level of commitment one could obtain from members. It was noted, however, that the Association had a relationship with the Chamber of Commerce and that perhaps using the facilities of the Chamber, including their computers, the Association could manage such a center.

On the other hand, there are some positive signs. The Gem Traders Association has established an Action Committee, Chaired by the Governor of the Central Bank, to work on issues of importance to the industry such as getting the Gem and Jewelry Exchange established. The Governor has promised His Excellency the President that the Exchange will be open by February 1990. It is hoped that the Action Committee will attack other basic problems of the industry.

One participant noted that it was important to make the Gem Traders Association strong so that it could interact with the Government effectively in support of the industry. Participants expressed willingness to explain their problems to multilateral donors if that would help. They agreed to meet with SLBDC and USAID again if requested.

2. The EDB has asked the World Bank for a project to finance the marketing of Sri Lanka's gems and jewelry in the United States.

Gems and Jewellery Sector Brainstorming Session

Date: Friday, November 17

Place: Galadari Meridien Hotel

Participants (from Sector)

USAID/SLBDC

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Romesh Dias Bandaranaike

Ron Black

Steve Hadley

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Mano Nanayakkara

Pamela Baldwin

Anton Balasuriya

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ANNEX 4

**POSSIBLE TECHNOLOGY FOCUSED PROGRAMS TO INCREASE
COMPETITIVENESS IN SRI LANKAN EXPORT INDUSTRIES**

POSSIBLE TECHNOLOGY FOCUSED PROGRAMS TO INCREASE
COMPETITIVENESS IN SRI LANKAN EXPORT INDUSTRIES

Programs initiated in East Asian countries to explicitly hasten industrial technology development may be grouped under four major categories--(1) industry support programs, (2) industrial RD&E institutional support programs, (3) industrial S&T human resource development programs, and (4) industrial S&T policy and planning programs. The following list is a composite of industrial technology development programs found in East and Southeast Asia.

INDUSTRY SUPPORT PROGRAMS

Company Directed RD&E Program
Industrial Association-Based RD&E Program
Industrial Consulting Service
Sri Lankan Expatriate Program
Technical and Industrial Information Center
Export Marketing Support Program
Export Packaging and Design Service
Quality Control/Quality Assurance Program
Company Computerization Program
Technology Choice, Acquisition and Mastery Program
Support Industry Development Program
S&T Oriented Business Incubator Center Program
High-Tech Venture Fund
High-Tech Trade Financing and Insurance Program
S&T and High-Tech Investment Acquisition Support Offices

INDUSTRIAL RD&E INSTITUTIONAL SUPPORT PROGRAMS

Industrial RD&E Institution Building Program
RD&E Institute's Company Support Program
RD&E Product Development and Commercialization Program

INDUSTRIAL S&T HUMAN RESOURCE DEVELOPMENT PROGRAMS

Sri Lankan University Fellowship Program
U.S. Graduate/Post Doctoral Fellowship Program
Sri Lanka-U.S. University Collaboration Program
Sri Lanka-U.S. University Joint Venture Program
Industry Based Universities
Industry and Industrial Association Training and Plans
Program
Specialized Training Centers
S&T Management Training/Consulting Program

POLICY AND PLANNING PROGRAMS

- S&T Policy Program
- National S&T Planning Support Program
- Technology Trends Assessment Program
- S&T Manpower Needs Assessment Program
- Strategic Business Identification Program

Some of the programs listed above have a product or service focus, such as quality control or a venture fund, whereas others have a market orientation, such as companies or RD&E institutions. This leads to some overlap in types of services provided. Also, depending upon one's perspective, some of the Industry Support Programs could be placed under the Industrial RD&E Institutional Support Programs or visa versa. The following is a listings of organizational activities, reportedly being conducted in Sri Lanka, in the above program areas. This list includes information on doners, Sri Lankan organizations and areas wherein the Ministry of Industry's "Strategy" statement notes that something should be done.

1.0 INDUSTRY SUPPORT PROGRAMS

WORLD BANK

* Has \$400,000 or so in unallocated funds

MINISTRY OF FINANCE

* Manages World Bank funding

1.1 Company Directed RD&E Programs

WORLD BANK

* SMI III & IDP III have allocated \$875,000 for this type of activity

GERMANY

* Attempt to design and commercialize cheaper bus body design with Colombo bus company

* Design and promotion of local manufacture of water pump

DUTCH

* Technical Assistance to private manufacturer to improve crankshaft and bearings of his product, namely windpumpers

MINISTRY OF FINANCE

* Manages World Bank Funding in this area

ECONOMIC DEVELOPMENT BOARD

- * Product Management Division can do this via a sectorial approach

DEVELOPMENT FINANCE CORPORATION OF CEYLON

- * One of the Banks administering World Bank funding in this area

STRATEGY FOR INDUSTRIAL DEVELOPMENT

- * Proposes tax incentive and R&D grants for product development

1.2 Industrial Association-Based RD&E Program

ECONOMIC DEVELOPMENT BOARD

- * Product Management Division supports formation of producer/exporter associations: Garments, Wood Furniture and Wood Products, Leather and Leather Goods, Tea, Hand Looms, Vegetables and Fruits, Spices, Cut Flowers and Foliage Plants, Marine Products, Gems and Jewels, Diamonds, Oil Seeds and Legumes, Essential Oils and Oleoresins

1.3 Industrial Consulting Service

WORLD BANK

- * \$100,000 to NERD Center to develop manufacturing consulting group

GERMANY

- * Fredrich Naumann Foundation supporting development of small and medium enterprise developers program in Federation of Chamber of Commerce
- * Training and equipment for NIBM

MINISTRY OF FINANCE

- * Manages World Bank funding in this area

ECONOMIC DEVELOPMENT BOARD

- * This is a major activity of the Product Management Division mainly supported with donor funds. Services Division provides packaging consultants

UNIVERSITY OF MORATUWA

- * University based consulting firm proposed

UNIVERSITY OF PERADENIYA

- * University based consulting firm proposed

NATIONAL INSTITUTE OF BUSINESS MANAGEMENT

- * Training and equipment from Germany

FEDERATION OF CHAMBERS OF COMMERCE

- * Provides consultants to small and medium scale industries under SMED Program supported by Friedrich Naumann Foundation

SRI LANKA BUSINESS DEVELOPMENT CENTER

- * Services offered

INTERNATIONAL EXECUTIVE SERVICE CORPS

- * Services offered

NERD CENTER

- * Has energy audit group
- * To set up manufacturing consulting group under World Bank IDP III

INDUSTRIAL DEVELOPMENT BOARD

- * Offer service

ARTHUR C. CLARKE CENTER

- * Provides industrial consulting services

1.4 Sri Lankan Expatriate Program

UNDP

- * Token Program

U.S. EMBASSY OF SRI LANKA

- * Proposal to USAID to assist setting up of an expatriate outreach program

1.5 Industrial and Technical Information Access Center

WORLD BANK

- * \$25,000 for this purpose in SMI III

JAPAN

- *JETRO

GERMANY

- * Appropriate technical information exchange with scientific libraries

CANADA

- * The Centre for Industrial Technology Information Services is sponsored by IDRC

MINISTRY OF FINANCE

- * Manages World Bank funding in this area

ECONOMIC DEVELOPMENT BOARD

- * Marketing Division has Documentation Unit and Trade and Shipping Information Service
- * Planning Division initiating a computerized data processing unit to collect and analyze data on all aspects of exports
- * Services Division has a register of Sri Lankan exports

CEYLON CHAMBER OF COMMERCE

- * Maintains directory for exporters

CEYLON INSTITUTE OF SCIENTIFIC AND INDUSTRIAL RESEARCH

- * Advertises that it has premier technical library in the country

NATURAL RESOURCES, ENERGY & SCIENCE AUTHORITY OF SRI LANKA

- * Has Sri Lanka Scientific and Technical Information Center

INDUSTRIAL DEVELOPMENT BOARD

- * Provides industrial information to small and medium scale industries

ARTHUR C. CLARKE CENTER

- * Has industrial technology information center covering areas of computers, communications, space communications, robotics, and energy

1.6 Export Marketing Support Program

ECONOMIC DEVELOPMENT BOARD

- * Product Management Division has a sectorial cost-sharing market development and promotion program
- * Marketing Division has 7 support programs

GREATER COLOMBO ECONOMIC COMMISSION

- * Organizes trade missions, investor forums, courses on how to deal with foreigners
- * Being merged with Foreign Investment Advisory Committee

STRATEGY FOR INDUSTRIAL DEVELOPMENT

- * Proposes tax incentive for promotion of non-traditional exports, marketing concessions to exporters, and promoting the development of brand names

1.7 Export Packaging and Design Service

UNDP

- * Supports National Design Center

ECONOMIC DEVELOPMENT BOARD

- * Product Management Division provides packaging advisory services
- * Marketing Division provides "counter samples" from potential markets
- * National Packing Center joint venture with Sri Lanka Institute of Packing

SRI LANKA STANDARDS INSTITUTE

- * Supports National Packing Center

CEYLON INSTITUTE OF SCIENTIFIC AND INDUSTRIAL RESEARCH

- * Supports National Packaging Center

NERD CENTER

- * Supports National Packaging Center

NATIONAL DESIGN CENTER

- * Supports design of handicrafts and rural industrial products
- * Receives support from UNDP

1.8 Quality Control/Quality Assurance Program

WORLD BANK

- * \$250,000 support to SLSI in this area

UNDP

- * Provides training and equipment of SLSI

MINISTRY OF FINANCE

- * Handles World Bank funding in this area

ECONOMIC DEVELOPMENT BOARD

- * EDB provides consulting support in this area

SRI LANKA STANDARDS INSTITUTE

- * Provides standards, consulting assistance, training and consumer information

1.9 Company Computerization Program

JAPAN

- * Support for CINTEC to set up computer training centers

UNDP

- * Support for CINTEC to set up computer training centers

COMPUTER INFORMATION TECHNOLOGY COUNCIL

- * Promotes computer awareness and education. Is setting up computer training centers

1.10 Technology Choice, Acquisition and Mastery Program

ECONOMIC DEVELOPMENT BOARD

- * Product Management Division does as part of overall sector development activities

STRATEGY FOR INDUSTRIAL DEVELOPMENT

- * Proposes promoting this by supporting foreign investment

1.11 Support Industry Development Program

WORLD BANK

- * IDP III Technical Development Fund can be used for this purpose

MINISTRY OF FINANCE

- * Manages World Bank Funding in this area

ECONOMIC DEVELOPMENT BOARD

- * Product Division's Export Production Village Programme (EPV)

1.12 S&T Oriented Business Incubator Center Program

GREATER COLOMBO ECONOMIC COMMISSION

- * Some services similar to those offered by business incubators available

UNIVERSITY OF MORATUWA

- * Cooperating with ARTHUR C. Clarke Center in the latter's development of a technology park

UNIVERSITY OF COLOMBO

- * Software Park

ARTHUR C. CLARKE CENTER

- * In process of developing a technology park the first phase of which will include an S&T oriented business incubator center

1.13 High Technical Venture Fund

WORLD BANK

- * \$200,000 available from SMI III & IDP III to study feasibility of this fund

USAID

\$500,000 available for venture fund start-up costs

MINISTRY OF FINANCE

- * Manages World Bank funding in this area

ECONOMIC DEVELOPMENT BOARD

- * With Central Bank has medium and long term funds for export oriented investments
- * Has equity participation scheme
- * Has small scale export oriented manufacturers and processor's loans
- * Has pioneering industries export project scheme

CENTRAL BANK

- * With EDB has medium and long term funds for export oriented businesses

NATIONAL DEVELOPMENT BANK

- * Has funds for equity investments

DEVELOPMENT FINANCE CORPORATION OF CEYLON

- * Has funds for equity investments

MAHAWELI SMALL RURAL ENTERPRISE FUND

- * Fund for small rural enterprise investments

OASIS

- * Overseas Sri Lankans' venture fund

CEYLINCO

Has a venture capital company

MERCANTILE CREDIT GROUP

- * Considering formation of a venture capital group

STRATEGY FOR INDUSTRIAL DEVELOPMENT

- * Venture capital companies will be encouraged

1.14 High-Technical Trade Financing and Insurance Program

CENTRAL BANK

- * May provide short term trade financing

PEOPLE'S MERCHANT BANK

- * May have trade financing scheme

MERCHANT BANK OF SRI LANKA

- * May have trade financing scheme

SRI LANKA EXPORT CREDIT CORP

- * Has an exporters' insurance program

1.15 S&T and High-Tech Investment Acquisition Office

JAPAN

- * JETRO

SWEDISH

- * Promotion of joint ventures with Swedish Engineering and Swedlanka Industries

ECONOMIC DEVELOPMENT BOARD

- * Marketing Division has overseas market promotion activities
- * Product Management Division does sectorially via promotion of joint ventures

STRATEGY FOR INDUSTRIAL DEVELOPMENT

* Trade and investment promotion offices will be set up in North America, Western Europe, Scandinavia, West Asia, East Asia and Australia

2.0 INDUSTRIAL S&T INSTITUTIONS SUPPORT PROGRAMS

2.1 Industrial RD&E Institution Building Program

WORLD BANK

* Funds in IDP III to support institution building activities grants program at CISIR, SLSI, the NERD Center, and \$100,000 for feasibility studies for new product development and service centers (possibly food processing & metalworking)

JAPAN

* Providing support to Universities of Peradeniya, Ruhuna, Moratuwa, and Colombo

GERMANY

* At Farm Machinery Research Center supports research and commercialization of low cost farm machinery
* Moratuwa University/textile technology

DUTCH

* Renewable energy research support, Special Energy Unit, Ceylon Electricity Board
* Product development support, Rural Technical Center, Department of Small Industry

SWEDISH

* NARESSA administered research grants program

UK

* Supporting University of Moratuwa

UNDP

* SLSI/equipment and training
* IDB Appropriate Technology Center/equipment, Technical Assistance, training program
* Supporting University of Moratuwa
* Colombo University/equipment and Technical Assistance
* CISIR/gas chromatograph

MINISTRY OF FINANCE

- * Manages World Bank funding in this area

UNIVERSITY OF MORATUWA

- * \$5,000,000 from JICA for Faculty of Engineering primarily in areas of textiles & computers
- * British ODA providing training in construction management (Civil Engineering Department) and textile technology (Textile Technical Department)
- * UNDP/UNIDO providing \$100,000 for training and equipment for mold technology for plastics and rubber industries
- * UNDP/International Maritime Organization providing equipment and training for nautical engineering
- * UNDP/UNIDO support of CAD/CAM Center

UNIVERSITY OF PERADENIYA

- * Japan is providing equipment for the Faculty of Engineering

UNIVERSITY OF COLOMBO

- * Japan is funding development of the Institute of Computer Technology
- * UNDP/ILO equipment, Technical Assistance support to computer center

UNIVERSITY OF RUHUNA

- * Japan is providing equipment for the Faculties of Science and Medicine

SRI LANKA STANDARDS INSTITUTE

- * \$250,000 from World Bank for providing assistance to companies in the area of quality control/quality assurance
- * UNDP/UNIDO funds for training

CEYLON INSTITUTE OF SCIENTIFIC AND INDUSTRIAL RESEARCH

- * \$400,000 from World Bank for strategy development equipment for engineering unit, process laboratory development, training, technical trans & equipment
- * UNDP/ILO--gas chromatograph

NERD CENTER

* \$350,000 from World Bank

NATURAL RESOURCES, ENERGY & SCIENCE AUTHORITY OF SRI LANKA

* SIDA research grants program

STRATEGY FOR INDUSTRIAL DEVELOPMENT

* Will set up Institute of Industrial Arts and provincial institutes of technology

2.2 RD&E Company Support Program

WORLD BANK

* Technology Development Fund could be used to support work at RD&E institutions

MINISTRY OF FINANCE

* Manages World Bank funding in this area

STRATEGY FOR INDUSTRIAL DEVELOPMENT

Will promote linkages between institutions and industry

2.3 RD&E Product Development and Commercialization Program

WORLD BANK

* Funding feasibility study for organization like the Korea Technology Development Corporation

GERMANY

* Research on non-polluting technology for making paper from rice straw

DUTCH

* Heat exchangers for fuelwood-conserving tea driers
* Test fiber-cement panels for housing

UK

- * Development of year round landing fiberglass fishing catamaran

UNDP

- * CISIR/rice flour project

MINISTRY OF FINANCE

- * Manages the World Bank program in this area

3.0 INDUSTRIAL MANPOWER DEVELOPMENT PROGRAMS

3.1 Sri Lankan University Fellowship Program

JAPAN

- * Fellowships provided to technical colleges under MOHES&T including engineering craft practices, automobile engineering and building construction

MINISTRY OF HIGHER EDUCATION, SCIENCE & TECHNOLOGY

- * Fellowships to Technical Colleges provided by Japanese

3.2 U.S. Graduate/Post Doctoral Fellowship Program

3.3 Sri-Lanka U.S. University Collaboration Program

USAID

- * USIA program

UK

- * Exchange of faculty and curriculum development through Sussex-Batticaloa and Cambridge-Peradeniya linkages

UNIVERSITY OF PERADENIYA

- * ODA support of Cambridge and Peradeniya faculty exchange and curriculum development program

3.4 Sri Lankan-U.S. University Joint Venture Program

INSTITUTE OF TECHNOLOGICAL STUDIES

* Joint Venture with University of Boston at Clear Lake offering degrees in management and computer engineering

STRATEGY FOR INDUSTRIAL DEVELOPMENT

* Will establish business management school linked to a foreign institute of business management

3.5 Industry Based Universities

3.6 Industry and Industrial Association Training and Plans Program

STRATEGY FOR INDUSTRIAL DEVELOPMENT

* Will provide incentives for this type of training

3.7 Specialized Training Centers

JAPAN

- * Financing National Training Center for Auto Engineering at Orugodawatte in cooperation with National Apprentice Board
- * Japan JOCV (volunteers) at technical schools of electronics, air conditioning and computers
- * Association for Overseas Technical School Mitsubishi/United Motors Course on Car and 4 Wheel Drive Vehicle Maintenance

GERMANY

- * Assistance to vocational training institutes including Apprenticeship Training Institute at Moratuwa

ECONOMIC DEVELOPMENT BOARD

- * Has Mushroom Development and Training Center at Katubedde
- * Product Management Division has lapidary training course

UNIVERSITY OF MORATUWA

- * Textile and CAD/CAM training
- * Apprenticeship Training Institute receives support from Germany

INSTITUTE OF TECHNOLOGICAL STUDIES

- * Electronics courses provided

SRI LANKA STANDARDS INSTITUTE

- * Provides specialized training program

INDUSTRIAL DEVELOPMENT BOARD

- * Reported to conduct management training

INSTITUTE OF ENGINEERS

- * Provides special courses

INSTITUTE OF CHEMISTRY

- * Provides special courses

STRATEGY FOR INDUSTRIAL DEVELOPMENT

- * Will establish Textile Training and Service Center at the Foremen Training Institute at Ratmalana and others upgraded
- * Set up apex organization to coordinate
- * Increase business management training

3.8 S&T Management Training/Consulting Program

GERMANY

Scholarships on maintenance

UNDP

- * Establish management consulting division at Textile Technology Service Center

4.0 POLICY AND PLANNING PROGRAMS

4.1 S&T Policy Program

WORLD BANK

* To sponsor review of tariff and tax structures, and of explicit encouragements to industrial technical development and studies of technological obstacles to industrial subsector development, textiles, food and crop processing and engineering industries; and study of financial mechanisms for technology development

ECONOMIC DEVELOPMENT BOARD

* Service Division sponsors Exporters' Forum and SRILPRO

NATURAL RESOURCES, ENERGY & SCIENCE AUTHORITY OF SRI LANKA

* Conducts policy studies

4.2 National S&T Planning Support Program

4.3 Technology Trends Assessment Program

4.4 S&T Manpower Needs Assessment Program

4.5 Strategic Business Identification Program

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