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Poverty Alleviation through Technological Capacity Building

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POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING

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UNDP assists research on crop improvement techniques.
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FOREWORD

Developed as well as developing countries are increasingly focusing attention on science and technology as crucial elements in the development process. There is also a growing awareness that technology could play a strategic role in achieving the goals of raising the standards of living of the population and ensuring environmental protection. A number of clear-cut programmes for poverty alleviation and environmental protection through the introduction of science and technology have made substantial contributions in some countries already.

At the same time, the experience of successful countries has demonstrated that in order to seize the opportunity offered by technologies, there is a need for applying concentrated and well coordinated efforts in establishing an integrated policy and development framework conducive to transfer, development and adoption of technology. This should certainly include the building up of required technological capabilities and qualified human resources. Establishing the required institutional infrastructure for Science and Technology (S&T) is a crying need which translates into the building up of Research and Development (R&D) institutions, technology transfer and promotion organizations, national systems for standardization, metrology, quality control and certification, engineering consultancy services, patent offices, technology information systems and financing. The participation of all stakeholders, including the private and the public sector, NGOs, local authorities and the general public in this process is vital not only for technology development transfer and adoption but also for maximizing the contribution of technology to employment creation and income generation and addressing the basic needs of the low-income population.

The introduction of S&T and technological capability-building into income generating acts in the rural areas is only one, although a very important element of a wider holistic approach to poverty alleviation which includes a comprehensive package of policy and other measures related to education, transport, communication, financial and social development. In view of the interest expressed in the developing countries of the region, ESCAP has undertaken a study on poverty alleviation through technological capacity-building which presents the main features of the strategy in selected developing countries, particularly China. It also proposes potential areas and modalities for future cooperation in the ESCAP region which would complement national efforts in poverty alleviation. The study was discussed during the Seminar on Poverty Alleviation through Technological Capacity Building organized by ESCAP, the State Science and Technology Commission of China. It had the support of the Office of Poverty Alleviation through Science and Technology and a generous financial support provided by the Government of China.

The present publication comprises the study, the papers presented by the participants, and the experts from China attending the Seminar, and the report.

It is hoped that this publication will be useful to all the stakeholders involved in poverty alleviation activities.

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INTRODUCTION

It has become very obvious that a large number of nations need extraordinary development inputs in order to ensure the fulfilment of the basic needs of their citizens. Poverty alleviation is a target that has been at the forefront of international development efforts since the very beginning of the development era. Even in the 1990s, the economies of these countries remained weak and fragile. More than a billion people in the developing world live on less than one US dollar a day. The list of these people could include the homeless, the landless, the sick, the disabled, the hungry, women and children, and the indigenous people whom we generally call the poor. The words 'lack' or 'deficiency', 'destitution', 'deprivation', 'abandonment', 'discrimination', 'inequality', 'oppression' and 'domination', 'remoteness', 'isolation', 'malnutrition', 'illiteracy', 'inability', 'powerlessness', 'vulnerability' etc. are always used to describe the situation of poverty from different perspectives.

The situation in large parts of Asia is no better than this. Despite the considerable progress achieved in recent years this region remains home to the overwhelming majority of the world's poor. Contrasting with the region's rapid economic growth, thirteen of the countries in the region are currently listed as least developed countries. Afghanistan and Cambodia both have suffered colossal losses in death, destruction and dislocation from long wars, and remain the most distressed, both economically and politically. The Lao People's Democratic Republic, Bhutan and Nepal suffer the disadvantage of being land-locked. The Pacific Islands not only suffer from a scarcity of domestic resources but also from the small size of their population. Their remote and dispersed location as well as a vulnerability to the international market further compound their problems. A number of countries are confronting the difficulty of transition from centralized planning to a market-oriented system and are facing related economic and political problems. In South Asia there are at least 120 million people who are landless, making up about 40 per cent of rural households. In China, there are 70 million people who lack adequate food and clothing to lead a relatively comfortable life.

Poverty presents an extraordinary challenge to the world community today. Fortunately, the international community has widely recognized that the fulfilment of basic needs is every human being's right, and has attached great importance to poverty alleviation. Member states of the United Nations have pursued a wide variety of approaches, strategies and programmes to combat poverty. The World Summit for Social Development focused attention on national and international action for poverty alleviation. The ESCAP has made great efforts to eradicate poverty through economic growth and social development and has taken a holistic approach to poverty alleviation, especially in Asia and the Pacific region. In contrast to the inappropriate traditional development model, this holistic approach emphasizes the pursuit of aggregate economic growth accompanied by measures to increase the capacity of all to contribute to the development process and share in its benefits.

Poverty is a complex problem with many causes. The approaches to address it may differ between regions and countries as well as groups of population. Among the approaches of

alleviating poverty, that through the introduction of science and technology has emerged as an important element. It is an integrated approach to the economic and social development of rural areas in many countries in Asia and the Pacific. By directly influencing the production, distribution and composition models in rural areas, this approach not only generates income and addresses the basic needs of a low income population but also increases the employment chances of rural surplus labour, reduces rural-urban migration, betters the utilization of local resources and improves the skill of the farmers. Science and technology has been proved by many countries in the ESCAP region to be an essential approach for the eradication of poverty.

The objective of the study is to

Recognize the importance of technological capability-building for poverty alleviation.

Contribute to a meaningful exchange of China's experience of technological capability-building for poverty alleviation.

Draw conclusions and policy implications from the experience.

Analyse the possibility of replication by other developing countries in the ESCAP region.

Propose the potential areas, modalities and action plan for future cooperation in the ESCAP region in the field of poverty alleviation through technological capability-building.

The paper will proceed to discuss the following five sections. The first section presents the main features of the strategy of poverty alleviation through capability-building and the significance of the change of strategy and its implementation. This focuses mainly at the local level. The second section gives some major national programmes in China directly designed to alleviate poverty from the perspectives of technological capability-building, such as the well-known Spark Programme, Harvest Programme etc. The background, implementation, main achievements and future trends of the programmes are discussed in this section. The third part attempts to summarize the experiences and achievements, challenges and opportunities of the poverty alleviation programme in China. The fourth section discusses the national initiatives of China in developing technological capability-building for the task of poverty alleviation. It focuses on governmental policies and strategies, the private sector, and the participation of NGOs in providing financial assistance to developing technological capability-building. The final section analyses the potential areas and modalities of regional and international cooperation and proposes an action plan in the ESCAP region.

POVERTY ALLEVIATION THROUGH LOCAL TECHNOLOGICAL CAPABILITY-BUILDING

The sign of changing strategy of poverty alleviation

In the late 1970s and early 1980s, China's rural reform was initiated in poor areas such as Anhui and Sichuan Province where agricultural productivity and farmers' incomes were so low that they could hardly get enough food to feed themselves. The main reason for such a situation was the commune system in which no incentive was created for an effective use of capital and

human resources. Institutional changes were thus first introduced to increase agricultural production and the income level of the farmers. The reform characterized as Household Responsibility System (HRS), adopted in the early 1980s, was very successful throughout the county. Agricultural production reached its peak in 1984, and farmers' per capita income increased by 342 per cent compared with 1978, and the number of poor was reduced from 250 million to 125 million in six years.

However, because of the deterioration of the environment and lack of necessary inputs and infrastructure, people in remote mountainous areas could not increase their income and improve their living standard without the implementation of special poverty alleviation programmes even after the HRS. Rural poverty is highly concentrated in the south-west, north-west and some mountainous areas in the middle and eastern regions. It is under this situation that the Chinese government formulated a new plan to help economic development in the poor areas in 1984, and formed a new organization, named the Leading Group for the Economic Development of Poor Areas (LGEDPA) to lead and coordinate the nation's poverty alleviation activities in 1986. The new plan emphasized the development of capacity-building in poor areas. The term 'blood creating' instead of 'blood transfusion' was used to express the main conception of the new plan. Under the guidelines of the plan a number of big poverty alleviation programmes such as development funds for specified poor areas, subsidized loan, and food for work have been implemented and strengthened.

As an important factor in economic development, science and technology were also emphasized in the plan. Several programmes aiming at increasing production in poor areas through technological change and technological capacity-building were implemented by different governmental organizations. As early as in 1987, the Ministry of Agriculture (MoA) and LGEDPA jointly worked out a project to increase maize production by helping the adoption of mulching film hybrid maize in poor areas. This project eventually became a major poverty alleviation programme called Wenbao Programme which was carried out in seventeen provinces and autonomous regions in 1989. The State Science and Technology Commission (SSTC) and LGEDPA jointly called for more emphasis on the role of science and technology alleviating poverty in July 1988, and enhanced two ongoing national programmes, Spark Programme and Harvest Programme at the same time. NGOs such as private enterprises and farmers' technical organizations also took part in this process.

THE MAIN THEMES OF POVERTY ALLEVIATION THROUGH TECHNOLOGY CAPACITY-BUILDING

Why does the Chinese government pay more and more attention to technology capacity-building and what can technology do to the economic development in poor areas? The answer is that only with technological change can China effectively reduce the number of the poor in the years to come. Rural poverty in China is a regional problem. The poor areas are characterized by a lack of both natural and human resources. Arable land per capita is extremely low and the quality of the arable land is very poor in the south-west, while water resources are scarce in the north-west even though there is abundant land area. Farmers in these areas receive little education and still use traditional methods in agricultural production. Few off-farm activities are created for the poor. As a result, both productivity and income are hard to increase without investment from outside. However, the effectiveness of the investments depends on technology

as well as management. Without technological change and the building of technological capacity, economic development in poor areas would not be sustainable. The role of technology capacity-building in poverty alleviation has been summarized below.

The amount of both natural and human resources will increase in poor areas.

The allocation of resources and the effectiveness of production will be improved by the adoption of appropriate technology and the improvement of management skills.

Management and marketing ability of the poor population will also be improved through training and education.

Much more competitive products will be produced for the market by properly utilizing the resources with appropriate technology.

Unemployment will be reduced by expanding SMEs and providing more off-farm work opportunities.

In general, technological capacity-building can be accomplished in various ways. First of all, education and training are the most important methods in the long run because they will not only teach poor farmers useful knowledge but also strengthen their understanding of new things which is of great importance in the market economy. In addition to regular elementary and high school education, adult education and training can be very useful if combined with the extension of some technologies. Pre-training programmes are sometimes the key to the success of a poverty alleviation programme in which poor farmers have to be intensively involved.

Appropriate technology development and extension will bring immediate benefits to farmers in the poor areas. Most agricultural technologies developed for the poor areas have the effect of increasing the production and income of all farmers if they are widely diffused among farming households. Such wide diffusion is constrained by the lack of some complementary input or the economic ability to buy such inputs. The effects of industrial technologies on poor farmers will depend on the characteristics of the technologies. If the technology is labour intensive, a lot of farmers will benefit from the development of industries that use this technology. Otherwise, only a few well-educated and wealthy farming households will benefit. Creating work opportunity should be the first priority in the development of industrial technologies.

To speed up the extension process and narrow the gap between research, innovation and adoption, a good technology extension system is essential in the poor areas. As will be discussed later, most agricultural technologies are extended by official extension stations in remote areas. Strengthening local extension organizations by training village and township technicians and providing necessary facilities is the pre-condition for those people and organizations to have an effective role in the extension process. Incentives should also be provided to keep local technicians from leaving their work.

Small and Medium Scale Enterprises will contribute more and more both to the economic development and human capital-building in the poor areas. First of all, SMEs usually are labour intensive and have the potential to absorb a large portion of surplus labour in the long run.

Technology used by SMEs is uncomplicated and easy to understand and there will, therefore, be few obstacles for farmers to shift from agricultural to nonagricultural activities. Second, most of the products produced by SMEs are for local markets at a cheaper price. The development of SMEs not only generate work opportunity and income but also increase the quantity of total consumption especially for non-food products and improve their quality as well. Third, since almost all products produced by the SMEs are for the market, the development of SMEs is also a process of human capital-building in terms of management and marketing skills.

Information is a bridge between producers and consumers. A market economy is based on the free flow of all kinds of information. The capacity-building of information technology in poor areas will provide more production opportunities and reduce transaction costs which are a main obstacle in the development of the economy in poor areas.

MAIN ORGANIZATIONS INVOLVED IN TECHNOLOGY CAPACITY-BUILDING AND THE IMPLEMENTATION OF THE NEW STRATEGY

The implementation of poverty alleviation programmes through technological capacity-building were carried out jointly or separately by related governmental organizations and some semi-official organizations. SSTC, MoA, Ministry of Broadcasting, Motive and Television (MBMT), Chinese Association of Sciences and Technology (CAST), All-China's Federation of Women (ACFW), all play an important role at both national and local levels. Governmental organizations are still playing a leading role in technological capacity-building in poor areas.

The administrative organization of science and technology, SSTC, has its own system throughout the country and takes charge of and coordinates technology development at each level. Under the new strategy, SSTC not only called for more emphasis on technological change for poverty alleviation, but also formulated major programmes such as the Spark Programme to help enhance technological capacity especially in small enterprises in poor areas. At the same time, experiments were conducted in the Dabie Mountainous Areas to help develop some industries that have comparative advantages as leading regional industry. A lot of experience has been gained by the implementation of these programmes and experiments. Provincial and Local Science and Technology Commissions in poor areas not only carry out the national programmes set up by SSTC, but formulate and implement some projects fitting their own situation as well.

Because agriculture is the most important sector in the poor areas of China, MoA also plays a very important role in poverty alleviation by promoting the adoption of new agricultural technologies and strengthening its agricultural technology extension system in poor areas. In rural China, especially in poor areas, farmers depend mainly on governmental extension organizations to gain access to and learn how to use new agricultural technology. Some case studies in the poor areas of the south-west have shown that more than 90 per cent of the technologies in use were from MoA's extension system. In the whole system, township extension stations and technicians in both village and township levels have more influence on the farmer' decision about technology adoption, because these technicians and organizations are more likely to have contact with farming households. Empirical analyses have already shown that more contact with agricultural technicians results in a higher adoption rate of new technologies by

poor farmers. Supported by other governmental organizations such as the State Planning Commission (SPC), Ministry of Finance (MoF) Agricultural Bank of China (ABC), MoA implemented a major poverty alleviation programme, Wenbao Programme, in twenty-three provinces and autonomous regions in 1989. The extension of hybrid maize and mulching in cold mountainous areas was the key feature of this programme. About 500 000 hectares of mulching hybrid maize were adopted in 1989. Local extension organizations and personnel at country, township and village levels, play a leading role in the implementation of the programme. It was the Wenbao Programme that brought around 12 million people living in remote mountainous areas above the poverty line. Poor farmers also gained some experience in the adoption of such technologies.

Jointly organized and implemented by MBMT, Ministry of Electronics, and the *Economic Daily*, a project named Poverty Alleviation Project through Introduction of Information Technology is gaining more and more attention. During its experimental stage, thirteen counties in Zhangjiakou, Hebei province, which were poverty-stricken had installed satellite receiving facilities and set up information centres by June 1995. An informat on editing centre in Beijing has been sending economic information totalling 20 000 to 50 000 words daily to these thirteen counties through satellite links at a fixed time, while the centre received feedback from them. Through information technology, the thirteen counties are now able to share information with developed counties and have begun to reap profits. The Zhangjiakou experience showed that through computer technology, satellite communication technology and networking technology, it is feasible to establish a multi-linkage economic information network. On the basis of phase one of the thirteen counties, phase two was launched on 11 October 1995, when twenty other counties from six provinces received donated facilities in Beijing.

The largest semi-official organization involved in poverty alleviation through technological capacity-building is the China Association of Science and Technology (CAST). As a public science and technology popularization system, CAST has played an important role in spreading new ideas and knowledge throughout the country. What CAST has successfully done in some poor areas is to organize training programmes for poor people in various areas of their everyday life, such as cooking and learning about nutrition, to special technologies like fruit tree plantation and management. Pilot projects have also been conducted in some remote areas by the local CAST.

Another semi-official organization involved in training is ACFW. The target group of these training programmes is women and the goal is to help women gain more knowledge of production and non-production activities and increase their ability both inside and outside their families. With the promotion of women's status in society the hardships of poor households tend to increase because women usually pay more attention to their children and family than men do.

THE MAJOR NATIONAL PROGRAMMES IN CHINA DIRECTED AT ALLEVIATING POVERTY

In this part, we will introduce some of the programmes which have been designed to alleviate the poverty situation in China's rural areas from the perspective of technological

capability-building since 1986, when China began its nationwide anti-poverty campaign. The background, implementation, main achievements and future perspective of the programmes will be discussed.

The PAST Programme

The PAST Programme, i.e. the Programme of Poverty Alleviation with Science and Technology (PAST), is one of the anti-poverty programmes launched by SSTC and personally promoted by State Council Song Jain in 1986. It was designed directly to alleviate poverty in the rural areas of China by relying on the advancement of science and technology.

The Programme aims to introduce appropriate science and technology into poor rural areas to guide and help poor farmers and village and township enterprises to develop production, so as to improve their resource development levels and labour productivity. In addition, it aims at promoting the development of commodity economy in poor areas and speed up the steps for local farmers to get rid of poverty.

Initially covering eighteen declared poor countries of Hubei and Anhui provinces in the Dabie Mountain Areas in 1986, and then in 1989, expanding to include Yan'an and Yulin districts in north Shanxi Province as well as Jinggang mountain areas on the border of Hunan and Jiangxi provinces, the Programme covered fifty-four declared national poor counties. So far, special funds granted by SSTC for poverty alleviation have accumulated to 40 million yuan, and loans up to 300 million. Eleven delegations for poverty alleviation composed of 333 officials have been continuously dispatched to the poor mountainous areas to help the local government and science and technology departments to organize technology transfer and dissemination, and development work. Key projects numbering 400, spreading scientific and technological achievements and development have been implemented. Science and technology demonstrative areas numbering 1 400 have been set up, and over 1.2 million technical personnel training conducted, which make most of the farmers at the relative areas master 1 to 2 pieces of appropriate technology. Now the PAST Programme has become one of the most effective measures of China's poverty alleviation development work, and has made significant contributions to the economic development of poor areas and improvement of the local farmer's living standards.

The implementation of the Programme is guided by the Leading Group for Economic Development (LGEDPA) under the State Council, and mainly in coordination with various levels of local governments relying fully on the broad masses of science and technology personnel and the participation of farmers.

The main measures and activities of the Programme can be summarized as follows:

Build a partnership between the academic institutions and poor areas. Based on the characteristics of various kinds of poor areas and the needs of poverty alleviation work, experts of different disciplines are organized to formulate the strategy for poverty alleviation with science and technology, conduct preliminary research on, and make plans for comprehensive regional treatment and resources development. In addition, they are expected to conduct strict techno-economic feasibility studies for mainstay industries and key poverty alleviation development

projects, provide scientific basis for various levels of local governments to make decisions for poverty alleviation and lead the poor areas to speedy, healthy, and sustainable development.

To organize a large number of science and technology personnel team for the implementation of poverty alleviation with science and technology through different measures. These include dispatching vice county governors and delegations for science and technology development to poor areas from colleges and universities as well as research institutes, motivating local scientific and technical personnel to participate in the technical work of poverty alleviation projects on contract basis, and training a large number of farmer entrepreneurs and local technical personnel in the poor areas.

To introduce and spread advanced and appropriate technologies to poor areas according to the needs of the local farmers.

To fully develop and utilize natural and labour resources of the poor areas. Some industries with the advantage of local resources and intensive farmer involvement are selected to be developed with concentrated scientific and technological force to form regional pillar industries of a certain scale. In the meantime, a number of socialized scientific and technological service organizations composed mainly of farmers and technical personnel have been set up to provide pre-production, mid-production, and post-production services for the development of pillar industries. With continuous efforts, such industries as silkworm, tea, fruit, livestock and poultry, bamboo products, traditional medicine, etc. at Dabie, Jinggan, and north of Shannxi Province have achieved annual production values ranging from dozens to hundreds of million yuan and covering 70–80 per cent of poor families. The processing depth and product development standard of the industries have been greatly increased. Efforts were concentrated in the restructuring of local industries, increased farmers' employment opportunities and income, and creating the conditions for these poor areas to develop market-oriented economies.

To create partnership and facilitate technology cooperation with other parts of the country so as to further open the door of poverty areas. In 1992, a project for the exchange and cooperation of cadres of poor areas in north of Shannxi Province and relatively developed areas in Shandong Province was initiated jointly. Till June 1994, 659 collaborative development projects have been selected with 207 of them put into practice and 54 under construction which brings about new incremental production value of 1 315 million yuan and profit and tax of 274 million yuan. During this period, Shandong Province helped the north of Shannxi Province in transferring or introducing 258 pieces of new techniques, recruiting 879 technical and managerial staff, training 2 560 technical workers of various fields, developing 205 new products, and creating 11 300 employment opportunities, which greatly promoted reconstruction and an opening to the outside as well as economic development of the northern Shannxi areas.

Sparks Programme

The Sparks Programme, the first strategic programme of science and technology based on the development of agriculture and the rural economy was initiated in 1985, and formally launched the following year after ratification by the government. The Spark Programme was based on the specific situation and characteristics of China.

It is well known that China, on the whole, is an agricultural country with rural areas covering 90 per cent of the land, and farmers accounting for 80 per cent of the population. The economic foundation is very weak, natural resources per capital is far below the world average. The rural area has long been the obstacle to China's economic and social development. However, with rural economic reform, the farmers have become increasingly aware of the importance of science and technology, and there is now wide-spread demand for it in the country. The Chinese government has incisively stated that science and technology is the first productive force and stressed that 'economic development should be science and technology driven, and geared to serve economic construction.'

From the above understanding, the Chinese government proposed the programme with a view to develop some appropriate and advanced technologies for the development of rural areas with 'less investment', 'short circle' and 'quick turnover', and named the programme Spark, which comes from an old Chinese saying: A single spark can start a prairie fire.

The aims of the programme are as follows:

Through the introduction of science and technology in the rural areas to enhance the quality, of labour, and to guide the farmers to the vigorous development of the rural economy.

To lead the village and township enterprises to a healthy development;

To promote market economy in the rural areas;

To spread the progress of the modernization and industrialization of agriculture and rural areas; and

Finally to build new rural areas with Chinese characteristics.

The mission of the programme is:

To make good use of rural natural resources;

To set up a group of model enterprises with science and technology as their guidance;

To make equipment applicable for the rural areas;

To train a large number ot technicians, managerial persons and farmer entrepreneurs for the rural areas;

To promote the establishment of social science and technology services system in the rural areas;

To develop high-yield, high quality and efficient agriculture.

The objectives of the programme are:

To enhance the quality of life of the farmers;

To speed up the process of industrialization and modernization of rural areas;

To promote the realization of becoming well-to-do farmers.

From the aspect of the government, there are four levels: the state, provinces (including the autonomous regions, municipal, special cities), prefectures and counties, participating in the management of the programme. These are in charge of the Science and Technology Commissions of different levels and supervised by the SSTC. Application of the projects of the programme are checked on and approved by financial institutions at different levels. There are also special administrative agencies generally called the Spark Programme Offices. The government at different levels is mainly responsible for the formulation of development strategies and the related policies for micro-control of the industries.

Based on national conditions, the operation of the programme is aimed at the practical needs of the rural areas, with special attention paid to the following aspects.

The programme is an advisory plan for the development of science and technology in contrast to the mandated plan of the state. Although the projects and technologies are examined and approved by the relevant government institutions, yet they are selected and finally chosen by the enterprise themselves according to their productive practice and the markets.

One of the characteristics of the projects in the programme is to develop a number of technological projects at the preliminary stage of focusing on the short cycle of commercialization of scientific achievement, to finally accomplish industrialization in the rural areas. So a lot of the Spark pilot projects and regional backbone enterprises have been designed and implemented.

The programme has been practiced with a financial system characterized by self and collective fund-raising, and loans and funds by the government in moderate degrees.

The programme targets village and township enterprises to achieve economic development of rural areas. Emphasis is laid on comprehensive utilization of rural resources.

Technology transfer from the Spark Programme is given high emphasis, and conducted in a planned and sustainable way in accordance with the needs of rural resource development, labour force shift, and qualified personnel training, and by integrating science and technology with the economy and with finance organically. The transfer of Spark technologies is to transfer scientific and technological results on the basis of mutual benefit between the supply and demand sides.

The Spark Programme has played a positive role in promoting rural development through purposefully introducing science and technology. Its achievements have been obvious to all and have been universally acclaimed and praised by many countries and international organizations. The programme has promoted the advancement of science and technology and created a fine model for rural industrialization in developing countries.

The programme has strengthened the awareness of science and technology of farmers and enhanced the ability of labourers with the establishment of more than 60 training centres and over 14 000 000 talented scientific, technological and administrative personnel who have been

trained for the rural areas, and brought up by a large number of farmer entrepreneurs young spark forgers (bellwethers) and special technicians.

The programme has fostered a self-development mechanism by relying on science and technology with stress laid on better composition of such productive factors as natural resources, labourers and funds, on the development of preferable and leading industries, and also on the creation of suitable social situations for the attraction of qualified personnel, technology, and funds. Therefore, enterprises gradually acquired the ability of self investment, self-exploitation and finally led to the road of self development.

With the contributions of science and technology commissions at various levels, relevant financial institutions and training centres, the Spark Programme made great achievements within ten years.

By the end of 1994, the number of projects started by Spark totalled 52 824, among which 31 625 have been completed. The total number of persons who took training courses for various skills was over 28.11 million, the number for 1994 alone was 7.46 million. The portion of the total investment for the Spark projects in the total investment for fixed assets of the whole country has moved up from 1 per cent in 1990 up to 1.3 per cent in 1994. In 1994 alone, 770 new projects have been started, with a total investment of 21 billion yuan, among which, 330 million yuan were government funds, 7.26 billion yuan bank loans, and 13.57 billion yuan raised by enterprises themselves.

Harvest Programme

Since the 1980s, the household production responsibility system, introduced in China's rural areas, mobilized the enthusiasm of hundreds of thousands of peasants, and naturally resulted in a great development of farming, forestry, animal husbandry, sideline production and fishery. As of 1984, however, China's agricultural output, especially that of grain and cotton, began to fluctuate for a number of years. Hence, China's agricultural production is faced with the serious challenges of enhancing momentum and furthering new-stage development.

The history of development of agriculture in China, and the level of agricultural production in other countries, indicate that there still exist great potentialities for China's agriculture to improve per unit area yield and quality. During the period of the 6th Five-year Plan, the annual number of agricultural research achievements in China mounted to 2 000 or so, of which only 30 per cent were applied in fair measure. This leaves much room for agricultural production to improve. In July 1986, the five agriculture-related departments of the CPC Central Committee put forward 'The Proposals to Safeguard the Continual and Stable Output Growth of Agriculture', demanding the prioritization and quick promotion of ten agricultural techniques that need less investment and yield greater output, so as to accelerate the output growth in farming, animal husbandry, and fishery. In order to expand the nationwide promotion of advanced applicable agricultural techniques, enhance integration of scientific and technological research and production, and to maintain the continual development of agricultural production and the economy, the Ministry of Agriculture and the Ministry of Finance decided to establish and implement the Harvest Programme involving agriculture, animal husbandry and fishery in the whole country based on the aforesaid proposals.

Till this year, the Harvest Programme, in practice for nine years, achieved the following:

Output growth has been attained

From 1987 to 1995, the number of applied and promoted advanced techniques in farming, animal husbandry and fishery totalled 237; the land area for application and promotion of improved varieties of grain and cotton and advanced techniques, over 1.2 billion Chinese mu (1 mu= 1/155 hectare); the number of livestock raised in scientific ways, over 0.4 billion; the water area for aquaculture in scientific ways, over 4.93 million mu; the increased grain, 27.3 billion kg. With the increased output value of 3.5 billion yuan, the programme has made an outstanding contribution to safeguard the supplies of farming and side line products and enrich the market economy.

A great number of agricultural research achievements and applicable techniques have been dispersed widely and quickely

Generally speaking, the pace of promoting agricultural research achievements and techniques in China is comparatively slow. It takes 4–5 years to promote and popularize a new farming technique. Nevertheless, the Harvest Programme has promoted and popularized a great number of improved varieties of crossbred rice, crossbred rape, crossbred maize, crossbred sorghum, as well as specially-oriented, high-quality varieties of wheat, beans and their kind. It has also promoted the encomposition of pig for lean meat, and hybrid etc. Achievements in various areas and techniques have been extended such as the standardization and systemization of cultivation and culture related to farming animal husbandry, sideline production and fishery, overall control of pest, technique of dry breeding and sparse transplanting of rice, interplanting of wheat and cotton, mulching, livestock raising in green houses, fish culture in net pens, fish and crab culture in rice fields, the mechanization in production and processing, etc.

The scientific and technological capacity-building has been greatly improved

As a result of the top domestic standard or advanced international standard of the programme's applied and popularized research achievements and techniques, and the comparatively high targets for output, the people involved in the programme, especially the technicians, were urged to pay special attention to scientific and technological capacity-building. The farmers and peasants also improved their technological capacity. Statistics showed that the research and extension personnel at different levels in the country who were involved in the programme totalled over 0.8 million, farmers and peasants under training, totalling 20 000 or more.

The industrial structure in the rural areas has been optimized

The Harvest Programme set out the planting structure of crops and livestock-raising structure. Increasing the revenue of farmers and peasants, this programme has accelerated the growth of agricultural output and the overall development of the agricultural economy.

The sound and efficient integration of administration, technology, finance and materials has been attained

Following the Ministry of Agriculture and the Ministry of Finance, the local governments at different levels attached great importance to the Harvest Programme. And the leaders at different

administrative levels took the responsibility to organize, coordinate the implementation of the programme. Hence, the optimized composition of related departments, fields and factors has been achieved.

The Harvest Programme was initiated at different levels

According to the mode, the local governments established and implemented their Harvest Programmes at the provincial, prefectural, county and township levels, respectively. Consequently, the complementary overall setup of the programme in the whole country came into being.

In the coming five years during the 9th Five-year Plan, the Ministry of Agriculture and the Ministry of Finance will further intensify investment in the Harvest Programme, strengthen its management and extend and popularize advanced techniques and improved varieties. Among others of vital importance are a number of improved varieties which will increase output by 15 per cent. These are the quick-growing and high-quality improved varieties of livestock, the famed and special improved varieties of aquatic products, mulching, rice dry variation and sparse transplanting, fertilizing in deep soils, dry farming and water-economizing farming, fodder in optimized composition, livestock-raising in green houses, ammoniated compost made of green stalks, aquatic culture in rice fields, fish culture in net pen, etc. The Harvest Programme will make greater contribution to the new development stage of agriculture.

D. The Splendid Cause

Thanks to the reforms and opening up to the world, China's modernization drive has made outstanding achievements, and the quality of life of the Chinese people has improved greatly. Due to the country's huge population, humble economic foundation, the great inequality of the natural resources, cultural difference, and regional imbalance of socioeconomic development, people in a number of poor regions in China still do not have enough food and clothing to consume. Therefore, poverty alleviation becomes the common concern of the governments and social circles at different levels.

In April 1994, ten celebrated non-governmental entrepreneurs put forward a written proposal addressing the non-governmental industries entitled 'Let's Devote Outselves to the Splendid Cause of Poverty Alleviation', proposing going to poor areas to exploit natural resources, establishing enterprises, training personnel so as to contribute to eliminating the difference between the rich and the poor, realizing common goals and concerted development. Its tasks were: to mobilize in an all-round way the state-owned enterprises in China and involve overseas commercial and industrial societies, enterprises and personalities in the poverty alleviation process in China; expedite, organize, coordinate and instruct the implementation of the Splendid Cause in the country; and, conclude experiences, popularize models and study policies of the Splendid Cause. These would result in harmonious relationships which in turn would help provide efficient and necessary services to the participants, so as to make the cause develop in a healthy way. The Splendid Cause has become a drive which is well planned and well organized.

Unlike the general doners, the participants in the cause and the host sides of the poor areas will all benefit from the economic and industrial cooperation. The main participants are

non-governmental enterprises, entrepreneurs, commercial and industrial organizations and people from overseas; the target areas are China's central and western regions, interior regions with sluggish economies, especially the regions inhabited by minor ethnic communities and frontier regions; the aim is essentially to exploit natural resources, set up enterprises, train personnel, develop trade, and cooperate in such fields as information, technology, management and operation, and marketing.

The participants from home and abroad equally adhere to the principle on a voluntary and mutually beneficial basis.

The All China Commerce and Industry Federation's (ACCIF's) branches at the provincial level, and non-governmental entrepreneurs throughout the country contributed actively, and the cause was warmly received by the people in the poor regions. The ACCIF urged its local branches to publicize and promote the Splendid Cause. Five thousand or more non-governmental entrepreneurs signed to participate in the cause within only six months. The United Front Work Department (UFWD) demanded its local branches at different levels to take an active attitude in participation and fully support the cause, so as to make it bigger in scale and momentum in order to yield better results.

The UFWD and ACCIF at different levels organized the non-governmental entrepreneurs for investment investigation and project negotiation in poor areas. According to incomplete statistics, in less than one year since the cause began, 2 600 of signed entrepreneurs started work. The related projects totalled over 300, of which some have gone into operation. The contracted investment surpassed 0.6 billion yuan.

In the future, the Splendid Cause will maintain its momentum and further development. It will perfect its operating mechanisms, build its support system, establish close ties with related departments and harmonize relationship, organize the exemplary investment investigation, enhance publicity and expand participation.

The Wenbao Programme (The programme for raising the extremely low livelihood of people in poor regions to one of having enough food and clothing to consume)

The poverty-stricken areas in China are mostly mountainous regions in the south and the dry and half-dry regions in the north. The steep mountains and hills, impoverished soils, different climates, ignorance or backward application of science and technology, and the low-level technological capacity of the farmers compound difficulties in obtaining enough food and clothing for the people in these areas. Hence, the first and foremost task of poverty alleviation is to provide the people with enough food and clothing.

Since 1989, the related departments of the state office of poverty alleviation, agriculture, planning, commerce, light industry, finance, etc. worked in a concerted effort to apply comprehensive methods of the complementary inputs and services with regard to technology, capital, and mulching, as a priority in the poor regions of sixteen provinces and autonomous regions (referred to as the Wenbao Programme in short). This resulted in the early ripening and output of grain in the poor mountainous regions. Characterized by less investment, quick effect, big growth margin, and sound results, the programme made great contributions towards

increasing grain output and helping solve eating and clothing problems in the regions from 1989 to 1994 in the following aspects:

The programme's promotion and extension was in quick speed, the regions where people benefited from the programme were wide

Maize mulching was popularized in the poor regions in sixteen provinces and autonomous regions. Its land coverage in 1994 amounted to 0.7 million hectares, 3.46 times that of 1988. The total land coverage in six years came to 4.47 million hectares, and extended to 471 counties (cities), 329 308 households, and 136.5 million people.

The output grew by a great margin

According to statistics, per hectare yield of maize with mulching was 2 508 kg more than that without mulching. The total increased maize came up to 11.21 billion kg. Now 12 915 poverty-stricken households and 569 382 poor people began having enough food, relieving the burdens of the state's relief deliverance, grain provident and financial subsidies. With the farming structure adjusted, the peasants benefited from the increased income of 8.7 billion yuan, and this laid good foundation for the poor regions to turn rich.

The rural industrial structure in poor regions got adjusted

The implementation of the programme resulted in the growth of grain yield and enough food for the local people, providing basic conditions for the mountainous regions to undertake diversified economic undertakings.

The technological and cultural capability of the peasants increased by a considerable extent

The programme introduced improved varieties and new technology to the mountainous poor regions. The farming technicians and agricultural experts came down to extend techniques and instruction. Consequently, the extensive and backward farming was routed out. By the popularization and extension of new applicable techniques, the technological and cultural capacity building increased.

It has been proved that the Wenbao Programme with less investment, quick effect, and sound overall results, is still the irreplaceable way to alleviate poverty in the poor mountainous regions in the north.

In order to further develop this programme, the Office of Poverty Alleviation and Development of the State Council and the Ministry of Agriculture will do the following work in coordination and cooperation with the departments concerned.

The organizational leadership will be strengthened

The plans, targets, goals and tasks for future poverty alleviation work should be well prepared according to the state's 87 Plan for tackling the key problems in poor areas based on the implementation experiences of poverty alleviation in past years. The capital, material, and technology that the related projects need should be well arranged in advance, so that the

supporting policies and complementary means will be implemented. Meanwhile, the work of instruction, checking and promotion should be strengthened, so that the programme achieves more.

Maze mulching will be improved

The scientific potentials to increase yield will be brought into full play, and the latest scientific and technological achievements will be introduced to the programme. With the effective means practiced, the technological extension service system will be perfected in poor regions. The agricultural experts and farming technicians are encouraged to go down to mountainous regions to offer technological service, so that science and technology will be extended to each household and the scientific and cultural capacity-building of the peasants and farmers will be furthered.

More activities conducive to the programme will be introduced

This will be done in the implementation of the programme so that diversified economic undertakings will be adopted to improve the adjustment of farming and industrial structure, making the best use of the local natural resources. In the future, new technology will be extended from maze mulching to the industries of planting, culture and processing. With this done, better results will be achieved for the peasants and farmers so that they have enough food and clothing, and become rich in the long run.

The financial support system will be perfected

The material supplies and subsidy policies to guarantee the implementation of the programme will be assured. The investment will be strengthened so as to enable the peasants and farmers to have enough capital for regular production activities. Such powerful measures will mobilize the enthusiasm and incentives to accelerate development through the path of poverty alleviation.

The Programme of Improved Varieties

The development of agriculture depends to a great extent on the adoption and popularization of improved varieties. Now the percentage of the supply of improved varieties is as low as only 27 per cent of those needed in China. The quality of varieties is not desirable, with purity of only 90 per cent. For a long time the system of varieties supply, not adaptive to the market economy, was seriously controlled by the rigid, planned operations which made research, cultivation and marketing of improved varieties dependent.

In order to improve the inflexible situation and accelerate the modernization of the industry of varieties, to upgrade production, extension and marketing of improved varieties and promote the development of the rural economy, the state has mapped out official goals as stated in the 9th-Five-Year Plan and the Long-range Targets in 2010 'to implement on a priority basis the programme of improved varieties to good effect' and regard the adoption of the programme as the essential measure to new agricultural development.

The programme includes the introduction and cultivation of improved varieties, breeding and production, processing and packing, extension and marketing and macro management. It will, therefore, involve collection of the original varieties, cultivation, regional test, appraisal,

parental propagation, production, purchase, storage, selection, coating, labelling, examining, sales, and after-sales service.

The proper and effective reforming measures taken by the departments responsible for research, administration, policy decision, law and regulations enforcement, management, investment, etc. to adopt this programme will optimize the industry of varieties in the long run, and greatly improve the quality and quantity of the improved varieties in China very soon.

The guidelines for the implementation of the programme are: to centre around the overall goals of agricultural production and the rural economy, keep pace with the economic system changing from a traditionally planned one to the market one, suit the needs of transition of economic growth from an extensive one to an intensive one, and stick to the overall and comprehensive planning and adaptation to local conditions. The guidelines also mention the advantages of bringing into full play the latent potentialities of the present improved varieties, technology, equipment and management, to establish the optimized and modernized Chinese industry of varieties.

The overall goals of the programme are to make the industry of varieties realize 'four fundamental changes', namely, the change from extensive production to intensive production, the change of supply from within administrative regions to inter-regional, international markets, the change from individual self-supply to the supply by middle or big-sized enterprises or groups, and the change from separation to systematization in cultivation, breeding, promotion and marketing, so that the modernized system of varieties suitable to the socialist market economy will be achieved. To be specific, by the year 2000, the percentage of land area with improved varieties will be 95 per cent or more. The operation area of the state-owned companies of improved varieties will increase from the current 0.75 billion mu to 1.2 billion mu. all the standards of selection, processing, packing and labelling up to the state second class, 50 per cent under coating process, the percentage of rice, maze, cotton and wheat supply with labels from the current 20 per cent to 60 per cent, the per unit area consumption of varieties will decrease, and make the contributed by percentage improved varieties in agricultural yield growth 5–10 per cent, accounting for 35 per cent of the total.

Beginning from the improvement of processing, packing and labelling, the research, production and promotion of improved varieties will be renewed priority areas. The capacity of processing, packing and marketing with labels of the state-owned varieties will increase from the current 2 billion kg or less to 6 billion kg.

The bases of improved varieties' cultivation and production will be established so that its production will be specialized. The system of production of the improved varieties will be built and perfected in relation to the infrastructure construction for airing, storing, processing and packing, etc. through joint investment by the state, the local departments and related companies, the state-level parental varieties farms, and special production bases of main plants. State breeding bases in south China's Hainan Province will be established and perfected, based on the ecological, local, and economic conditions. From these, the relationship among the departments in the whole process of the selection, breeding, production and marketing will be harmonized so as to fully benefit from the overall advantages.

Middle or big-sized enterprises or groups will be formed or combined to systematically undertake the cultivation, breeding, promotion and marketing of the improved varieties.

The varieties will be renewed with speed. The state-level introduction of crops and preservation centres and the renewing centres for main crops such as rice, wheat, maize, cotton and soyabean will be set up and supported, so that they will play a leading role for research, cultivation, and breeding work of the whole nation. In cooperation with the middle and big-sized enterprises and groups, the research centres and institutions will work out a great number of creative and improved varieties.

The measures of overall control and inspection will be taken so as to successfully fulfill the different targets. A number of state-level and ministry-level quality test and verification centres, state-level regional experimental stations for crop varieties, the state storehouses of varieties for emergencies like famine, and the state-level varieties information network will be set up and perfected. By doing so the related control, research, and operation institutions will be built so that the goals of the programme will be realized.

The governmental departments at the state and other levels have provided great support to the implementation of the programme. A number of provincial governments have formed special leading groups, held working meetings, and worked out the steps and preferable policies to implement and expand the investment. It is expected that the adoption of the programme will play a greater role in the national economic development and the realization of the 9th Five-Year Plan goals and the goals set for the year of 2010.

THE OPERATIONAL EXPERIENCES AND ACHIEVEMENTS IN POVERTY ALLEVIATION

The Operational Experiences

The various operational experiences accumulated in the process of poverty alleviation through science and technology can be summarized as the following:

To develop the commodity economy backbone by science and technology is the fundamental way for the poor regions to alleviate poverty and become rich

It is of vital importance to set correct and applicable guidelines for the poor regions to develop the economy properly and avoid blind economic undertakings which go astray. Taking into consideration the limited awareness regarding the commodity economy and the poor scientific and technological capacity possessed by peasants and farmers in poor regions, the Chinese government expressly puts forward, that the commodity economy supported by science and technology is the fundamental way for the poor regions to alleviate poverty and become rich. Under this guideline, science and technology personnel are encouraged to go down to help township enterprises, research institutes, and higher educational institutions are organized to work as technological supporters in poor counties. The key problems of food and clothing are solved, the regional industrial and economic structure is established, the comprehensive service system combining technology, farming, industry, and trading is formed, and measures such as inter-regional cooperation with developed regions, municipalities and cities are undertaken. It

has already been proved that such awareness of commodities, markets, competition and technological capacity-building that are built through diverse ways, lay a good foundation for both present poverty alleviation and future development in the poor regions.

To establish regional backbone industries is the key factor for the poor regions to develop the economy

The progress of poverty alleviation depends on the application of science and technology, which necessitates the establishment of proper industries. It has been proved that the mode of setting up regional backbone industries is more powerful in practice. Conducive to breaking away from the traditional individualized and backward production ways, enlarging diversified undertakings other than the single farming, and upgrading production specialization, protecting and utilizing natural resources in an effective way, helping a great number of involved households rather than individuals to alleviate poverty and become rich, increasing the quality of technological commodities, competitive and economic effects, and the establishment and development of backbone industries which are suitable to the local production power are of vital importance for economic growth in poor regions.

It is very important to introduce suitable backbone industries in poor regions. The local natural conditions must be taken into consideration, and the advantages of local natural resources must be utilized. What is more, the backbone industries must be market oriented.

To promote the long-standing application of science and technology in economic undertakings assures continuous economic growth in poor regions

A single technical application or the establishment of a single backbone industry has quick effects. However, the economic growth in poor regions is a continuous process spread over a long period of time. Possibilities of poverty repetition must be avoided after the alleviation of poverty in the poor regions. China's poverty alleviation practice shows that the promotion of long-standing application in the economy assures continuous economic growth in poor regions. In order to promote the long-standing application of science and technology in economy, the Chinese government attaches a vital importance to the cultural and technological capacity-building of peasants and farmers in poor regions. The practice of professional and technical education centred around the 'Green Certificate Project' and basic education in diverse methods greatly improve the technological capacity-building of the people, and a great number of peasants and farmers become skilled agricultural personnel.

To apply the science and technology in diverse ways for poverty alleviation guarantees the success of poverty alleviation

A number of effective ways and measures have been taken for poverty alleviation through the application of science and technology in China:

1. Poverty alleviation delegations are sent to poor regions to help local governmental organizations work properly. These delegations publicize the strategies and policies of poverty alleviation, train cardres and people, help work out the economic development plans and extend advanced applicable techniques.

2. The scientific and technological developing teams are organized to implement scientific and technical project plans. The positions of vice chiefs of the countries and townships in charge of science and technology activities in the poor regions are taken by selected personnel of the team so that they will help work out annual and long-term plans for development, introduce and extend applicable techniques, organize training, and solve key technical problems in alleviating poverty.

3. Advanced applicable techniques are adopted by peasants and farmers, and the problems in the process of adoption should be solved by setting exemplary and typical cases.

4. The backbone industries are developed through depending on the progress of science and technology.

5. Technical training are implemented yielding good results so that the technological capacity-building of peasants and farmers improve.

6. The social service systems are established and perfected. The systems, mostly with the farmers and technical personnel, in wide coverage, strong extension ability and high works quality, offer services of different kinds in the whole process of production.

7. The ecological environments are improved and perfected and development is kept in motion. The exemplary and typical undertakings are well arranged, various engineering, biological, ecological and other measures are taken, the overall regional, ecological control is practised, so that regional ecological deterioration is totally controlled, and the overall development process is kept moving in poor regions.

The Operation Achievements

1. The overall achievements

The ten or more years of painstaking work of poverty alleviation in China has yielded great results. The number of poor reduced from 0.25 billion in 1978 to 65 million in 1995. The percentage of the population below the poverty line in rural areas decreased from 31 per cent to about 7 per cent in 1995.

The following three stages can be identified in the process of poverty alleviation in China.

First stage: 1979-85, the period the number of people below the poverty line dropped drastically. The poor in rural areas dropped from 0.25 billion to 0.125 billion. This means an average decline of 17.8 million people per annum. The percentage of poor dropped from 31 per cent to 14.8 per cent.

The second stage: 1986-92, the period the people below the poverty line dropped cinsistently. The number of poor dropped from 1.25 billion to 0.8 billion, with an average decline of 6.4 million per annum. The percentage of poor people in the rural areas dropped from 14.8 per cent to 8.8 per cent. During this period, the Chinese central government set 331 poor counties as the priority ones to alleviate poverty in the country, and establish special poverty

alleviation organizations, and began the well-organized, well-planned and large-scale work of poverty alleviation as well as worked out a series of preferable policies to achieve this end. The total investment in poverty alleviation surpassed 40 billion yuan. In addition, 22 tons of fertilizer, 30 000 tons of much film, 60 000 tons of steel sheets, 24 000 tons of diesel oil, 4 000 vehicles, and 10 000 cubic meters of lumber were allocated to poor mountainous regions according to plans. And the local governments also expanded inputs to help alleviate poverty. By the end of 1992, the net income per capita in the key poor counties increased from 208 yuan to 450 yuan, with an actual increase of 133.8 yuan after deducting the inflation rate. The water supply problem for 25 million people and 30 million livestock was solved. Eighty or more woods farms, orchards, medical herb's and tea farms, 50 000 or more township enterprises, and 100 000 km long highway were built. More power lines were extended, as a result of which the power consumption increased by 60 per cent in poor areas.

The third stage: Since 1993, with a view to completing poverty alleviation work for the remaining 80 million poor people, the Chinese government has stipulated and implemented the 'The Stage 87 Plan for Tackling Key Problems in Poverty Alleviation', aiming to solve poverty problems with the help of concentrated human, material and financial resources. The plan set three work goals. First, to make the average net income per capita increase to 500 yuan by 2000 according to 1994 price index, and form the basic conditions to let people at poor level have enough food and clothing to consume and avoid the possibilities of poverty repetition. Second, to strengthen the building of infrastructure, solve water supply problems for people and livestock, build high roads and supply power for most poor townships, countryside markets and special commodities production bases. Third, to better cultural, education, medical and public health conditions, to eradicate illiteracy of adult farmers, to expand adult technical educational, to control endemic diseases, and to control birth rate. In the past two years since the plan was implemented, people below the poverty line dropped by 10 million in 1994 and by 5 million in 1995.

2. Signs symbolizing the development in poor regions

Tremendous changes have taken place in poor regions through the implementation of poverty alleviation by the application of science and technology.

a. The farmers' average income per capita increased to a considerable extent

The immediate results of the poverty alleviation work was that the farmers' average income per capita increased by a considerable extent, based on the continuous production growth in the poor regions. In 1994, the average income per capita of peasants and farmers in the national key poor counties increased to 648 yuan. In such counties, in middle China's Henan Province, it surpassed 550 yuan, and doubled that in 1995. There were 4.445 million people at poor level and 90.3 per cent of the total poor people in the eighteen key poor counties in the middle China's Dabie Mountains began having enough food and clothing to consume within only four years since the implementation of poverty alleviation through the introduction of science and technology in 1985. The people at poor level dropped from 4.925 million to 480 000. The Huanggang Prefecture of middle China's Hubei Province made good use of the technical supporting units, which helped introduce improved varieties, hold training classes, and develop

technical projects. Of the supported poor, 92 per cent of the households had enough food and clothing to consume. The average net income per capita of the people in the prefecture's four poor counties increased by 92 per cent. That in the Hosan County of east China's Anhui Province increased to 110 per cent from 1990 to 1994. And hence, the farmers' foundation for better life and expanding production was prepared.

b. The production level has been improved greatly

Compared with the situation at the beginning, land application, productivity, and commercialization of farming products have been improved to a considerable extent, and the production in every field is able to keep up the momentum. For instance, the total output value of agriculture and industry in the key poor counties in Hubei, Anhui and Henan provinces increased by 78 per cent, 36 per cent and 48 per cent respectively, and the financial revenue income in these counties increased by 89 per cent, 64 per cent and 51 per cent, and the economic growth rate was 34 per cent, 25 per cent and 12 per cent higher than other counties respectively in each province from 1985 to 1989. The GNP increased by 210 per cent, industrial output value increased by 490 per cent, agricultural output value, by 170 per cent, gross output value of the township enterprises, by 830 per cent, financial revenue, by 140 per cent in the Heshan County in west Anhui Province during the time from 1990 to 1994. The average grain output per capita in the key poor counties increased up to 351 kg in 1994, only 22 kg less than that in the whole country. The backbone industries have developed in the poor regions. The industrial products have taken their position in the domestic markets, and some have even opened international markets.

c. The industrial structure in rural areas has been improved considerably

The output value of township enterprises accounted for over one-third of the GNP in the rural areas in 1994. The booming of township enterprises and the non-farming industries resulted in the improved industrial structure combining agriculture, forestry, animal husbandry, sideline production, fishery, industry, commerce, etc. For instance, in the aforesaid Heshan County, the total industrial output value accounted for 33.7 per cent of the total agricultural and industrial output value in 1985 and 70 per cent in 1994. The percentage of total output value of township enterprises in the industrial total output value increased from 8.6 per cent in 1985 to 70 per cent in 1994. The percentage of the tertiary industry in GNP increased from 4.09 per cent in 1985 to 22 per cent in 1994. These figures showed that the industrial structure has improved greatly.

d. The productive techniques have been greatly improved

The technology introduction, transformation, extension, popularization and creation have resulted in great improvement of agricultural and non-farming productivity, making productivity in some poor regions match the average level in the country. The enlarged inputs of fertilizer, improved varieties, farm chemical, farming mulch film, and farming machines, etc. for modern production, the expanded land coverage of improved varieties, the improved agriculture infrastructure such as irrigation works building, highway building, power supply and telecommunications building contributed to the technological and cultural capacity-building of peasants, and the formation of a sound technological atmosphere among peasants and farmers in the poor regions in the whole country.

e. The ecological environments have been greatly improved

The ability of utilizing natural resources and fighting against natural disasters has been strengthened through the implementation of poverty alleviation with science and technology. The introduction and extension of applicable farming techniques bettered the ecological cycling and contributed to the improvement of the ecological environment. For instance, in Heshan County, the afforestation coverage grew to 620 000 Chinese mu. The wood areas increased by 19 per cent, and afforestation areas increased by 22 per cent. Soil erosion in 330 square kilometers has been totally controlled. The areas which yield despite drought and excessive rain have been enlarged by 210 per cent. The improved ecological environment has laid a good foundation for continuous economic development in the poor regions.

f. An all-out social development has been achieved

The implementation of poverty alleviation through the application of science and technology not only resulted in a tangible improvement in the lifestyle of farmers and peasants, emancipated productivity, but also freed the thoughts of the people, and propelled the all-out social development in the poor regions, where illiteracy elimination, basic education and technical education, medical and public health work, cultural and physical activities are booming. People's awareness of the commodity economy and market competition has been formed and improved. A change of attitude towards birth has resulted in the decline of population growth.

The Challenges

Though remarkable achievements and rich experiences have been obtained in poverty alleviation, many challenges remain and attention will have to be paid to the future development of poor regions.

a. *By the end of 1995, there are still about 65 million people living under the poverty line.* To realize the goal of eliminating absolute poverty by 2000, more than 13 million people have to be brought above the poverty line yearly. It is obviously an arduous task.

Geographically, the remaining portion of the population in poverty is mainly concentrated in the high mountainous areas, rocky areas, loess plateau, high altitude frozen regions, deserted areas, reservoir areas and areas where the occurrence of endemic diseases is frequent such as the middle and eastern regions. Fifty per cent of the poor belong to the southern and northern provinces. These areas have adverse circumstances, such as frequent natural disasters, limited per capita arable land, difficult access to drinking water, remote and separated from the outside world without communication facilities, and environment degradation. All these indicate that these areas are problematic and the work of poverty alleviation will be more difficult than before. How to use science and technology to tackle the problems is indeed a big challenge.

b. *There is a long way to go to realize self and sustainable development in poor areas.* The implementation of poverty alleviation projects may sometimes fail and then people go back to poverty situation due to lack of self-development. The experience of anti-poverty work indicated that getting rid of poverty steadily is built upon the capability of self-development and sustainable

economic development. Therefore, the internal self-development mechanism-building should be prioritized in the future anti-poverty agenda.

To build the capability of self-development, three virtuous cycles should be formed. First is the virtuous cycle of the quality of farmers, i.e. the enhancement of the level of cultural, scientific and technological competence of poor farmers at various levels to enable them to develop by relying on their own knowledge and power. Second, the formation of the virtuous cycle of capital, i.e. the establishment of industries which have the ability of self-accumulation of capital and circulation. Third, the formation of the virtuous cycle of the eco-system, i.e. the pursuit of harmonious development between economic growth and environment protection. Economic growth cannot be at the expense of resource destruction and environment degradation, but on the basis of the improvement of the ecology.

c. *Fostering the farmers' competitiveness in the market economies is a big challenge.* It is well known that China is undergoing the transitsion from a planned economy to a market economy. According to the arrangement by the Chinese government, the fundamental framework of a market economy system will be built by 2010. The economies of poor areas which are handicapped by small-scale individual household production will be lashed by strong competitive market economies. This puts forward new requirements for capability-building work. More attention should be paid to the awareness of market conception and ideologies by farmers, to enhance their marketing and managerial skills, as well as to provide science and technology. Only in this way can the farmers master the law of the market and grab the opportunity brought by the transition to develop their economies.

d. *Technological capability-building is not a task of a single person, sector, or organization, but one of the whole society to act in concert.* Apart from the support from government, technological capability-building needs favourable policies, talented people, abundant capital input, and management experiences and participation from the international as well as the whole society. Therefore, in future, the efforts should mainly be focused on policy formulation to mobilize the entire society to participate in the process of anti-poverty.

e. *Building up the classified technological capability-building model.* Because of the variety of natural, economic, cultural and social conditions, the technological capability-building cannot be uniform with the same strength. It is imperative to follow the practice of 'suit the measures to local conditions', and direct the focal point. From now on, emphasis will be laid on the middle and western regions of China, especially on the minority regions.

f. *Building up social security guarantee network* for those who temporarily or perpetually fall into the poverty pit because of loss of ability to work, or natural and social disasters, to obtain basic needs for survival.

g. *Institution innovation for poverty alleviation*, including the reform of social and economic systems in poor areas and institution innovation with a view to enhancing the capability of developmental staff in order to maximize on the use of limited resources for rapidly eradicating poverty.

NATIONAL INITIATIVES FOR PROMOTION OF TECHNOLOGICAL CAPABILITY-BUILDING FOR POVERTY ALLEVIATION

Governmental Policies and Strategies

The importance and significance of science and technology in social and economic development have been recognized in China. However, it was not until the 1980s that China paid much attention to its policies and strategies of anti-poverty activities. Chinese anti-poverty programmes before the 1980s were mainly oriented to offering humanitarian assistance to the poor through the distribution of food and materials for basic survival. And these were done by relying on the system of extensive social welfare and the security system. One of the characteristics of such anti-poverty activities is its humanity by offering the poor some conditions for basic survival. The other is its political compensation through fiscal input from the government.

The beginnings of anti-poverty policy-making can be traced back to the late 1970s when China held its 1st National Conference of Science and Technology and formulated a number of science and technology policies for its social and economic development. The idea that economic development must rely on science and technology and that scientific and technological endeavours must be oriented to serve the demands of social and economic development has been a common understanding among the economic, social, political and scientific circles.

At the beginning of the 1980s, Chinese top leader Deng Xiaoping put forward his famous idea that science and technology is the first productive force. This idea has become the basic framework of Chinese policy-making for its social and economic development over the last 15 years.

Under the guidance of Deng's thought, the policy of poverty alleviation through technological capability-building has been formulated as the elemental strategy for struggling against poverty in the mid-1980s in some rural regions. After about ten years of experiment along these lines, the Chinese government now has confirmed its faith in poverty alleviation through science and technology.

With the establishment of the market economic system reforms there has been an urgent demand for Chinese science and technology development. In 1995, China held its 2nd National Conference of Science and Technology. Empowering China through science and technology education has been put forward as a basic national strategy.

In the late 1970s, China began its social and economic reforms by implementing the household responsibility system in the rural country-side. In the mid-1980s the reforms had extended to all sectors of the national economy and the circles of science and technology. The reforms have brought great benefits not only to Chinese social and economic development but also to Chinese ideas about commerce. Commercial ideology has taken root in the minds of the Chinese to banish poverty from most rural areas where the living standard is very low and the economy is relatively underdeveloped.

Therefore, the final document of the second National Conference of Science and Technology proposed detailed national policies and strategies of science and technology development in the near future.

In order to ensure that food and other agricultural commodities demanded by the 1.2 billion Chinese population at present, and about 1.3–1.5 billion in the future, reach them, great efforts must be made to promote scientific and technological progress in agriculture and rural economic sectors. It is necessary to rely on technological capability-building for rural economic development, especially for poverty eradication in some remote areas.

Even though great achievements have been made due to the anti-poverty campaign in the last fifteen years, there are still about 65 million people living under the poverty line in rural China. In order to realize the country's second strategic target of upgrading the living standard of the whole country to a relatively comfortable level by the end of this century, 70 million people must be lifted out of poverty in the next few years. And poverty alleviation is still a hard work for the country, because the poverty areas left are those with more disadvantageous environment and conditions. Considering this situation, the Chinese government put forth its anti-poverty strategies as the following:

a. Transfer the concentration of anti-poverty movement from blood input pattern into blood creation one, where blood input pattern means to help the poor through offering them the materials, fund and food for their basic survival based on humanitarian grounds, and blood creation pattern means to help the poor through some technological tool so that production capability can be built within the poverty group.

b. Further strengthen scientific and technological anti-poverty activities by means of supporting technological extension and education in poor areas. Among the factors causing poverty are the lack of techniques and commercial ideology. Therefore, it is essential to help the poor by helping them to change their own minds. There was an old saying that giving the poor fish was second to offering him the fishing skill.

c. Guide the people of poor areas to develop local resources through S&T measures by the introduction of some suitable techniques. The resources of most poor areas are relatively rich and under-exploited. Through technology-building strategy, the resources can be used more efficiently to yield more in these areas.

d. Aim at economic growth as the final goal of anti-poverty action. Because economic prosperity determines living standards, it is essential to create economic opportunity for the poverty groups. The poor situation of the local economy is the most difficult problem for most of the poor areas. Thus through programmes offering economic opportunity income and employment of the poor areas can be greatly improved and this will in turn help in the final eradication of poverty from these areas. The Chinese government intends to adopt stronger measures to initiate economic opportunities in the anti-poverty process.

e. More specifically, the Chinese government formulated its actions in detail for the next five years i.e. from 1995 to 2000, in order to coordinate all forces engaged in the front line of the anti-poverty battle. It was re-emphasized in the Action Document of China National Anti-Poverty for 1995–2000 that poverty alleviation through science and technology is the basic national policy and strategy of the anti-poverty movement.

The main purposes of this national strategy include:

Solving the problem of hunger and providing basic survival guarantees to the extremely poor. This is the primary idea of poverty alleviation.

To advance commercial economic growth and empower the self-developmental capability of the poor areas by introducing suitable techniques into these areas and popularizing them among the poor farmers through scientific decision, planning and management.

The implementation of governmental policies and strategies in poverty alleviation through science and technology requires large inputs of human resources, financial assistance, material offering, tax reduction, economic project priority and the like.

In China every year, there are above 500 000 administrators, technicians, scientists, traders, leading farmers and social volunteers from various agencies working at the front line of the anti-poverty campaign. And about four-fifths of them are engaged in the work relating to S&T assistance to the poor.

Financial assistance is the elementary source of poverty alleviation through science and technology. Every year the Chinese government budgets a rather big share of its governmental expenditure for anti-poverty movement. In the recent five years, the governmental budget for anti-poverty programmes is, on the average, about 100 million yuan and four-fifths of this was used for poverty alleviation through technological capability-building. Compared with the population under the poverty line the anti-poverty budget of China is not very high. However, it does account for about 1 per cent of the total governmental expenditure. This indicates the firm conviction of the Chinese government to eradicate poverty through technological capability-building. In the coming years an increasing portion of governmental expenditure will still be available for the Chinese anti-poverty battle because the remaining five years of this century is the key period for the Chinese government to keep its promise to upgrade the living standard of the remaining 70 million poor to one above the poverty line.

The following are the main principles for this arduous anti-poverty movement. These principles can be viewed as the strategies of the Chinese government's anti-poverty movement in the near future.

To guide the anti-poverty movement towards relying on technological capability-building by both advancing science and technology progress and enhancing the knowledge of the poor labourers. By this way, self-developmental capability of the poor areas can be built.

To depend on the relative advantages of resources for the breakthrough in poverty alleviation through science and technology. To rationally utilize this resource advantage and to emphasize their shifting into commercial advantages. In this way, market competition of the poor areas can be created and commercial ideology can be built, which will in turn be helpful for the eradication of poverty in these areas.

To emphasize the idea of 'local action', oriented to local poverty-problems and resource conditions'. Every region has its own special poverty problems and special situations regarding

both the causes leading to poverty and the resource advantages for getting rid of it. Emphasizing locality is very important in anti-poverty action.

To coordinate the economic, social and environmental goals in anti-poverty action. For a specific region, a complicated and coherent interrelationship exists among economic growth, social progress and environment change. Usually poor areas face challenges from the economy, community and environment simultaneously and coordination is crucial for solving these problems.

To focus on ideological transformation. The participants of the anti-poverty programme through technological capability-building must change their mind-sets from traditional ones to a modern economic one by employing market economy perceptions to their anti-poverty activities and ensuring sustainable development.

To strengthen integrated anti-poverty action for greater success and to avoid scattering the limited anti-poverty resources especially fiscal budget. In this aspect, the use of the available forces and resources is particularly encouraged by dedicated organization and planning, for the large poor regions with social and political significance.

The major tasks of national anti-poverty programme through technological capability building has the following four aspects:

Make the popularization rate of advanced agricultural techniques and innovation increase above 10 per cent of the current level, and contribution rate of scientific management and technology to increase agricultural revenue about 155 per cent in the main poverty regions of the country.

Establish several propped industries and leading sectors for agriculture in various poverty areas. Driven by the development of these propped industries and leading sectors, the economic return of agricultural activities can be improved, which in turn will give a stable economic safeguard to the poor.

Increase the cultural and science and technology level of the anti-poverty participants, both the project administrative staff and the poor. The low technological level of rural labour is the most serious handicap blocking the economic growth of poor areas. By means of education and internship training, the technological capability of the poor areas can be uplifted and the potential for development can be created.

Poverty alleviation is rather complicated. It is extremely important that the eradication of poverty depends upon the building of blood creation mechanism for the poor of the poverty area and the upgrading of the technical knowledge and technological capability of the poor. Obviously, after about fifteen years of practising, the Chinese government has formulated a series of poverty alleviation policies and strategies through technological capability-building. These policies and strategies have, as indicated above, resulted in great victories in many battles of anti-poverty. In the future, the Chinese government will surely execute these anti-poverty policies and strategies for the complete eradication of absolute poverty from China.

Financial Aspect of Poverty Alleviation Programmes

Availability of financial resources is one of the main prerequisites for poverty alleviation. In China, the financial resources for poverty alleviation come from various channels which will be discussed as follows.

1. *Special state aids for poverty alleviation.* The state government is mainly responsible for poverty alleviation. With a view to eliminating the country's absolute poverty by the year 2000 the Chinese government has listed the task of helping poor areas as the centre of its rural work and provided a large amount of financial resources for the task. In 1980, the Ministry of Finance created a special fund, the Development Fund for Underdeveloped Areas, to provide grants to resource-poor provinces in northwest and southwest China. In 1983, the State Council authorized the establishment of the Sanxi Agricultural Construction Fund to provide an annual 0.2 billion yuan aid to thirty-nine poor counties in Gansu and eight in Ningxia. In 1984, the State Commission set up a Food-for-Work Programme designed to use surplus grain and cotton stocks to pay for infrastructure construction in financially depressed areas and from 1984 to 1992, the central government committed 5.2 billion of grain, cotton and cotton cloth for this programme. Each year, during the 1986–90 period, the state provided an additional subsidized special loan of one billion yuan for the implemented poverty alleviation programmes. In 1987, another 50 million yuan subsidized special state loan was granted to support the development of the pastoral areas. During the 1991–5 period, an additional subsidized loan of 500 million yuan, on an annual basis was provided to support those counties whose average annual income per capita in 1990 was below 300 yuan; one million tons of grain or industrial commodities was offered annually to farmers as salaries for their work in the construction of farmland and small-scale water conservancy facilities in southwest and northwest parts of China; and 100 million yuan subsidized loan was provided to 500 counties to rehabilitate disabled people. Up to now, the total amount of all kinds of anti-poverty funds per year provided by the central governmental has reached over 10 billion yuan.

2. *Financial assistance from various ministries and agencies.* Dozens of line ministries and agencies play a role in poverty alleviation. Financial assistance provided from these organizations is large though there are no statistical figures. Take the example of State Science and Technology Commission, as it initiated the Programme of Poverty Alleviation with Science and Technology in 1986. If provided 56.5 million yuan and 320 million Spark loans for the development of poor regions with 471 Key Technological Development projects and more than 1 500 science and technology demonstration plots. These resulted in the spread of a large amount of advanced and appropriate technologies and their application in the poor areas.

3. *Financial assistance from various donors.* Past and Ongoing Donor Assistance for poverty alleviation has played an important role in China's anti-poverty campaign. Many donor agencies like UN agencies, bilateral agencies and international NGOs are involved in the Chinese poverty alleviation programmes. For example, the UNDP has more than twenty projects totalling $ 41.2 million with a specific poverty focus, IFAD has disbursed over US $ 140 million in soft loans for poverty alleviation projects in the rural areas of Sichuan, Shandong etc. in China. ADB has provided technical assistance in integrated rural development in three provinces in southwest China. Australia, Canada, Germany, Italy, Japan, EEC etc. and some International NGOs like

Ford Foundation, CARE International, Save the Children Fund etc. have supported the development programmes in the poor areas of China.

Private sector participation and financing of technological capability-building

Poverty is a complicated social, economic and political issue tormenting the developing countries. To alleviate poverty through technological capability-building is the fundamental strategy of the Chinese anti-poverty movement. Efforts from the government at various levels alone cannot eradicate the serious poverty problem from the land of this big developing country. Recognizing the contrast between the governmental inputs and what is required for eradicating poverty, the Chinese government adopted a comprehensive anti-poverty strategy which attempted to absorb all possible forces into the movement.

In recent years, in addition to augmenting its inputs for poverty alleviation, the Chinese government also paid great attention to encourage all possible forces to join in the anti-poverty movement by means of policy stimulation in terms of economy, politics and humanity. Under the encouragement of the governmental anti-poverty policy, the private sector has become one of the main forces in the Chinese anti-poverty movement. The stimulation and policies include: (i) one to five years exemption from tax for newly established private enterprises; (ii) income tax exemption for a term of eight years for private enterprise from other areas for development purposes (such as the running of forest farms, animal farms, power plants, etc.); (iii) interest-free credit or low ratio of interest credit for private sector, etc. At the local level, more preferential polices and measures have been adopted to encourage and assist the development of the private sector. Now the successful collaboration between the private sector and the government has been appreciated as an outstanding feature of Chinese poverty alleviation programme in recent years.

The participation of the private sector in the Chinese anti-poverty movement is principally linked to a strong relation with the technological capability-building of the poor areas through various forms:

Building factories in poverty area

Many poor areas have resource advantage and a cheap labour force, which are the two essential factors in economic activities. The lack of sufficient funds for industrial investment, and advanced technology for manufacture is a common phenomenon of all poor areas. Considering the great potential for economic return, the private sector under the stimulation of government policy has extended its economic activities into some poor areas by industrial investment for factory-building in order to gain continuous prosperity for its own development. This activity has proved to be a successful way for the private sector to participate in the poverty alleviation programme through technological capability-building. In China, many poor rural areas get their primary industrial development input through outside private investment. Actually, this also indicates one of the basic principles of economic development in its spatial expansion and regional extension among different areas.

Developing trade in poverty areas

A poor area is poor because of its lack of modern commercial ideology and trade system necessary for local economic activities even though other causes are also extremely important. Economically,

market potential is relatively considerable in many of these areas even if they are poor in terms of buying capability per capita at present. However, commercial competitors are few and trade risk is relatively low. Due to these advantages as well as the policy encouragement of the government, many local markets for rural goods have been developed in the poor areas of China under the participation of private traders. The joining of these private traders greatly improved the local marketing situation and promoted the development of the local commercial economy. This in turn made considerable contribution to poverty alleviation of these poor areas. It gave assistance to change the local poor's traditional ideology into a modern commercial one and accelerate the process of technology capability-building of these areas for the final eradication of poverty.

Marketing to and from poverty areas

Lacking convenient access to the outside world is one of the essential causes leading to poverty in many remote areas. However, many poor areas have their own special products. Development of these local special products needs a fine channel of marketing to and from the outside world. With this in mind, the Chinese government has encouraged the private sector to participate in developing market relations with the poor areas on the basis of mutual benefits during the past fifteen years. These activities have accelerated the development of rural propped agricultural sectors oriented towards poverty alleviation and have given assistance to the empowerment of the poor areas. One of the successful cases in this aspect was the establishment of the selling system of silkworm, cocoon, and chestnut, in promoting the industrial development of silkworm breeding and chestnut in the Dabie Mountains, one of the poor areas in China.

Participating in economic development of the poor areas

Since the 1980s, with the deepening of reform in all aspects, the private sector became a more important force of local economic development. It has permeated into all aspects of local social and economic activities and hence has a significant role in helping the poor to fight against hard conditions. Aggressive enterprises both oriented to manufacturing local agricultural products and marketing local goods are some of these examples.

Creating economic cooperation with poor areas

Through the joining of the private sector local economic activities, many opportunities can be created for the improvement of the living conditions of the poor. The purpose of most private enterprises is oriented to economic return and interest. Because of low income and under-development, many poor areas have considerable potential for economic and business prosperity which is a positive force for the private sector both in and outside the poor areas. Therefore, under the stimulation of proper policies, the private sector will automatically make efforts to cooperate economically with the poor areas.

Absorbing surplus rural labour from poor areas

Low income is the direct expression of poverty and creating employment opportunity has proved to be an effective way for poverty alleviation. Under the guidance of the national anti-poverty strategy, many surplus rural labourers from poor areas have been organized to find employment

opportunities in relatively developed areas. The export of labour from poor areas cannot only earn a lot of money for their family but also help them to improve their own technological conditions. Labour is one of the most active production factors in the social and economic system. It has access to commercial ideology of developed areas. Many of them return to their hometown to create their own professional careers after several years of working outside. This is an important way for poor areas to build their technological capability for poverty alleviation and thereafter, economic growth. Every year there are more than 10 million rural labourers from poor areas in central and western China rushing into coastal economic developed areas to find jobs in the private sector and other economic branches. This great flow of labour has resulted in both the improvement of living standards and technological capability-building in many poor areas of China.

The Chinese experience of poverty alleviation during the past fifteen years indicates that the active participation of the private sector is an indispensable component of the anti-poverty movement through technological capability-building. Actually, the purpose of private sector participation in poverty alleviation can be distinguished by two aspects: economic and humanitarian. Because of its nature (blood creation), the private sector's participation in poverty alleviation is much more oriented to its economic purpose. And this feature has great implications for the technological capability-building of poor areas.

In the last fifteen years, the participation of the private sector in the anti-poverty movement has made great contributions to the alleviation of poverty in many remote poor rural areas of China. Subsequent to its success, the Chinese government in the future intends to encourage the entry of the private sector and other possible forces in its fight against poverty through technological capability-building.

Role of NGOs

Another important force in the Chinese anti-poverty movement are NGOs which have played a significant role in alleviating poverty during the last fifteen years.

The NGOs participating in the battle against poverty can be listed as following:

- Specific farming associations
- Farmers' society at different levels
- Manufacturing agencies linking with agriculture and marketing
- Marketing agencies linking with agriculture and manufacture
- Agricultural cooperative agencies
- Research institution at various levels
- Universities, colleges and professional training centres

- Academic associations at different levels
- Various professional associations.

These NGOs have different ways of contributing to the anti-poverty movement. However, to strengthen technological capability of the poor areas is the most important. The following can be distinguished as some roles played by NGOs in poverty alleviation in China.

Dissemination of innovation and advanced techniques among the poor

The lack of proper knowledge for production is one of the principal causes leading to the problem of poverty in many remote areas. The introduction of advanced technology into the poor areas can bring many benefits to them. Consequently, this can change local farming behaviour at different levels and make the poor understand that they should depend on technology to relieve them of their poverty. In the last fifteen years the introduction of advanced technology has been one of the concentrated activities of the anti-poverty movement and NGOs played an important role in the dissemination and extension of innovation and advanced techniques among the poor. It has been proved that this dissemination and extension has resulted in outstanding achievement in poverty alleviation in many poor areas.

Selling new species with high-yield to the poor and teaching them how to farm

New agricultural species can, under the same conditions, bring higher yields and returns to farmers than traditional ones. It has been demonstrated that a remarkable anti-poverty effect can be acquired in a short period by distributing some suitable species and their farming techniques to the poor, which has been appraised as a quick poverty relieving tool in China. In China, the distribution of new species to the farmers are mainly done by the Service System of Agricultural Technology Extension at different levels and various Special Farming Associations, which are the principle NGOs acting in the front line of the Chinese anti-poverty battle.

Offering technological training to the poor

As indicated above, lacking techniques and having low ability to adapt to change in both production and the market are the key reasons leading to poverty. Therefore, offering technological training to the poor is an effective way of alleviating poverty. And this is mainly done by NGOs, especially local agricultural technology extension stations, various farming associations and agricultural experts from various research institutions and universities. During the last fifteen years many poor people have been relieved from the plight of poverty and equipped to become rich by accepting new technology after participating in training programmes. Many such examples can be seen in poor regions like the Dabie and Jinggang Mountains.

Creating scientific models for the poor to be rich

Poverty alleviation is not only an economic issue but also a social and cultural one. The poor usually have many difficulties in accepting new anti-poverty techniques because of their traditional ideology. Creating awareness is essential for the extension of new anti-poverty techniques among the poor. The great effect of the new techniques in changing the situation of the poor has created their faith in learning, practising and adopting these techniques in their

own economic life. A number of scientific model households have been created by the local technology extension system in rural China and these households have played a significant role in helping the dissemination of new agricultural techniques to the farmers.

Serving as a medium for economic cooperation

From agricultural production to marketing or via industrial manufacturing to trade is the principle route of a rural economy characterized by agriculture. Therefore, how to link the scattered farmers to the market is a key step for agricultural success in many poor areas. NGOs oriented to commercial marketing play a significant role in organizing farmers into various sectors of industrial development. Academic associations and institutions also have a great impact in initiating opportunities of economic and technological cooperation between the poor areas and the outside world.

Studying poverty as an issue related to economics, policy and institution, sociology, population, resources and environment. etc.

The importance of studying poverty issues in the process of poverty alleviation is obvious: anti-poverty policy formulation requires detailed information of the relevant poor areas and many anti-poverty activities also require a feasibility evaluation. Even though the government at different levels has some information, the viewpoints of experts and specialists from various NGOs have provided a solid foundation for Chinese anti-poverty programmes. In the last fifteen years, Chinese NGOs, especially the research institutions, education bodies and various associations have made efforts in studying Chinese poverty issues and the study rose as one of the hottest topics in the Chinese social sciences.

In these ways, the anti-poverty activities of Chinese NGOs have made many achievements, of which the obvious augmentation of technological capability in many poor areas is worthy of mention, because of its importance in eradicating the problem of poverty from these areas.

The following is a successful case of the activities of the NGOs in the anti-poverty movement through technological capability-building in the western mountains of Yunnan province.

The western mountains of Yunnan province has been listed as one of the most poverty stricken regions in China. However, living conditions in these mountains have greatly changed in recent years even though poverty still remains. The experience indicates that NGOs have a significant role in poverty alleviation through technological capability-building. In recent years, 410 villages of the 435 have evolved their village-level technology extension associations, with Lijiang, a sub-province of Yunnan and 827 special farming associations. The NGOs played an important role in training farmers and popularizing techniques. The 873 technical training programmes had been helped by various associations and extension services and above 180 000 farmers had been trained in 1993 in the Nujiang sub-province, another acutely poor region of Yunnan. Helped by these anti-poverty activities, living conditions have improved in recent years and in 1993, the income of the poor in Nujiang increased by four times that of 1980.

Therefore, the participation of NGOs has been appraised as indispensable in the Chinese anti-poverty movement. Practical experiences have indicated that NGOs, especially farmer's

associations and technology extension services, have contributed considerably to the technological capability-building of poor areas and the complete eradication of the problem of poverty in these areas.

Local Initiatives for Poverty Alleviation, Building from Below

There are ongoing criticisms that there has been much development of the bureaucracy, but very little of the people. Much of the process of poverty alleviation and development programmes have effectively bypassed the poor. However, in China, the role played by local communities and authorities in poverty alleviation was initially given a high importance. This is based on the understanding that 'top-down' approaches are not specifically suitable to the local situations, and always lead to the failure of poverty alleviation programmes, while communities and authorities know better about the needs of the poor, availability of resources, attitude of the population etc. Therefore, 'suit measures to local conditions', 'put the people first', 'start from what they need and what they have' and 'planning for the people, with the people and by the people' are the main principles applied to the planning and implementation of the poverty alleviation programme. The key decision is made by the people in the problem situation or those who have substantial involvement in the planning process.

In the past decade, the local communities and authorities, especially the village executive committee and able persons have played a positive role in capacity-building and poverty alleviation in China. They are both leaders and practitioners. 'To be rich, you must build a good village executive committee', this saying is widely accepted. The role of local communities and authorities in poverty alleviation through technological capability-building is discussed as follows:

- Building awareness, e.g. realization of the problems, constraints and strengths among the poor farmers, and provision of solutions.
- Mobilization of local resources to develop suitable agricultural extension activities and non-farm activities and generation of farmer's income.
- Provision of credit.
- Dissemination of agricultural information, knowledge and skills.
- Recommending more profitable farming and non-farm business.
- Provision of training opportunities for poor farmers, especially women and giving timely guidance in adoption of new technologies.
- Encouraging and supporting establishment and development of various farmer's organizations and cooperatives.
- Organizing exposure programmes, e.g. conducting demonstration and observing a working model, etc.
- Provision of linkage between farmers and outside markets.

A survey conducted at seven villages which took the lead in getting rid of poverty in Baokang County, may give some tangible explanation of the role played by the local communities and authorities in poverty eradication.

Situated north of Hubei Province, the seven villages were some of the poorest mountainous villages ten years ago with per capita net income of less than 200 yuan. After a decade's efforts, now the seven villages rank the richest in the county, with the per capita net income reaching 1 466 yuan in 1994, 79 per cent more than the county's average. It must be noted that each village has a strong executive committee. With high motivation, the committee puts the needs of poor farmers first, clearly aware that the situation of the village constantly seeks a suitable model for economic and social development. Based on resource advantages, each village has its own economic development model. At Wangliangshan village, the forest-grain model was adopted. At Zhangjiagou village, fungi-grain model was adopted. While at Jioulichuang village, the mineral-grain model was applied. The various models of economic development prompted the rational use of local resources and readjustment of the industrial structure. Meanwhile, the village committee provides various socialized services and training for the farmer's agricultural activities and non-farm activities.

Consider another example. Huaxi Village in Jiangsu Province has won universal praise for its practice in helping the poor. Situated in a developed region, Huaxi village never forgets to help the poor in impoverished areas. With the strategy of combating poverty through capability-building, the village has trained 800 kinds of agricultural, managerial and technical personnel for the poor in the middle and western areas and greatly uplifted the farmer's quality.

The final goal of Chinese anti-poverty movement is to alleviate the existing 70 million people from poverty by the end of this century. The elementary strategy that the Chinese government adopted for poverty alleviation has experienced a great transference from the blood input pattern to the blood creation pattern. Direct offering of materials, fund and food for the poor is the main feature of blood input pattern in anti-poverty, while the blood creation pattern is characterized by building technological capability for the poor so that they can gradually solve their poverty problem by themselves. The Chinese government will continue its direct participation in the anti-poverty movement through technological capability-building acting as a leading force to organize, coordinate and guide other forces to join the movement. It also continues to formulate and execute several policies to stimulate and absorb all possible forces to participate into the battle of fighting against poverty. In this aspect, the private sector and NGOs are particularly important due to their diversification of participation in the anti-poverty movement and their significant role. The Chinese experience indicates that they are the indispensable force of the massive anti-poverty movement.

POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPABILITY-BUILDING AND INTERNATIONAL AND REGIONAL COOPERATION, FOLLOW-UP ACTIVITIES AND RECOMMENDATIONS

The international awareness of the Strategy of Poverty Alleviation through Technological Capability-Building

From the above analysis, we may conclude that the PATCP strategy has proved to be an effective way to combat poverty. The utilization of science and technology has enhanced the intrinsic advantages of the poor areas.

The functional mechanism of the strategy that led to success lies in the combination of technology and resource which made it possible for limited resources to be utilized efficiently. Economic development has obtained a firm foundation by relying on science and technology.

Of course, the approach is not a panacea. It cannot be expected to solve all the problems in the poor areas. Many factors contribute to the failure and success of a strategy.

Firstly, having science and technology is the prerequisite of the strategy. The one most important factor that led to the success of the China Spark Programme lies in the availability of technology in academic institutions. There is however, a relative technological 'vacuum' in the vast rural areas. The implementation of the programme bridged the gap and created an impressive economic result. Generally speaking, technology cannot be engendered within poor areas but has to be introduced from outside.

Secondly, to better disseminate science and technology, it is necessary to have a workable promotion system to handle the relationship between the promoters and the receivers and improve the way of doing so. Based on the above analysis, it can be seen that China has an extensive network which provides the organizational guarantee for appropriate and advanced science and technology to be diffused among all farmer households and turned directly into productive forces in the rural areas even though the network is not complete and large areas need to be covered.

Thirdly, the receivers' atitude and their capacity is also a key factor for the success of the strategy. Generally, having lived long in an environment shut off from the outside world, poor farmers tend to be insensitive to new things, science and technology included. Long years of struggle for a hand-to-mouth existence on low productivity land has crippled their ability to endure risks, hence forming barriers to the diffusion of science and technology. Though some farmers are anxious for new technology, they are not able to pay for it. Here is a vicious cycle: low income results in the shortage of technology; lack of technology know-how leads to low productivity and thus results in low income.

Finally, policy incentives and government subsidy are the motive forces towards the success of the strategy. Technology capability-building is a complex and integrated process including not only technology innovation and transfer, but also the demonstration, application and adaption of technology. Each stage needs policy incentive and financial support, especially in the economically fragile regions. In short, PATCH is a new strategy which changed the traditional approach to poverty alleviation into an integrated holistic approach and contributed greatly to poverty eradication and rural economic development in some counties. Yet, problems are still present, and further development of the strategy needs collective action in the ESCAP region.

The Potential Areas and Modalities of International and Regional Cooperation

1. *Agricultural technology innovation and dissemination in rural areas*

Agricultural technology can directly influence the mode of resource utilization and productivity and finally effect the yield and quality of agricultural production and its competitiveness as well as the farmers' income which is a crying need. Cooperation in this field is based on the fact that the level of technological development is different from place to place. Efforts should be

concentrated on the common and appropriate technologies which have been widely applied by developed countries or areas which have proved to have huge yield-increasing potential. The following lists some of the technologies:

- High-yield varieties.
- Improved fertilizer technology.
- Disease and pests controling and prevention technology.
- Installation of agricultural technology, e.g. mulch-film covering cultivation technology, warm-house no-mulch cultivation technology, horticultural crops warm-house technology.
- Water-saving irrigation technology.

Considering that FAO is mostly involved in the innovation and transfer of agricultural technologies, it is requested to provide technological and financial assistance for the above mentioned and in the ESCAP region. ESCAP together with APCTT and other organizations should facilitate the technology transfer.

2. *Industrial technology innovation and transfer in rural areas*

Industrial technology is of vital importance for SMEs in poor areas. Many SMEs in rural areas slumped soon after they were established due to lack of technology innovation. Backward technology results in poor quality and low competitive products with high cost and material consumption. Cooperation in this field may include:

- SMEs' technology innovation.
- SMEs' management skills and training.
- Deep-processing technology.
- Environmental friendly technology application by SMEs.
- Technology information system establishment.

3. *Technology service system*

4. *Technology marketing*

5. *Science and technology policy research on regional development*

Modalities of cooperation may vary according to different regions, fields and levels.

Exchange of information, experience, technology and expertise concerning technological capability-building in rural agricultural and industrial sectors should be promoted on a priority basis. The exchange may be through conference, seminars, workshops, study tours, industrial

and technical exhibitions and fairs, technological demonstrations, circulation of published material etc.

Jointly sponsored programmes for technological know-how and training of skills, including technological and managerial personnel training for poor farmers, formal technological schools, full-time training and on-the-job training should be extended. Vocational education is essential to those who cannot enter junior middle school and college to learn one skill or another. Television and correspondence school programmes are also of vital importance for technology training.

Enterprise-to-enterprise or academic-to-enterprise technological assistance partnership should be encouraged. The partnership could accelerate technology transfer and accelerate technology innovation and progress. The cooperation may be multi-sectoral, inter-regional and intra-regional.

Investment-related technology transfer should be promoted. The government, companies, private sector, donor agencies, and academic institutions who have technology and capital advantages together with good labour and land resources in poor areas should implement programmes to develop the poor areas.

Area-specific studies and technological consultation are necessary. Area-specific studies could give a specific diagnosis and treatment for technical problems. Technology consultation is the most effective way of transmitting knowledge.

C. Practical Action Plan and Recommendations for Technological Capability-Building in the Poor ESCAP Region

Pilot projects should be designed and implemented in some selected areas to facilitate the building of partnership between the local government, NGOs and community-based organizations for technological innovation and application.

A simple survey of SMEs' technology may be conducted in a number of counties in the ESCAP region, which will be prepared to provide technological advice.

A number of technical training centres may be jointly set up at national or local levels with the ESCAP assistance to provide training for the technical and managerial personnel as well as the poor farmers.

Regional or subregional poverty alleviation programmes through technological capability-building may be proposed to meet biennially to review the progress of the implementation of the action plan for poverty alleviation through technological capability-building. The venues may be decided upon in consultation with member governments. Participation will be open to various organizations and institutions.

Periodicals, newsletters and publications on poverty alleviation through technological capability-building may be prepared by the Secretariat of the ESCAP or some organization entrusted by the Secretariat and circulated among the member counties to exchange information, experience and technology on poverty alleviation issues.

Rural technology development and extension centres or rural technology parks may be set up at different levels. The centres or parks will be the special zones with strong sci-tech development ability, radiation ability and demonstration functions which are regarded as the growing points of technologies.

Technology exhibitions, fairs and demonstrations may be held annually in different counties to promote technology transfer and cooperation between the various nations in the ESCAP region.

Build up the technical cooperation trust fund and technical development fund to support technology introduction, demonstration, popularization and consultation for the development of poor regions. A bonus fund to award the scientific and technical personnel who directly engage in poverty alleviation work in poor areas for a long time may also be established. Government and donors are invited to contribute to the fund.

Technical capability-building for vulnerable groups (for example disabled persons, women and indigenous people) should be given special attention. Programmes have to be designed to meet their special needs to enhance their technical levels and ability to help themselves.

More effort needs to be expended to increase an awareness of science and technology in poor areas through technological awareness days, weeks or months.

The implementation of programmes for poverty alleviation through technological capability-building demands concerted and united national and international action and inputs of more resources. Therefore, the international organizations, particularly UNIDO, UNDP, FAO, UNFPA, UNICEF, UNESCO and ILO etc. and financial institutions such as ADB, World Bank etc., are requested to participate in and provide funds for the implementation of the above mentioned activities.

DEVELOPMENT OF SCIENCE AND TECHNOLOGY FOR RELIEF FROM POVERTY

1

Northern Shaanxi is situated in the hinterland area of China today. It is also a typical and representative area of China's northern and central undeveloped areas owing to its complicated regional environment. If we are able to change its present condition and pave the way for making it prosperous through science and technology, it will be of great strategic importance for the vast undeveloped northern and central-western areas.

In 1989, the China Commission for Science and Technology identified Northern Shaanxi (an old liberated area) as a project area for the alleviation of poverty. A team of technicians was sent for this purpose in 1990. Six years later, successful work was done in terms of introducing projects and developing local abilities of science and technology. Thanks to the help of the Commission and the government at all levels, the aid-the poor programme has been imbued with new energy. Transformation has been carried out in the following three directions: First, from the general and experimental work to the development of the use of local resources and industrialization. Second, from agriculture and animal husbandry to the development of the two along with that of industry. Third, from the model of speed-benefit to the model of quality-benefit, making the aid-the-poor programme yield both economic and social results, gradually incorporating scientific and technological methods resulting in an improvement in the quality of work and product. All this will no doubt lead to the alleviation of poverty in Northern Shaanxi. The following are what we have achieved:

1. *The consciousness of science and technology has been enhanced among the cadres and the people.*

Apart from the unfavourable natural conditions and undeveloped social environment, the long-term poverty of Northern Shaanxi is largely attributed to a lack of access to modern science and technology. Since the Aid-the-Poor Programme was launched, people and cadres have changed their concept and ideology due to a series of measures taken in sending persons out and inviting others in, setting examples of experiment and conducting technical training. The people are no longer confined to the traditional agricultural framework, and are aware of the important link between modern technology and prosperity. They also try their best to invite technical persons to help them, acquire technical materials, actively join in technical training classes, and strive to become exemplary in changing over to modern technology. There has been a high tide for studying and applying science and technology in the rural areas of Northern Shaanxi.

2. *The pace of shaking off poverty and becoming rich has been quickened.*

During the past six years, the National and Provincial Commissions for Science and Technology and the Northern Shaanxi Commission for Construction have allocated funds for

aid-the-poor programmes totalling 33 million yuan (RBM), out of which more than 30 million yuan were specially used for helping the poor by means of modern science and technology. Over one million yuan was given for breeding the Angola goat and supporting training centres. There have been 80 projects including the development of major industries, financial support for two extremely poor areas and setting up of two exemplary counties. At present 47 projects have been accomplished with an accumulative added value amounting to 3.6 hundred million, making more than 350 000 people get rid of poverty and become prosperous.

In 1992, Anzhai County successfully introduced from Shandong the technique of growing vegetables in large booths made of plastic film. In 1995, this kind of vegetable-growing had developed to over 1 000 booths with an income of 8 000 to 12 000 yuan per mu, and promoted the development of booth vegetable growing in Northern Shaanxi. This not only put an end to the non-availability of vegetables in winter in Northern Shaanxi, but also enabled over 10 000 households to shake off poverty. The development of a leading industry of Anzhai County made it possible to have a steady economic growth and progress in three steps within three years. Despite the severe drought in 1995, the net income per farmer registered 820 yuan, with an average of 800 jin (400 Kilograms) of grains per person.

Jiaxian County took the economic plant, date trees, as its breakthrough for developing the local economy. By the end of this century there will be two mu of date trees per man. In 1995, though there was a severe drought, there was a very good harvest of red dates which brought an income of 253 yuan to each person on the average. 130 households had earned more than 10 000 yuan.

3. *The role of scientists and technicians has been given full play.*

Over a long period of time in the past, scientists and technicians could not give full play to their specialized skills owing to lack of funds. Since the Aid-the-Poor Programme was put into practice, all the exemplary projects for the counties and prefectures have materialized in five aspects: task, place, time, personnel and funds, which ensured success of the work. In the past several years, 147 persons from science and technology were successively introduced to this area from colleges and research institutes of other provinces. They have played an important role in guiding or doing the work of giving aid to the poor. Now there are 47 projects which have been accomplished or appraised; 154 persons and 30 units were awarded prizes for the progress of science and technology. These prizes were either granted by the Shaanxi People's Government, prefectures and counties departments or by the Hong Kong Zhenhua Foundation of Science and Technology for Aiding the Poor. The enthusiasm of the masses, scientists and technicians was greatly aroused, which enabled them to dedicate their talent and energy to the work of helping the poor, and to achieving greater success.

4. *The influence of Aid-the-Poor Programme has been extended.*

The Aid-the-Poor Programme through science and technology in Northern Shaanxi was developed on the basis of experience of the Dabie Mountain Area in this aspect, but at the same time it was conducted in a creative way, and therefore it has produced more effect and its benefit and influence has spread wider. In September 1993, when the Scholars' Society of Hong Kong came to Northern Shaanxi for investigation, they praised the way the Aid-the-Poor Programme

had been carried out, saying it was the only way for China's remote and backward areas to shake off poverty. They also awarded 75 scientists and technicians who had made great contributions to the programme. Meanwhile, there were several associations from Japan and expert delegations from Canada visiting the Northern Shaanxi area, which made the Aid-the-Poor Programme popular to the outside world, and got their support spiritually and financially.

2

The Aid-the-Poor Programme in Northern Shaanxi, though begun late, has generated a lot of experience, and the following are what we consider necessary:

1. *All the forces should be mobilized to conduct the programme in a concerted way.*

The Aid-the-Poor Programme is a comprehensive project, which requires a concerted effort of all social forces because the strength of any one department of a unit is not enough to undertake such a great task. In the past years, the aid-the-poor team of the National Commission for Science and Technology, the Provincial Commission for Science and Technology and the Northern Shaanxi Commission for Construction have jointly conducted investigations, chosen projects and worked out yearly programmes. All three were jointly responsible for checking and examining the expenditures. All the funds were used in a unified way in order to get the most out of the programme. This experience was praised by the National Commission for Science and Technology and Shaanxi People's Government on many occasions. In order to do a better job in the aid programme, we have stressed the great significance of science and technology, and attracted more people to join us. At the same time, great support has been given to introducing projects, raising funds and providing necessary materials, which promote the accomplishment of all the projects on schedule and bring about economic profit faster. For the exemplary county of Jiaxian there were four units (provincial Commission for Science and Technology, the Office for Old Liberated Area, Shaanxi Provincial Military Command and Shaanxi Forestry Research Institute), which took cooperative activities in helping the county to develop red dates production as an effective way and shaking of poverty.

2. *The guiding principle must be clear and the goal definite.*

The cause of poverty in Northern Shaanxi is attributed to many factors. Only by correctly analysing its specific conditions and taking appropriate measures is it possible to attain good results in a short time. The past years practice, investigation and experiences, enable us to put forward the following principles, that is, 'emancipate the mind, transform the concept, lay stress on key points, realize the role of science and technology, set examples for others to follow, support concrete projects, stress exploitation, make compensatory service, develop the programme in a forceful way, etc.' At the same time, we have set a rule for Aid the Poor Programme, a rule of 'three highs' (new technology, new kind, new product). Since 1990, we have carried out some exemplary agricultural projects for helping the poor to shake off poverty by means of science and technology in different districts, which played a good exemplary role in reforming traditional agriculture, emancipating the mind and broadening views. On the basis of the success we have made, and beginning from 1993, we have mapped out an Aid the Poor Programme for two extremely poor areas in Baiyu Mountain District, and the district along the Yellow River bank, which included the so-called 'two million mu projects'—one million mu of apricot trees

and one million mu of red date trees. These two projects were jointly worked out by more than 12 provincial research institutes of forestry and fruit trees, with their expert team taking part in formulating the technological norms and specifications of the projects. More than 60 talented persons were invited to serve as technicians and set up 11 experimental points. This gave an impetus to the further development of the aid programme and offered technical service to the projects. The province, prefecture and county, allocated funds of more than 2 million yuan per year. The projects were also supported by the Ministry of Forestry and Forestry Bureau of the Three Northern Areas. The '2 million mu projects' have been a great success after two years practice. By the end of 1995, the newly planted apricot trees amounted to 165 000 mu, rejuvenated apricot trees to 179 000 mu, and apricot seedlings to 7 400 mu. The total area for apricot growing amounted to 815 000 mu. There are now 265 000 mu of newly planted date trees, old orchard 221 000 mu, seedling 8 200 mu, and the total area for red date trees amounts to 820 000 mu. Therefore it may be said that the 'two million mu projects' will make the area prosperous, and serve as an example of aiding the poor by means of science and technology.

3. *Let science and technology take the lead and set up a good service system.*

It is very important to make people understand that science and technology is the first productive force and that there must be a complete and perfect service system. These are the most important means with which to help people overcome poverty and develop leading industries from single production to the economic integration of producing, marketing and trading. Take the raising of goats for example. We have popularized the experience of Hengshan County which greatly contributed to the growth of goat-raising in Northern Shaanxi and made a lot of goat-raising households prosperous. A policy of setting up production centres in each county was adopted, with respect to apple produce, with a branch in every village, with an apple society in charge of experimentation and demonstration of apple production. We have stressed apple societies of Liulin and Panlong villages of Yan'an City and established three centres (experimental and exemplary centre, technical training centre, marketing service centre) for economic integration; we have a demonstrative base, a contingent of technicians, a proper management and administration as well as a unified way of producing funds, loans, and returns. All these practices have enabled the farmers to improve their level of modern methods of productivity remarkably well and develop the economic strength of the village centres.

Zichang County has employed the model of so-called 'five ones' to develop the production of potatoes, that is, one leading industry, one leading body, one contingent of technicians, one company, one leading enterprise who have set up a general potato production company, developed a series of potato processing industries, set up a wholesale market and popularized the techniques of potato growing. Now the potato growing area has been expanded to 870 000 mu, with a general production value of 1.24 hundred million yuan, or 87 per cent of the total production value of the four leading industries. Each farmer has a net income of 481.8 yuan. Potato-growing has become a new way for overcoming poverty and become prosperous. Zichang County was named 'China's potato county' by the State.

4. *The concept of aiding the poor through science and technology should be widely disseminated.*

Owing to an inadequate access to science and technology among the people in Northern Shaanxi, we have launched a propagating movement in different forms. Firstly, we have made

14 films on the theme of Aid-the-Poor Programme broadcast on Closed Circuit Televisions (CCTV) programme were made. These films include 'Good tidings of red dates country', 'Angola goat and wool', 'Bringing under control the sand area in Yulin', 'Shandong cadres in Northern Shaanxi', etc. Secondly co-sponsored by *Shaanxi Daily*, a drive of 'soliciting articles on the report of Aid-the-Poor Programme by means of science and technology' was started. About 40 articles were published, which have made the persons and events concerning the aid programme popular, and praised those who made contributions to it. Thirdly, we have invited correspondents and reporters from 10 central and provincial mass media to visit Northern Shaanxi area, who have written more than 30 reports and have published them in different newspapers. The programmes of *News Hookup* and *Talks on Point of Issue* on CCTV have broadcast the special reports on the Aid-the-Poor Programme of Northern Shaanxi. All these activities aroused the interest and support of the society at large and gave great impetus to the programme.

5. *Special attention paid by the leadership at all levels is a guarantee of success.*

From the very beginning, the Aid-the-Poor Programme of Northern Shaanxi was given enormous support by leading bodies at all levels. The State Councillors, Song Jian and Chen Junsheng, successively visited and investigated Northern Shaanxi, pointing out the importance of science and technology for the Aid-the-Poor Programme and for improving the quality of life of the working people. They proposed that the old liberated area of Northern Shaanxi be built into an exemplary area of Aid-the-Poor Programme. The senior officials of the National Commission for Science and Technology including Guo Shuming, Jiang Minkuan, Zhu Lilan, Deng Nan, Han Degian and Xie Shanorning as well as more than 30 directors of national departments, visited and investigated the Northern Shaanxi area. Two conferences were held successively in 1991 and 1994, by the National Commission for Science and Technology, Shaanxi Communist Party Committee and Shaanxi People's Government. One was Conference on Aid-the-poor by Means of Science and Technology and Economic Development in Northern Shaanxi, the other was Forum on Exchange of Experiences of Aid-the-Poor by Means of Science and Technology Made by Shandong and Shaanxi Cadres in Northern Shaanxi. All the participants approved of the Aid-the-Poor Programme. The top officials of the Province like Governor Cheng Andong, Deputy Governors Wang Shuangxi, Jiang Xinzhen, and Fan Xiaomei visited Northern Shaanxi many times to investigate and direct the work. In order to further improve the aid programme, the Provincial and Prefectural Commission for Science and Technology and the Office for Old-Liberated Areas jointly set up organizations for aiding the poor by means of science and technology and appointed special persons in charge of the work. At the same time, in each county there was a vice-magistrate in charge of science and technology; and some villages have appointed vice directors of science and technology. The above organizational system provides firm guarantee for success in the Aid-the-Poor Programme of Northern Shaanxi.

PROGRAMME OF POVERTY ALLEVIATION WITH SCIENCE AND TECHNOLOGY

INTRODUCTION

China, with a population of more than 1.2 billion of which 0.9 billion people live in the rural regions, ranks as the largest agricultural country in the world. Since the founding of China in 1949, the Chinese government and people have made honest efforts to feed its huge population. However, the problem of poverty remained serious up to the 1980s. By the end of 1986, there were still over 100 million rural people living below the poverty line. The Chinese government has prioritized the alleviation and elimination of poverty in order to realize an acceptable standard of living all over China. Science and technology has, in this context assumed enormous importance.

In 1986, the Chinese government established a special organ, Leading Group for Economic Development in Poverty Areas (LGEDPA), and began its national campaign to combat poverty in the rural areas targeting 599 poor-stricken counties. China's anti-poverty strategy was to grant the poor farmers credit funds and, at the same time, adopt favourable policies, provide work relief, build infrastructure facilities, construct basic farmlands, popularize appropriate technologies, increase employment opportunities, and seek support from the whole society.

To shoulder the responsibility of the problem of poverty in the Dabie Mountain Areas, in 1986, a delegation from various departments led by State Councilor and President of State Science and Technology Commission (SSTC) Song Jian made a survey and proposed the Programme of Poverty Alleviation with Science and Technology (PAST). It was assumed that a rational utilization of mountainous resources would depend, to a large extent, on the depth and breadth of development in science and technology, which would upgrade rural products and enhance their market competitiveness. This would also improve labour quality. For this purpose, SSTC established the Office of Poverty Alleviation with Science and Technology (OPAST), and set up offices in various provinces, cities and counties with a vision of providing a full and abundant life to the people in the Dabie Mountain Areas.

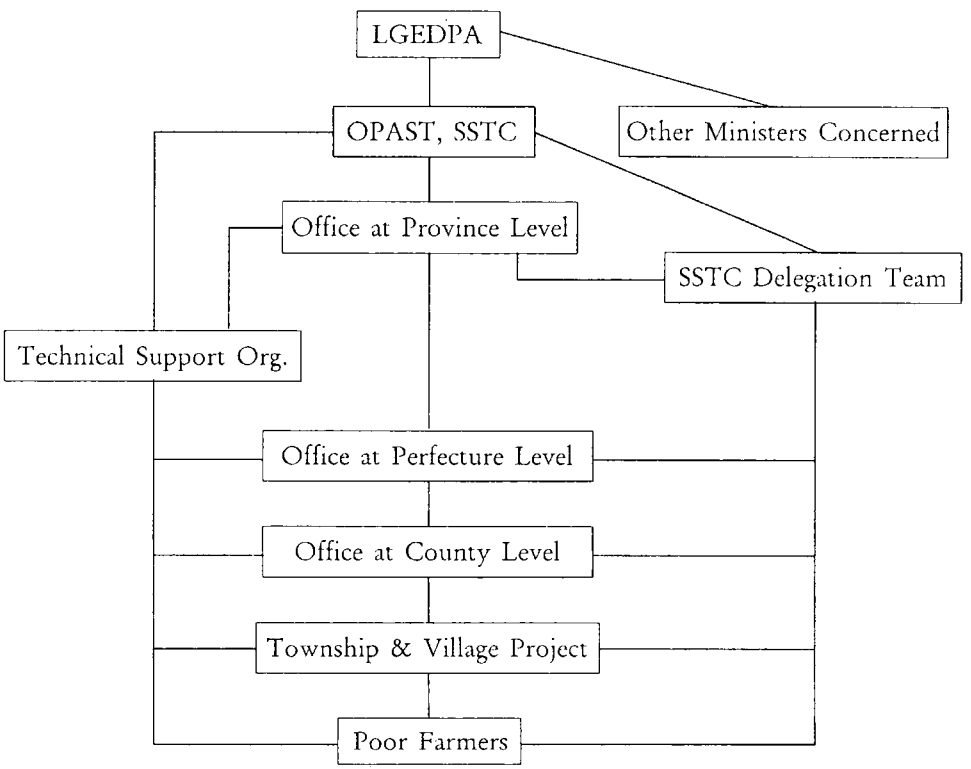
AIMS AND OBJECTIVES

The aims of the programme are to introduce various advanced and appropriate technologies to the poverty stricken areas and to guide and help poor farmers to develop their production capability. This would result in an improvement of local resource development, quickening the pace of economic development.

STRUCTURE

The implementation of the programme is guided by the LGEDPA under the State Council, mainly in coordination with various levels of local government and by relying on the broad masses. The structure of implementation of the programme is shown in figure 1

Figure 1



MAIN ACTIVITIES

Initially, the PAST Programme was implemented in 18 key poverty-stricken counties of Hubei Henan and Anhui provinces in the Dabie Mountain Areas. In 1989, the programme was expanded to include the north of Shannxi Province, Jinggang Mountain Area, on the border of Hunan and Jiangxi provinces, as well as some poor minority regions. These areas are mostly mountainous areas with rich natural resources and abundant labour supply, but their economic base is weak, the quality of labour inferior, management and technology level low, per capita net income less than 100 US $, and below subsistence in food and clothing. This situation has altered over the last ten years due to the PAST Programme. The programme has been active for the past ten years, and the situation has now altered.

A. The programme provides general guidelines to the development of poor areas

It is based on the characteristics of the various kinds of poor areas and needs. Experts are organized to formulate the strategy for poverty alleviation through science and technology after conducting preliminary research.

B. Mobilization and the participation of the scientific and technological personnel in the tasks of poverty alleviation

Experienced experts, middle-aged and young intellectuals, who come from colleges, universities and research institutes, were organized into scientific and technological development teams to work in poor areas. Vice county magistrates in charge of science and technology were dispatched to help the poverty-stricken counties to draw up scientific and technological development plans and annual development plans. They were instructed to select development projects, introduce advanced technology to poor areas, and deal with all problems related to development of resources. For those who have long been working on scientific and technological work in poor areas, funds were set up to award their outstanding contributions.

C. The programme trained a large number of farmer entrepreneurs and local farmers in poor regions, and improved their management quality and technological skills

According to the actual local demand of poor regions, it carried out a multi-level, multi-channel and multi-form training to improve the peasant's capability in using technology to develop local resources. In this way each village of the impoverished areas was able to have its own technical backbone. Most farmers have learnt one to two appropriate methodologies, thus contributing to poverty alleviation work.

D. Popularizing advanced and appropriate technologies on a large scale to poor areas according to the needs of the local farmers

In accordance with the needs of local resource development, advanced and appropriate technologies have been promoted on a large scale for impoverished regions. Advanced applicable technologies have also been transferred to productive forces in order to accelerate the socio-economic development of the poor regions. For example, SSTC has extensively popularized the hybrid rice cultivation technique in the Dabie Mountain Area. The technique of sparsely dry farming of rice has been introduced in the north of Shanxi Province and the Dabie Mountain Area, making the grain output in these areas increase by more than 30 per cent. SSTC promotes the technique in breeding, cultivating and processing silkworms, tea, livestock, poultry, fruits, and bamboo, etc. in poor mountain areas and minority, which have greatly improved the utilization of local resources and increased employment opportunities, and income of the poor farmers in these regions.

E. Building up and perfecting socialized scientific and technical service system

To ensure that science and technology really reached all the households in the poor regions, every scientific and technological department of the local governments at all levels have set up a great number of technical and economic service organizations. These are mainly composed of peasants and technical personnel, dealing with both technical and market problems in the cause of resource development. They impart reproduction knowledge regarding plants and show the local peasants how to plant seedlings and use fertilizers. The organizations offer technical instructions during production process to the peasants, and provide them with streamlined post-production services such as, purchasing, processing, storage, transportation, sales, etc., thus solving the problems that is difficult to solve for a single poor family by itself.

F. Selecting suitable technology, and building up regional backbone industry on a proper scale

According to the resource advantages of every poor region, the selection and application of advanced development technologies is fairly crucial. Setting up a local backbone industry, which can make full use of natural and social resources in that area, and absorb most of the peasant participants is equally important. The 'help-the-poor' teams have been concentrating on large area development, creating conditions for the development of commodity economy.

1. According to investigation reports, the advancement in gross industrial and agricultural output value, capital income, local financial income and other key national economic indexes in the Dabie Mountain Area and other areas under the PAST programmes are generally higher than the average advancement of other areas of the same province in the same period. And the standard of life is likewise higher.

2. The quality of leaders and labour and resource development has improved greatly. PAST programmes have strengthened the peasants' ability to use new advanced technologies. The technical and cultural levels of the peasants have also improved remarkably.

3. The regional commodity has been developed to a relatively high level. The industries of silk-worms, livestock and birds, bamboo, fruits and tuber crops situated in the Dabie and Jinggang Mountain Areas, the north of Shanxi Province and the minority regions in the south-west of Guangxi Province are becoming the backbone industries. These back bone industries yield an annual output of tens of millions of yuan or even hundreds of millions of yuan separately. They cover more than 70–80 per cent of the poor families, producing many competitive commodities both in the domestic and foreign markets.

4. Ecologically, the poor areas have improved which in turn has strengthened economic development.

THE FUTURE FOCUS OF PAST WORK

At present, China is undergoing a transition from a planned social economy to social market economy. The Chinese government is organizing two strategies for this transition. They are, 'Vitalizing the Country with Science and Education' and 'Sustainable Development'. In the future, PAST will stress the following aspects:

A. Training in management and technology on a large scale. Selecting more advanced applicable technologies and training poor peasants, managers and technicians from poor areas.

B. The advancement and perfection in the market economy of the poverty-stricken areas.

C. The sustained development of poor regions. Sustainable development is in the interest of the whole world. The contradiction of environment and development stands out in poor areas. The coordinated development of society, economy and environment of the poor regions, is very important and will make a great contribution to the sustained development of the world.

D. The exchanges and cooperation with various circles abroad. Anti-poverty is a common task of all governments of the world. The 1990s is a critical period for the Chinese people in the poor regions to get rid of poverty. The strategy of poverty alleviation through science and technology have proved to be an effective way to combat the problem. A challenging task is to strengthen the international exchange and cooperation in this field with all countries, but especially with those in the ESCAP region, as well as international organizations and NGOs. We sincerely welcome international organizations to offer technical support and economic aid to the work of PAST of China.

A PILLAR INDUSTRY, POVERTY ALLEVIATION AND SCIENTIFIC INPUT

MOUNTAINOUS REGIONS

INTRODUCTION

Most of the poverty-hit areas in China are situated in the mountainous regions, and out of the 18 poverty-stricken mountainous regions in the country, 16 are found in the great mountain ranges. While there are 592 poverty counties throughout the country, 496 are mountainous. Of the existing poverty-stricken population of 65 million, the majority is concentrated in the mountainous regions. So to speak, the problem of poverty in China is chiefly a problem of the poverty-stricken mountains. Since the year of 1986, when the Party Central Committee of CPC and the State Council commenced large-scale national programmes of poverty alleviation, the Ministry of Forestry carried out the designated support tasks in the 18 poor counties of the five prefectures in the Jiuwan Mountain Range of Guizhou and Guangxi. The principle for poverty alleviation development activities laid down by the Ministry of Forestry was to prioritize economic development and approach the problem pragmatically. The guiding ideology for poverty alleviation is to expand forest resources, adjust the industrial structure and give a full role to the advantages of the mountainous region so as to establish the region's pillar industry that is mainly composed of forestry and horticulture. During the past nine years, the endeavour has established 12 million mu tree plantations in the Jiuwan Mountain Range. In comparison with 1986, the acreage of forested land has increased by 9.843 million mu, an increase of 64.01 per cent; per capita grain has increased to 339 kg, with a net increase of 110 kg; net income per capita grain has risen to 367 yuan, which is about two times more; poor population has been reduced by 2.241 million, which accounts for 76.6 per cent of the total poor population of the region; the gross industrial and agricultural production values of the 17 poor counties have grown to 5.66 million yuan from 1.58 million yuan, which is a 3.6 times increase. The work of poverty alleviation helped us to grasp the fact that science and technology was unavoidable in converting the abundant natural resources of the poor mountainous region into economic effect. Science and technology alone could strengthen the capability of 'blood-making'. As a result, in our general planning, poverty alleviation through science and technology has been placed in a prominent position, and forestry has been pinned as the pillar industry. The economic advancement of the mountainous people has been accelerated, through experiment, demonstration, dissemination of advanced and appropriate scientific and technical achievements, and establishment of industries.

Heightening the People's Concept of Invigorating Forestry with Science and Technology and their Qualifications

Poor regions are usually bad in communications, backward in education, and science and technology, all of which pose serious obstacles in the extension of new techniques. Therefore,

the first thing in poverty alleviation is to raise the level of consciousness of the people. In nine years, with a total input of over 30 million yuan from the state budget, the Ministry of Forestry has facilitated the mountainous region in setting up 1 forestry technical school, 5 prefectural level forestry training centres, 18 county level forestry technical extension stations, as well as more than 200 forest work stations, disease and pest control stations and other social service posts.

A. *Strengthening the training of the grassroots cadres.* During recent nine years, seven courses and workshops on economic development in poor regions have been held by the Ministry of Forestry in the Beijing Forestry Administrative Officials Institute and other institutes subordinate to the ministry. They have been attended by over 300 economic management cadres from the prefectures, counties and townships (xiang). In Congjiang County of Guizhou Province, a training course on economic development and pragmatic techniques have been offered to the party secretaries of districts and townships. Out of a total of 31 trainees, 27 were officials from minority nationalities. All this has effectively built up scientific qualifications and decision-making capability of the cadres from grassroots institutions.

B. *Acclerating the culture of 'permanent type' professionals for the region.* Two hundred and eighty students for degree studies have been sent to the ministry and subordinate institutes of higher learning for training. The Forestry Technical School and forestry training centres have turned out over 3 200 professionals and technicians, who have become the leaders in the alleviation of poverty.

C. *Reinforcing the training of the forest farmers.* Various types of public media have been used, pragmatic booklets of science and technology have been disseminated and site demonstrations have been conducted, which have raised the abilities of the farmers.

D. *Conducting cultural activities for poverty reduction.* Programmes like the participation in the Culture for Poverty Reduction, and Delivering Newspapers to the Countryside, contributed culturally. *Journal of Forest Science and Technology* which has opened a special column of Science for Poverty Reduction, has been very useful. Timely reporting of technical information for poverty reduction guides the way for production, and exerts an imperceptible influence on the people's understanding of science and technology.

Speeding up the Transfer so as to Raise the Overall Effects of a Comprehensive Development of Forestry

The transfer of scientific and technological achievements has a direct bearing on the quality and efficiency of economic growth in the poor regions. In this regard the Ministry of Forestry has done a great deal of work in the past nine years. The Management Regulations for Encouragement Fund of Poverty Alleviation by Science and Technology, Ministry of Forestry was promulgated, according to which awards are given to scientists and technicians who make great contributions towards the alleviation of poverty. The Forestry 87 'Poverty Alleviation Programme in Jiuwan Mountain Range Region was formulated, which prioritizes projects that are backed by advanced science and technology. Moreover, in the light of economic conditions of the poor regions, favourable support policies are adopted e.g., technical services are free at least till the time when production generates economic returns. The smooth implementation

of the above measures has enormously aroused the enthusiasm of the scientists and technicians, hastened the transfer of scientific and technological achievements to the poor regions, and enhanced the overall effects of the comprehensive development of the mountain forestry.

A. *Helping the Poverty Region in the Introduction of New Technologies.* The introduction of technology has the advantages of fast effect and clear target, and is an excellent means of poverty reduction, if the necessary training is conducted properly. For the purpose of helping the farmers of the southwestern Guizhou increase tea oil production, we brought in bees for tea oil tree polination. In Jinping and Liping counties of the prefecture, technical training courses on the yield, were held for the whole prefecture, which enabled the farmers to have a clear knowledge and command of the technique. Up to now the technique has been taken as one of the key extension projects in the seven poor counties of the prefecture.

B. *Conscientiously Strengthening Technical Development and Application*: Forestry research institutions have been organized to research in line with the local resources of forest, fruit trees, medicinal plants and minerals. A group of key enterprises have transformed low-level raw material production to high-level processing. The Research Institute of Chemical Processing and Utilization of Forest Products, The Chinese Academy of Forestry, has devoted 38 per cent of its research directly to national and provincial poor counties. Zhang Zonghe and Xia Dingjiu from the Research Institute of Chemical Processing and Utilization of Forest Products and the Research Institute of Resource Insects respectively led the research team to the Zhushan County, Hubei that is situated in the Dabashan Mountain, where they have erected a forest chemical mill deep in the mountain. Since 1988, it has accumulatively generated a new production value of 53.88 million yuan in the county, made an earning of foreign currency of 3.48 million US dollars, and created new profits and taxes of 5.51 million yuan. The mill has also promoted the cultivation of Chinese gall on a large scale while the farmers growing the gall have made an additional income of about 10 million yuan.

C. *Extending Energetically the Advanced Appropriate Scientific Achievements.* Large-scale extension of advanced and appropriate scientific and technological knowledge increases the yields of different crops. The returns from forest products is necessary for the alleviation of poverty, stressed all the time by the Ministry of Forestry. For example, the nationally well-known ABT Centre of the Chinese Academy of Forestry offered favourable conditions to provide its highly effective and compound serial products of ABT Rooting Powder and techniques to the poor regions. By the use of ABT Rooting Powder, Guizhou Province has increased the yield of hybrid rice by 12.3 per cent compared to the controls, the Xingshan County in the Dabashan Mountain has used ABT Rooting Powder in cultivating root cuttings of camphor tree and the survival rate has been augmented by 55 per cent in comparison with the controls. Another example is the research project of Geological Variation and Selection of Provenances of Chinese Fir undertaken by the Chinese Academy of Forestry that was started in the 7th Five-Year Plan (1986–90), which has, through the 14 years of research, selected a batch of superior provenances that show a 40 per cent increase in the volume on an average, and the best provenances are right in the region of the Jiuwan Mountain Range. For the sake of helping the farmers grasp the technique, the scientists and technicians of the academy have regularly visited the production sites, assisting the local governments in organizing and guiding the farmers for the collection of 45 000 kg seeds, generating an economic gain of 1.35 million yuan, based on 30 yuan/kg.

D. *Setting up Good Demonstrations.* Experience tells us that as the people of the poor regions are relatively of uneducated, good demonstrations of science and technology could get twice as much success with half the effort. Firstly, in setting up the demonstration, high standards and strict requirements have been demanded. The method is to set distinct responsibility among the different districts, work out a model, then fan it out to promote its development in the surrounding areas. For example, in the implementation of the poverty reduction project, which was conducted by the Ministry of Forestry, of Full Illumination and Mist Spray Culture of Root Cutting Seedlings of Lake Mulberry (*Morus alba* L.), at the beginning, two scientists were based successively in Huangping County for three months, who were in full charge of the plan and design of the nursery, and taught nursery techniques. Two million seedlings were turned out of the nursery in the same year when the root cuttings were planted, with two rotations in a year, which reduced the seedling cost by 70 per cent. Secondly, importance has been attached to the scale, optimization of structure and varieties. Economic effect has been enlarged by means of lease, share-holding, mortgage, the optimization of structure and varieties, and value-added processing. For example, the Ministry of Forestry has carried out the poverty reduction project of Extension and Demonstration of Fine Species of Balingzi Tea Oil Trees in Pingjiang County, Hunan Province. Up to now, 2 321 mu of demonstration plantations have been established, 15.64 million strong seedlings of fine species have been turned out, with a seedling value of 3 million yuan, and the demonstrations have brought along the extension over 50 000 mu land. It is estimated that when the trees on the extended land are in full fruiting years, the yearly income will exceed 90 million yuan.

The Advantage of Science and Technology in Solving Production Problems

During the work of poverty alleviation, the Ministry of Forestry has always laid emphasis on the role of the integrated capacity of science and technology in order to break through the restriction imposed by key technology for production' development, and stimulate a fast economic development of the poor regions. In Exploring solutions to the problems of poverty in the desert regions where 60 per cent of the poor population in China live, the Ministry of Forestry has put together scientific forces, of research and extension work, closely combining the amelioration of ecological environment with economic development. The use of technologies such as the establishment technology for oasis shelterbelt system, preliminary selection and cultivation techniques for suitable plant species for different type of regions, afforestation techniques for arid and saline or alkaline land, and use of advanced model, have extended the forest coverage. Experiences like 'Desert Small Biological and Economic Sphere', 'Sandy Land Rice Growing With Lining Film', and 'Agroforestry Intercropping of Two Rows and One belt', have resulted in an increase of the forest coverage in the desert regions by 9 per cent. 9 million ha of desert and semi-desert grassland has been protected and rehabilitated, where nearly 5 million people have been lifted out of poverty. In addition, the Chinese Academy of Forestry has taken part in the Taihang Mountain Greening Programme, and has solved the technical obstacles such as afforestation techniques in the drought region. In the light of the fact that the rural areas in China, the north in particular, suffer from serious shortages of energy and fuelwood, successful techniques for the development of fuelwood plantation have been worked out, which has achieved apparent social, economic and ecological effects.

Although we have made a great contribution towards poverty alleviation with science and technology, we still have a long way to go to fulfil the demands which are entirely realistic.

In the Jiuwan Mountain Range region, there are still 1.3 million people who live in extreme poverty with a per capita income below 300 yuan, and are concentrated in the far and rocky mountain areas inhabited by minority nationalities. In the following five years, the possibility of those people being lifted out of poverty will influence the general situation of the National 87 Poverty Alleviation Programme. Firstly, further understanding should be acquired, in the poor regions. Leading bodies at various levels should be enriched with scientists and technicians to consolidate the comprehensive service function of the government. Secondly, on the basis of consolidating the existing extension system, the extension organizations should be reinforced at the village and natural village levels. Thirdly, poverty alleviation through science and technology should be combined better with a change from extensive to intensive management. Fourthly, favourable policies should be adopted for the transfer of scientific and technological achievements to poor regions while scientists and technicians should be supported strongly to develop projects of fast-effect and better-returns. Fifthly, diversified forms and multiple channels should be employed in fund-raising so as to increase the intensity of scientific inputs and enhance the efficiency of fund use. Sixthly, while forestry is of central importance, a balanced development should be pursued between forestry, farming and animal husbandry so that a full and rational utilization of mountain resources can be made. Meanwhile we sincerely hope that poverty alleviation work in the future could be further accorded a strong support from the ESCAP and other international organizations, and wish the exchange and cooperation be further strengthened among the countries of the Asia-Pacific region. Let us strive together to wipe out poverty in the world on our march to prosperity.

PILLAR INDUSTRIES, POVERTY ALLEVIATION AND SCIENCE AND TECHNOLOGY

DABIE MOUNTAINOUS AREA

INTRODUCTION

Dabie Mountainous Area is the poorest in Anhui Province with very little arable land. The number of poor farmer households was 3 850 with an average per capita income of less than 150 yuan (RMB) in 1985, or 39.6 per cent of the total peasant households in this area. The Anhui Science and Technology Commission by developing regional pillar industries promoted the economic development of the area.

1. The Concept of Regional Pillar Industries (RPI)

The concept of pillar industry is a set concept between microscopic enterprise economies and macroscopic national economies. Pillar industry is the assembling of industries with certain attributes, and also the sector of national economy divided by some standards. Beside the industry, all professions and trades in the national economy ranging from big branches to small sectors, from production to circulation, service, culture, and education could be called pillar industry.

Pillar industry means an industry that is of vital importance to local economic development.

A regional pillar industry (RPI) can play a vital role in the local economy by providing a lot of quality products, bringing about higher economic efficiency by effective utilization and exploitation of regional natural and social resources on a large scale.

The development of RPI could change the economic situation of scattering, in backward rural areas, enlarge the scale of production and management contributing to increasing the capacity of the rural economy to resist natural disasters and market risks. The development of RPI can also put forward higher requirements for modern science and technology, technical personnel, and the whole course of complete preproduction, production and post-production. This results in the revitalization of the local economy and the progress of science and technology in rural areas. The large-scale use of RPI has greatly enhanced the integration of agriculture, industry and trade, conducive to upgrading the level of productivity and intensive management. The RPI development can ensure poverty alleviation, and contribute to the progress of material and spiritual civilization.

2. The Characteristics of Regional Pillar Industries

The substantial characteristics of RPI's roles in social and economic development are as follows:

(1) *Regional characteristics*

Dabie Mountainous Area is located in the border of Anhui province, Heman province and Hubei province with a complex geographical and topographical characteristics. It can be divided into three ring-like band zones, based on natural regional characteristics, namely the inner cycle with high elevation and reservoir area, middle cycle with low elevation and hilly area, outer cycle with hills and plain. The sequence of economic development should transport the resource and product from the inner to the outer cycle through the middle but the capital, technology, personnel and information should move in the opposite direction, so as to promote the economic development of the mountainous and reservoir area. Now, the regional scale economy in the Dabie Mountainous Area had formed five industrial centres initially.

a. The mulberry, silkworm and silk industrial zone centred in Jingzhai county, expanded to Luan county, Yuexi county, etc. The newly-built silkworm culture districts, gradually formed an industrial belt of mulberry, silkworm, cocoon and silk.

b. The mushroom industrial zone centred in Heshan county, bringing along the six counties in the Dabie Mountains, gradually formed the mushroom industrial regional belt.

c. The Wanxi white goose industrial zone centred in Luan county, bringing along Heqiou county and sou county gradually formed a white goose industrial regional belt.

d. The bamboo product industrial zone centred in Qianshan county, bringing along the serial development of bamboo products in Heshan county, Jingzhai county and Luan county. Yuexi county, gradually formed bamboo industrial regional belt.

e. In the tea industrial zone including Heshan county, Jingzhai county, Luan county, Qian shan county, and Taihu county, there are 239 townships with tea cultivation, or up to 90 per cent of the total townships.

(2) *Scale characteristics*

Modern industry, due to a strengthening of a divided and specialized production, and at the same time influenced by cohesion, gradually became the pillar industry with a certain scale of regional economy, which could involve specialized production and promote the overall development of regional economy.

The production elements of five regional pillar industries such as silkworm, mushroom, bamboo product, white goose, and tea in the Dabie Mountainous Area, became a set of industrial groups in commodities economic operation.

a. The mulberry, silkworm, cocoon and silk industrial economic belt has been important. Taking Jingzhai county as an example, in 1995, there are 258 000 mu (1/15 ha) of mulberry cultivation garden, 6 million kg of cocoon output per year, 4 primary silkworm

culture plant, 19 silkworm processing plants with a capacity of 1 200 T, 1 100 T of raw silk and 150 000 pieces of clothing production in this county. The total industrial output value was 500 million yuan (RMB) in 1995 and 20 per cent in total output value of agriculture and industry of the whole county. The industry provided employment for 86 000 persons and led 12 500 households out of poverty. Now this industry is expanding from Jinzhai county to Lu'an county, and Yuexi county, etc. Newly-built silkworm culture district, gradually have formed regional economic belts of mulberry, silkworm, cocoon and silk industries.

In 46 years, from 1949 to 1995, silkworm production in Jingzhai county, attained some achievements. Mulberry cultivation area has increased to 258 000 mn, from 1692 mn, cocoon output, six million kg from 52 500 kg, and established the integrated production of mulberry cultivation, silkworm culture, processing, and textile.

b. *The mushroom industrial economic belt.* There are 22 townships, 55 villages, 6 000 peasant households enaged in black fungus, shii-take, and swamm culture in Heshan county. The county science and technology commission set up a mushroom development company, and parent protospecies culture plant, demostration and training unit. Since poverty alleviation through science and technology started in 1986, science and technology commission have invested two million yuan (RMB) in six poor counties of the area. This enhanced the development of a mushroom industry, and formulated the prospect of a 'production of scale, complete service and rational distribution. All this benefited thousands of households'.

c. *The white goose industrial economic belt.* For example, in 1995, Lu'an county cultured 4.5 million white goose. The annual eider down output was 160 T with an income of 30 million yuan (RMB). 1 080 T of frozen goose was exported. Output value was 13 million yuan, etc. The white goose industry created a total output value of 280 million yuan (RMB). Now the industrial network has been set up which has guided the serial development of white goose in the neighbouring counties.

d. *The bamboo product industrial economic belt.* The counties in the Dabie Mountainous Area are abundant in bamboo resources, with an area of 439 170 mu. Bamboo is a major resource of economy in the mountainous area. There are 20 000 peasant households, and 40 000 persons are involved in bamboo production in Qian shan county. The annual output value of Bamboo is 250 million yuan (RMB), 20 per cent of the total output value of agriculture and industry of the whole county.

e. The tea output in the Dabie Mountainous Area increased in the recent decade, especially its brand-name. There were 95 per cent townships in the Heshan county engaged in tea production, and the output value in 1995 was 31.59 million yuan, becoming one of the major pillar industries in the Dabie Mountainous Area.

(3) *Driving characteristics*

The five pillar industries in the Dabie Mountainous Area centred around the individual backbone enterprises, which brought along some small industries, thousands of poor households, and

specialized households to form a loose or closely allaying groups through serial development, unity and cooperation, and dispersions of products and spare parts. This not only accelarated the work of poverty alleviation but attracted surplus labour in the rural areas to participate in the non-agricultural production management, with beneficial effect on the county economy.

With the development of the pillar industry, and the consequent capital accumulation, it became possible to invest in agriculture, other industries and enterprises.

3. The Approaches and Experiences of Poverty Alleviation through Science and Technology in the Dabie Mountainous Area

(1) *Promoting the establishment of pillar industries through programme development*

The selection of a particular technology in a programme, based on local resources, and centred on the leading industries, had resulted in the formation and growth of pillar industries in the Dabie Mountainous Area by serial developments. Jingzbai county took the mulberry and silkworm production as a breakthrough for poverty alleviation. The introduction of good varieties, establishment of high-yield mulberry gardens, and extension of practical and advanced technology, settled the technical problems in processing and laid the foundation for integrated production of local silkworm and silk. The total output value from serial development of cocoon and silk of the whole county was 470 million yuan (RMB). Taxes from the integrated development in the finance revenue was 40 per cent. It became a pillar industry for the revitalization of local economies. Anqin orange association together with Taihui county undertook the programme of the technology of high-yielding and cold-resistant oranges. After several years of implementation, orange output of Anqin city increased to 12 million kg from one million kg in 1991, and 1.6 million kg from 0.3 million kg for Taihu county, which became one of the four pillars in the county's economy.

At present, eight pillar industries have been set up in the Dabie Mountainous Area of Anhui province informed by science and technology. These are the integrated production of cocoon and silk centred in Jingzhai county, the serial development of tea centred in Heshan county, the wanxi (the west of Anhui province) white goose culture and serial processing centred in Lu'an county, orange cultivation and serial development centred in Taihu county, bamboo serial processing and development centred in Qianshan county, mushroom and Chinese chestnut development centred in Heshan county, Chinese chestnut development centred in Jingzhai county.

(2) *Extension of practical and advanced technologies on a large scale through demonstration and fanning out from one point to an area*

The programme selection stressed science and technology capacity. It transformed the scientific and technological results into practical productivity. For example, the extension of B spray on Chinese nut for adjusting the ratio of male and female flowers, artificial hatching of wanxi white goose, high-yield cultivation of American jingseng, etc. (which had been awarded the prize of national and provincial science and technology progress), in combination with the local situation, promoted the economic development of poor areas. It also included the extension of various improved varieties and advanced technologies. The programme of 'brand-name and high-quality

tea development' in Heshan county was adopted. This programme used advanced tea processing techniques, through the processing of brand-name tea, and stir-fry green tea, instead of traditional huang da tea (yellow and coarse tea). The tea output of the whole county reached 2 800 T in 1993, with 600 T of high-quality tea, and 20 per cent in total tea output, with value of 50 million yuan (RMB). Sixty per cent of the total output value. The technical development of forage grass for white goose in Lu'an city introduced and extended 4 terrestrial varieties over 3 000 mu, and 2 aquatic varieties over 30 000 mu. Replacing refined fodder with green, reduced the cost of goose culture by 20 per cent.

In order to increase the grain yield and provide food securities for farmers in the mountainous area, with the support of state science and technology commission, Jingzhai county first introduced the technique of dry-culture and thinly-planting of rice seedling in 1992. It then selected four experimental and demonstration sites at different altitudes, extended this technique to the area of 5 037 mu with 20 per cent of average yield increase. The additional output of grain was 0.5 million kg. In 1993, Jingzhai county held field extension meetings in order to summarise and review experiences. The officers, the technicians, the participants from Hubei province, Henan province and other parts of Anhui province appreciated the significances of the extension of this technology in the mountainous area. Now, the six counties in the Dabie Mountainous Area extended this technology over an area of 1.088 million mu, and relieved the food shortage prevalent there.

(3) *The organization of scientific and technological development group establishment of wide-spread technical, supportive, and social service system*

Very important measures for poverty alleviation through science and technology were the dispatches of development groups for poverty alleviation. There were working teams, experienced experts, junior and senior scientists and deputy heads of county who organized universities and academic institutions as a supportive unit for poor counties (cities). Anhui provincial science and technology commission had dispatched work teams to help poor counties in designing and formulating scientific and technological development plans and annual development plans. They were entrusted with the selection of programmes, demonstration and extension. They were also asked to organize technical training, so as to increase the technical level of industrial development in poor areas.

Ms Li Cheng Qian, the president of Anhui Academy of Agri-Sciences led concerned experts to review the programmes of poverty alleviation in Yuexi county many times. She took over as the executive head of the programmes, 'Low-yield soil amelioration technique', and 'Basic self-supply approaches of food in Yuexi county'. She also worked on hyhrid rice, maize, rapeseed and mountain vegetables on selected Tsites at three different altitudes and with 37 technical personnel dispatched. She participated in the extension of practical and advanced technologies and services.

In order to ensure that most of the farmers in the poor areas mastered, the work of poverty alleviation through science and technology at different levels, service organizations consisting of farmers and technical personnel were created.

Anqing orange industrial association was the service agency dominated by farmers, possessing 19 branches, and 3 000 members. The agency held training courses 120 times, with 20 000 persons

trained and 30 000 copies of information published and circulated and provided the technical contract and service for 800 000 plants of orange trees, with an increase of orange output of one million kg. It engaged in organizing and distributing fertilizers, pesticides, micro-elements, and special tools, etc, and sold one million of high-quality orange trees and 1.5 million kg of orange. Yuexi county maize institute was a scientific and technological entity run by local people, in order to relieve the food shortage in the poor mountain area. It conducted the breeding of varieties breeding in Qing Chuan, and Shanxi province, over an area of 2 000 mu, and provided the hybrid varieties for farmers, amounting to an annual output value of 2 million yuan (RMB). Yuexi micro-element institute was responsible for the production and extension of micro-element fertilizer. The annual output value was four million yuan (RMB). Tax and profits were 400 000 yuan in 1992.

(4) *Strengthen technical training, promote the enhancement of technical level of the labourers*

During '85 planning years', different levels of science and technology commission carried out technical training while engaging in programme development, and set up a training network initially at or between different levels. There were 600 cadres at basic level, and 3 000 farmer technicians. This experience resulted in the increase of skills and overall quality of production.

4. The Reaction for Regional Pillar Industries on the Social and Economic Development of Poor Areas

(1) *Revitalizing the local economy*

The development of regional pillar industries in the Dabie Mountainous Areas had proved that grasping regional pillar industries could guide and revitalize the overall situation of local economic development, and promote the establishment and development of regional pillar industries.

The regional pillar industries in the mountainous areas could arm agriculture with modern science and technology, increase the labour productivity and comprehensive efficiency, and bestow considerable output value, tax and profits to the local economy. In 1995, the total output value from serial development of mulberry, cocoon and silk industries was 500 million yuan (RMB). Jingzhai county accounted for 20 per cent of the total output value of agriculture and industry of the county. The total output value from white goose culture and processing was 280 million yuan (RMB) in Lu'an county, 250 million yuan (RMB) from bamboo products in Qianshan couty, and 20 per cent in the total output value of agriculture and industry of the whole county.

The development of regional pillar industries in the mountainous area, could provide ample employment opportunities for the abundant labour resource in the rural areas, attract spare labourers involved in non-arable land management, promote the economic development of the mountainous area and increase the income of the farmer. Many production factors from traditional nature economy could be recombined with commodity production process to accelerate the progress of industrialization, commercialization, and modernization of agriculture in the countryside. The dissemination of industrial civilization to the rural area, will result in a reduction of differences between industry and agriculture, city and township.

(2) *The regional pillar industries quicken the pace of poverty alleviation*

Poverty alleviation through science and technology had promoted the development of regional pillar industries by designing plans, selecting programmes, implementing serial development, changing capital investment, supporting economic entities, and organizing industrial associations. It was also responsible for improving the whole course of services and developing as economy of scale.

Since 1986, the programmes introduced 284 junior and senior scientists, carried out expert consulting persons 926 times, held training courses 3 098 times with 174 200 farmer technicians being trained. It set up 121 economic entities for poverty alleviation, transferred 1 840 practical and advanced technologies, implemented 164 development programmes, invested 441 million yuan (RMB) with 1:8 input-output ratio, and alleviated poverty for 160 000 peasant households.

(3) *The regional pillar industries proposed higher requirements for science and technology*

There are macroscopic and microscopic, double interacting relations between the progress of science and technology and the development of regional pillar industries. In a macroscopic view, science and technology progress was the determining factor for social and economic development. In a microscopic view, the development of industries was the economic growth point of science and technology, the using point of scientific results and the receiving point of advanced technologies. It proposed new and higher requirements for science and technology.

The regional pillar industries highlighted the development of intelligences, talents and technologies. It introduced the technical personnel and technologies from the talents and intelligence intensive supportive unit. It also organized industrial associations, set up and completed the systems of technical training service, development, support, demonstration and information. All this resulted in the comprehensive efficiency of industries.

Feather collection technique from living white goose was introduced from East Europe in 1985, and covered the whole of Lu'an county by 1987. After experiments and demonstrations for three years, Lu'an county held technical training courses 389 times, 35 800 persons were trained, and 556 technical service teams were organized. The total feather collection from living goose reached 2.659 million pieces with an output of 211.3T eider down valued at 9.346 million yuan (RMB). Each collection could increase to 3.51 million yuan (RMB) per goose, 3–4 times for breeding goose, with 10–14 yuan (RMB) additional income. Eider down became an important product for exchanging and obtaining hard currency. The tradition of only selling living goose or pickled goose changed.

Jingzhai county extended a series of new techniques such as: 'setting up a garden in one step,' 'hybrid mulberry', 'complex mulberry garden', 'small cocoon culture', 'normative sterilization', 'level culture of small cocoon and mulberry leaves, 'forage spray of fertilizer' etc. On the bases of a serial development of mulberry, cocoon and silk industries, the yield of mulberry garden increased, and the quality and value of cocoon improved. Bamboo product industries changed from selling raw bamboo and traditional simple products to industrialized processing and utilization of bamboo (such as bamboo shoot can processing, artificial bamboo board and paper making with bamboo), which enhanced the remoulding of traditional industry.

(4) *The regional pillar industries facilitated the optimization of industrial structure*

The management of traditional agriculture was marked and food production overweighed by the weak foundation of industry in the Dabie Mountainous Area, which resulted in the slow growth of agriculture, uncoordinated development, and utilization of resources. The development of regional pillar industries promoted the adjustment of industrial structures, rational distribution and optimization of production elements. Introduction of talents, technologies, unity and cooperation and increased labour productivity, accelerated the utilization and development of advantageous resources in the mountainous area.

TECHNOLOGY, CULTURE, PILLAR PROPERTIES AND POVERTY ALLEVIATION

1996 is the year of eliminating poverty in the world. People all over the world are actively searching for the methods of eliminating poverty. In order to find effective measures we offered our experience of achieving acceptable standards of life through technology, cultural development and the expansion of pillar properties in Fushan town, ShangChen county of Henan province, Dabie Mountain Area, to other countries of the world.

1. *The source of the mountain area's poverty lies in its backwardness due to insufficient access to science, technology and culture.*

   Fushan town of ShanChen country lies in the hinterland of the Dabie Mountain Area, a juncture of Hubei, Henan and Anhui provinces, with an elevation of 400 metres. There are 18 villages, 5 226 families and 25 500 people there. The total area covers 141.4 square km with 12 000 ha of mountainous field, and 1 000 ha of cultivated land. Everyone has only 334 square m of cultivated land and 7 mu of mountainous field. As the town is located in the deep mountains, it is not conveniently linked by road. Its cultivated land is small and the production of grains limited. However, being a transmitional region from northern subtropical zone to subtropical zone, it possesses the advantages of its particular geographical location. The weather here is humid and the source of light, heat and water is rich with the annual average temperature ranging between 14–15°C. The annual sunshine time is 1940–2180 hours, frost-free period is 217–19 days and the annual rainfall is over 1 200 mm, which is highly suitable for the growth and breeding of many kinds of economic plants and animals. Such conditions provide us with a possibility of a diversified economy. The development of commodity economy and the increase of mass income combined with good health becomes possible. But because of the undeveloped technology and technical culture, rich resource have not been fully utilized. When we arrived at the town to alleviate poverty in 1983, we found that only 1.2 per cent of the total population had a high middle school diploma, while 3.5 per cent had a junior middle school diploma and 17.6 per cent were illiterate adults. Among 35 cadres of the town office, only four had degrees above middle grade. All the others had only a primary professional title. No one had a high professional degree. There were only six specialists for every 10 000 people. Forestry, plantation of tea, Chinese chestnut and husbandry were backward. In 1983, the total income from industry and agriculture of the whole town was only 2.4 million yuan, and the average net income per capita was 73.5 yuan. There were 85 per cent families whose annual income was below 120 yuan.

2. *Introducing technology to improve scientific and technological ability and technological culture.*

We decided to take the following measures to fight against poverty.

To select right items, make a good plan, and bring the superiority of mountainous resources into full use. In this town, the mountainous fields are plentiful, the land layer deep, weather humid, and rainfall abundant. All these conditions are very good for the growth of economic plants. So we selected mulberry, tea and Chinese chestnut as three pillar properties and developed the wild mountainous goods. Through scientific demonstration we made a complete development plan. We have built 100 mu of mulberry field, developed 500 mu of tea field, grafted one million plants of Chinese chestnut and established a purchase, process and sale market of cocoon, tea, chestnut and wild mountainous goods.

Training in science and technology. After making the plan, specialists played a key role in carrying it out. For example, in the practice of sericultural training, we emphasized the following three levels. (1) Training technical persons. The persons who took part in the training at this level included both the technical personnel and farmer technicians in the whole town. A combination of theory and practice was employed. The ability of the trainees both in administration and instructing production has been greatly raised after being trained. (2) Training families through demonstration. We selected one among every 10 silkworm rearing families to demonstrate, extend and popularize the scientific techniques of silkworm rearing. (3) Training farmers. We trained farmers by holding meetings, taught them every matter related to sericultural technology and popular science. We had trained more than 2 000 technicians, 15 thousand farmers and more than 3 000 families. We had succeeded in raising people's scientific and technical quality considerably. Besides emphasizing the training of special techniques, we also strengthened basic education. All the villages of the town have primary schools. Moreover, there are three high-middle schools, and one professional high-middle school in the town. A special emphasis was placed on adult and professional education. Farmers were trained in correspondence schools, radio schools and other training schools according to their age and vocations, so that their educational levels improved. Now, more then 99.7 per cent of children are in school, and the percentage of illiterate young people is below 2.5. About 9 800 villagers have finished senior middle-school education, which accounts for 38.43 per cent of the total population. 11 040 villagers have finished junior middle-school education, which in terms of percentages is 43.29. The percentages above are 37, 23 and 37.79 per cent higher than that of 1983 respectively. There are 41 cadres in the township, among whom seven are graduates, 11 are professional graduates and 13 have finished three years' training.

Introducing techniques and talented persons. The main barrier to exploiting resources lies in the backward techniques and lack of skilled persons. In order to change this situation, we have not only made full use of the available techniques, but also introduced advanced techniques from outside. The main approaches in this respect included: (1) Introducing new agronomy, new technology, new races suited to local conditions into this area. There

are four high quality mulberry races and three new silkworm races have been introduced from Jiang su, Zejiang, Anhui and Shandong province. New tools and chemicals for rearing silkworm and instruments were also imported. (2) Introducing all types of specialists. At present, more than 100 persons from universities and academic institutions belonging to other provinces have been brought in, which has solved the problem of backward techniques and lack of specialists. Combining advanced techniques with local conditions, we worked out a plan for sericulture development and spread out a series of scientific techniques, such as a 'combined rearing of young silk worm', 'disinfection for disease prevention', 'silk worm rearing rooms and tools match', 'standard rearing techniques', and 'fast raising mulberry'. The popularization of all these methods has greatly improved sericulture. The cocoon crop per case of silkworm eggs has been raised from 20 kg to 35 kg. The yield per unit of area has risen to about 50 per cent. The output value per case of eggs has increased from 200 yuan to more than 500 yuan, bringing economic benefit to silkworm farmers.

Establishing an experimental base is an effective and direct form that demonstrates science and technology to the farmers. In practice, we selected two points as our base, namely, Xu Yan village, located in hilly land, and Zha Zi He village, located in the mountainous area. In each base three to five families were selected and trained to serve examples as. At first, a programme of techniques was implemented in the selected families then it was spread to others. Most villagers accepted this and thought it to be effective. They could learn from their neighbours and relatives. For example, Xu Yan village had 210 000 mulberry trees, they reared 200 boxes of silkworms only in 1983, and the income was 20 000 yuan. In 1994, after the new techniques had been introduced, the farmers in the village reared 800 boxes of silkworm. The cocoon output reached 25 000 kg and the income increased to 360 000 yuan, a 18 fold increase over 1983. Their experience has been communicated to other counties and other provinces.

Establishing and completing service system to provide a set of necessary services. It is necessary to establish an efficient service system during the course of introducing and extending advance science and technology. To satisfy this we established Sericultural Science and Technology Extension Centre and Silk Company at the county level, Sericultural Technology Service Station at the town level, Science and Technology Group at the village level and one demonstrating family for every ten sericultural households. Therefore, all the advance techniques we introduced from the outside could be implemented smoothly through this service system.

3. *The significant achievement in financial resource development through the exploitation of science.*

Science and technology are the first productive force. In the practice of introducing technology and raising the scientific level in the mountainous areas our self-developing capacities have been strengthened and three main industries are being developed. During the past few years, people in Fushan town planted about 410 hectare of mulberry trees, 310 hectare of tea plants and more than one million Chinese chestnut trees. The production of cocoons, tea and chestnut every year has increased to 200 000 kg,

500 000 kg and 300 000 kg. The yearly income has gone up to 4 000 000 yuan, 3 000 000 yuan and 1 800 000 yuan respectively. 1995 saw a gross value of the industrial and agricultural output of 71 250 000 yuan, an average pure income per capita of 1 045 yuan in Fushan town, an increase of 29.6 fold and 14.2 fold over 1983 respectively. Since then, farmers in Fushan town have acquired stable incomes.

Fushan town's experience in alleviating poverty by means of introducing advanced technology, developing scientific and technological capability and sericultural mainstay industries has been popularized in the Dabie Mountains. In Xinyang prefecture there are six counties including sixty-nine towns and 120 000 families who carry on sericultural production. With the establishment of nearly 9 000 hectares of mulberry fields about 40 000 sericultural households have achieved wealth.

TECHNOLOGY, SUSTAINABLE DEVELOPMENT AND POVERTY ALLEVIATION

A CASE STUDY ON AIDING THE POOR WITH SCIENCE AND TECHNOLOGY

INTRODUCTION

Change in social institutions is an important condition, for social and economic development. Since the introduction of the contracted responsibility system in the early 1980s with remuneration linked to output (the all-round contract), grain productivity has increased dramatically in the Luotian County, Hubei Province, and the Dabie Mountains. The provision of grains can be made by the people themselves in most areas of the county.

The new responsibility system has liberated productive forces in the countryside and raised the peasants' productive initiative. However, such inspiration is not without the conditions it requires which are the coordination of science and technology. In the early and mid-1980s, the increase in grain productivity in the Dabie Mountain Area of Hubei Province, as well as in other mountainous areas of China, was mainly due to the introduction of agricultural technology, use of superior seeds (such as hybridized rice) and the large-scale use of fertilizer in addition to the implementation of the responsibility system. The introduction of science and technology resulted in the increase in productivity per unit and a leap upwards in gross output.

The mono-agricultural productive structure, especially 'making grain the core', spells a great potential crisis in mountainous ecological systems. For example,

The productive structure in Luotian County in the early 1980s

Agriculture and Industry	Agriculture
% 100	60.09
Agriculture	Grain
% 100	72.5

'Making grain as the core' resulted in destroying forests. The area of bare mountains increased, the percentage of forest coverage decreased from 50 per cent to 31.4 per cent, and the tilling area on the slope over 25° reached 10 000 ha. The lack of energy also speeded up the destruction of forests. Soil erosion area constituted 19.1 per cent of the total land. The rise in the river bed and blockage in the reservoir was a result of deforestation which in turn resulted in the increase in the paddy field under the river bed and the degradation of the soil. The percentage of tillable land with scarce phosphorus and potassium was 35.1 per cent and 46.8 per cent respectively. Natural disasters were frequent. Peasants were extremely poor with

an annual net income per capita of $ 40 (US) and an annual consumption of grain of over 8 000 000 kg from the government.

In 1986, the central government initiated a large-scale activity to aid the poor. The state council confirmed Luotian County to be a key poor county, and the Science and Technology Commission of Hubei Province began to work together with the State Science and Technology Commission towards poverty alleviation in the region.

Based on the principle of 'developing commodity economy over the past ten years based on science and technology and creating a regional pile industry', Luotian County has developed a path of aiding the poor. With local resources as the target, and alleviation of poverty as the objective, what is needed is the coordination between rich people rich county and development in economy, society and environment.

LUOTIAN COUNTY BRIEF

Luotian County is situated in the south of the Dabie Mountains in a longitude from 115° 06' to 115° 46' in the east, and a latitude from 30° 45' to 31° 16' in the north. Out of a population of 564 000, 503 200 live by agriculture. The total area of land is 2 144 square km (3 216 000 mu or 214 400 ha). The population density is 263 people per square km. Tillable land is 25 200 ha with an average of 0.05 ha per person. Of the total land, 34.6 per cent is composed of hills, and 31.4 per cent consists of river-valley. The annual precipitation is 1 200–1 400 mm annual and average temperature is 15.7 to 16.7C. The tillable soil is mainly yellow and brown and the mountains consist of largely metamorphic rocks. It is the centre of heavy rainfall in the Hubei Province, although the exact distribution of rainfall is not even.

Luotian County belongs to a transitional belt and experiences temperatures which vary from being warm to those prevalent in sub-tropics. Biological resources are abundant. There are over 1 000 different species of plants. Economically, the most important are the Chinese chestnut, mulberry, persimmon, Chinese tallow tree, tung tree etc. There are 24 varieties of mulberry and 14 varieties of Chinese chestnut, among which the history of culture can be traced back to a hundred years.

SUSTAINABLE TECHNOLOGICAL SYSTEM

Objectives and Problems to be Solved

Economic development has brought with it an increase in the level of income of the people of the region.

The above objectives can be divided into three areas which need attention.

a. Self-provision of grain with an average per capita grain possession of at least 400 kg and guaranteed food security.

b. The per capita annual net income for 95 per cent of the peasants should surpass the poverty line (which was $ 31 per person in 1986, and US$ 62.5 per person in 1995,

according to the definition). By the year 2000, the per capita annual net income of peasants should reach 187.5 US $. (Note: This was the original objective in 1986, the figure should be 312.5 US $ now).

c. The maintenance of a balance between revenue and expenditure. Increase the percentage of employment.

Environmental objectives are to gradually increase the forest coverage and the diversity of living things. It is important to eliminate bare mountains and control soil erosion. Damage by harmful insects should be brought to an end, and the level of water pollution should be kept within permissible limits.

The above objectives are roughly consistent with those of Sustainable Agricultural and Rural Development (SARD) of FAO.

The problems to be solved are

a. The conflict between the increase of population and the decrease of tillable land. To increase the unit grain output and expand land for grain given the condition of the constant increase of population.

b. The conflict between the demand for more cash and the need for grain productivity. Grain is usually a low income product. In order to increase income, peasants have to develop ecoforestry. However, ecoforestry production conflicts with grain production under the traditional technological system.

c. The conflict between the environmental protection and resource development.

The Direction of Technology Development

Given the geographical location and climate, the direction of agricultural development should be to maintain grain output and develop the agri-forestry system based on ecoforestry.

The Structure of Technology

Macro-population structure can be supported by the development of an agroforestry, and a diversified ecological system based on the ecological serclimax in the area. It can also be supported by increasing the income and food security. Important plants which should be developed are the Chinese chestnut, mulberry, persimmon, tung tree, Chinese tallow tree, tea tree, fruit tree and medical trees etc.

The ecological serclimax in the area is mixed evergreen and deciduous broad-leaved forest 800m above the sea level, and mixed deciduous broad leaved and softwood forest and theropencedrymion between 800 and 1 500 m above the sea level.

Micro-structure involves the selection, cultivation, introduction and extension of high yield, anti-reversibility food grains. It also involves the development and extension of new cultivation and processing technology such as developing ecoforestry and grain. The demonstration and

extension of multiple cultivation models, courtyard economy based on biogas (livestock-biogas-fruit/grain/fish) are extremely useful.

MAIN MEASURES

In order to realize the above objectives of technology development the following main measures were taken:

(1) As survey of the resources and the formulation of plans of science and technology development.

In 1984, the Science and Technology Commission of Hubei province organized 11 expert survey teams consisting of 42 scholars from Central China Agricultural University, Central China Normal University, Provincial Agricultural Academy, and the Wuhan Branch of the Chinese Academy of Science and over 40 technicians from Luotian County, to conduct a systematic investigation and study the development and utilization of local resources. They identified specific natural resources, advantages and disadvantages and proposed a plan for development. The feasibility study of the plan was also conducted. The objectives of developing main populations were determined. Later, they revised the plan according to the demand of different times.

(2) As selection of teams to help Luotian county in the development of science and technology.

The main factor restricting the economic development in the mountainous areas is the lack of human resources in science and technology. Thus, the Provincial Science and Technology Commission selected and dispatched various science and technology development teams according to the needs of different projects from universities and research institutions. Those teams settled down in the Luotian county to carry out research and demonstration of projects with the cooperation of the local technicians. They also provided peasants with training in implementing technology. They made an important contribution to the formation of local resource based pile industry.

(3) The coordination between Concentrated Scientific and Technological Problem Solving (CSTPS) (handling the key problem with science and technology), demonstration and the 'star-fire plan' project.

The combination of CSTPS, demonstration and the 'star-fire plan' (which aimed to support village-township enterprises) project made it possible to develop resources according to the demands of local resource. Since 1985, there have been 156 projects of CSTPS. Demonstration and 'star-fire plan' have been carried out in the Luotian county with a total investment of $ 5 893 600.

a. Organizing CSTPS based on the demand of key technology for the viable protection and utilization of resources.

For example, to solve the problems contributing to the low yield and difficult preservation of Chinese chestnut, the provincial science and technology commission organized experts to

research the physiological and biochemical characteristics. These were, characteristics demanding, fertilizer, integrated pest management, chestnut freshness preservation, and processing, etc.. They produced such research reports as 'The problem of the Chinese chestnut empty-bur', 'The high yield technology of increasing the rate of bearing branches and female inflorescences, reducing the rate of male inflorescences', 'Chestnut freshness preservation technology' and 'Chestnut serial product processing technology' etc. It was found that the fundamental cause for the decrease in the chestnut yield and low unit yield was the problem of the chestnut empty bur, which was the result of the lack of boron nutrient ($r=-0.97$). According to the controlled testing, the rate of the empty-bur in the testing field decreased from 50.2 per cent to 4.5 per cent. It was also found that the lack of functional phosphorus in the soil was the main factor restricting the division of the chestnut female flower and eventually lowering its yield. After the addition of phosphorus and the cutting process, the yield in the testing field increased by 107.6 per cent on the average. Based on the above research, the technicians developed a technology by reducing the rate of empty bur and, increasing female inflorescences by decreasing male inflorescences.

In addition, research was also conducted on mulberry, persimmon, tea and so on.

b. The demonstrative extension of technological achievement of CSTPS

Immediately after the CSTPS, the respective demonstrative projects speeded up the extension of new technology. Again, take Chinese chestnut for example. The demonstration of spraying a wide area with boron, was conducted during the flowering period. In only two years of 1987 and 1988, the increase in the chestnut yield reached 1 600 000 kg which was US$ 480 000. The rate of empty bur decreased from the original 33 per cent average to 5 per cent. The technology of adding female flower and reducing male flower resulted in the increase of flower branches by 18.2 per cent on the average and yield by 37 per cent. In addition to the demonstration of the chestnut cultivation technology, the development of forestry (Chinese chestnut, Chinese tallow tree, mulberry), grain and livestock-biogas-grain (fruit and fish) were also initiated. Some families were identified to show the eficacy of these methods.

The model of the small farm ecological agriculture and courtyard ecological economy based on biogas were especially successful. A positive ecological cycle was obtained. It provided an option for reducing the shortage of energy in the rural areas and the destruction of forest resources and raising the income of the peasants.

c. Implementing the 'star-fire plan' and in-depth serial development of resources and increasing the additional value and market capacity of products.

Selling crude materials alone cannot increase revenue and employment, nor can it provide a relatively stable market Nevertheless, there is always a desire for an additional value of products. Therefore, Luotian County paid special attention to the in-depth exploitation of resources. They successfully established a number of in-depth processing industries and its corresponding supporting facilities in keeping with the results of the 'star-fire plan' at the national, provincial, and local levels. For example, they set up the chestnut tin-can factory, the chestnut freshness preservation storage with a capacity of 1 850 tons, because of its capabilities for air conditioning, and high and low temperature and normal temperature storage. They also established filatures, textile mills, a pongee silk factory and silk cloth-making factory. The

production through these resource in-depth processing in turn led to the further development of local resources.

d. Speeding up the extension and popularization of technology.

Luotian County placed emphasis on technology training related to the projects on mulberry, the chestnut and livestock through on-site demonstrations, field-trips and so on. These training activities were conducted in local towns or villages as well as in adult schools. They were organized by the science and technology development teams of the county with the support of the local agriculture forestry technology extension centres. Science and technology experts were also contracted to take care of a piece of a field with a total area of 66 666.6 ha annually to speed up the extension of technology. For example, they established a technology extension system related to Chinese chestnut, consisting of a county forestry technology extension site, and village and township forestry sites. In addition, villages and families identified for the demonstration of technology made it possible for the effective extension of the chestnut technology.

e. Adjusting the industrial structure. Developing specialized villages and site bases to conduct large-scale development.

There is no commodity market without scale. Since 1986, Luotian County adjusted its industrial structure, increased its resource commodity and production scale. It established 100 specialized villages related to mulberry, Chinese chestnut and livestock, and restored small chestnut, mulberry forest, tea and traditional medicine farms (called five small farms). Farms were contracted out to those families who could handle technology and management. They were connected to isolated and individual production sites to form a large-scale production base. There were 54 666.6 ha economic bases elated to chestnut and mulberry including 48 connected production sites with an area of more than 66.6 ha and an average economic area forest of 0.1 ha per person. Chestnut grew very quickly. In 1995, the area of the chestnut planted reached 24 666.6 ha, among which 1/2 the area consisted of the system of planting Chinese chestnut, grain/mulberry or Chinese traditional medicine. The output of the chestnut passed 10 000 t, its area and its output was 5.5 times and 3.1 times more than that of 10 years ago. Luotian County was the growing base of chestnut in China.

f. Developing the industries based on natural resources through the introducion of processing technologies and running enterprises which stimulate its development (named 'Dragon Head Enterprises'). Integrating trade, industry and agriculture.

The founding of the Cocoon Silk Corporation (with an output value per year of $25 million), and Zhengbao Foodstuffs Group, has formed a silk textile and food industrial system. The former combines 65 auxiliary enterprises, with the Cocoon Silk Corporation taking the lead. The range of activities include cocoon, silk reeling, silk weaving, pongee silk weaving and the tailoring of silk clothes. The latter consists of three refrigerated storages, and a 1 000-ton per year cannery which stimulated the development of a group of townships or villages to run food processing enterprises. The above two systems, together with other forms of processing industries, make up 28.5 per cent of the County's yearly revenue.

g. Ease the daily tension in the countryside through strengthening energy construction.

Firewood-saving stoves have been in wide use, saving 400 000 ton of firewood each year, equal to the growing of 13 333 ha of forest. About 6 000 biogas pools and over 10 000 solar energy water heaters have been built, which stopped the damage done to forest due to lack of fuel.

RESULTS

a. The peasants are now properly fed and clothed.

In the last 10 years, in spite of a 77.3 thousand, increase in the population and a 913.3 ha decrease in the farming land, the total grain output increased by 7 953 ton, thus sufficiently satisfying the needs of the County.

b. The income levels of farmers have obviously improved.

In 1995, the annual per capita net income was US$ 156.8, a three-fold increase over that of 1985, the average annual growth being 28.7 per cent. The County was ruled out of the list of 'poverty-stricken Counties', with most people no longer poor.

c. The County's revenue is rising every year. The revenue for 1995 is five times that of 1985 and per capita revenue in 1995 is three times more than in 1985, which balances the expenditure and revenue.

d. Economic structure is developing towards optimization.

The previous mono-structure of the agriculture of grain has been broken. A variety of crops which are mainly economic crops, are now grown with speed and on a large scale. Agricultural output value dropped from 60 per cent of the total agricultural and industrial output value in 1985 to 20 per cent in 1995. Grain output value from 72.5 per cent in 1985 to 29 per cent in 1995. Eco-forest, mainly chestnut and mulberry, has become an important source of income.

The Fu's Temple village is an example in point. Since 1988, mulberry planting area has increased five times, silk cocoon output 10 times (average household making 375 dollars from this), the chestnut area 4.5 times and its output 3.3 times (average household earning 188.25 dollars from this). A quarter of the village's chestnut land and a half of the mulberry land have adopted the practice of chestnut-mulberry and chestnut-grain inter-growing.

e. Ecological environment is improving.

The county has eradicated its barren hills with the rate of forest average reaching 67.2 per cent, twice as much as in 1985. It was named successively by the Ministry of Forest the 'National Model Unit of Afforestation', 'Demonstration County of State Scientific Afforestation', and 'Model County of Eco-forest Construction'. In 1995, the State Council listed this County as one of the '100 Best Counties in Forestry'. 25 degree or more slopes have not been tilled and have been turned into forest instead, thus stopping soil erosion. Hill tops are covered by pine or fir trees, lower hills by chestnut persimmon, tallow tree, mulberry or tea. An optimum ecological cycle of livestock-biogas-fruit (grain or fish) exists.

CONDITIONING FACTORS

After 10 years of effort, Luotian County has achieved a lot in moving towards its sustainable development goals, reducing poverty, and co-ordinating the development of ecology, economy and society. But many factors constrain its further development and there are some hidden crises.

a. Market competition.

Silk and chestnut of Luotian County are 100 per cent commodity and subject to competition from both domestic and international markets. In 1995, the low price for silk cocoon caused the mulberry growers to destroy some of their mulberry trees. Silk development therefore fluctuates.

b. Technologies.

The lack of deep processing techniques hinders the development of some resources. Take the Chinese tallow tree for example. The tallow-grain system has been a tradition. Tallow oil was used as lamp oil, but now it is used in chemical fields. Its many substitutions limits its use. In 1987, we tried to produce a product with tallow but failed because of immature technology.

c. The risk of the scale of plant population over expansion or that becoming mono.

On one hand, if some plant population scale is too big and mono, there may be the risk of plant epidemics. On the other hand, farmers may rely too much on the monoculture of certain crops for their income and thus subject themselves to the influence of market change.

REMARKS

a. The multi-system of agroforestry, in Luotian County that is, chestnut, tallow tree, persimmon, mulberry, grain, herbal plant, and tea multi-layer culture, can coordinate the goals of grain, income and environment. In the long run, the system's development had better match the courtyard economy with biogas as the core, so as to ease the tension of daily life energy, and decrease the demand for firewood.

b. Efficiency is the incentive factor in multi-agroforestry system, and a result of scientific and technological development.

Technology plays a major and sometimes even a decisive role in sustainable development and the eradication of poverty.

c. The population scale and the development of multiple/complex agroforest systems are interrelated. There will be no scale of commodities occupying market and no competition in the market, without a certain scale population, and thus it is difficult to establish a corresponding technological and economic service system and an infrastructure of modern agriculture. The self-sufficient small-scale agriculture can meet ecological goals, but it can hardly meet the goals of economic growth and the eradication of poverty. Inversely, environmental goals cannot maintain themselves long.

d. The technological system of Sustainable Agriculture and Rural Development (SARD) in Luotian County has taken the form of organic agriculture and ecoagriculture supplemented by modern agricultural technology. Organic manure is profusely used, with unorganic fertilizer as the auxiliary, mainly to provide the necessary elements lacking in the soil. While macroly, a multi-agroforestry eco-structure should be developed with local ecological communities microly multicrop technology should be developed with biogas because of the chain link of self-nutrition and energy recycling. In some areas, this organic or ecological agricultural system is implemented with a positive impact for the eradication of poverty.

POVERTY ALLEVIATION THROUGH PERSONNEL TRAINING

CONTEXT

The Situation of Chinese Poverty

The problem of poverty is mainly located in the rural areas of China most of which are situated in the remote mountain or hilly regions characterized by poor agricultural land and a difficult communication system. In 1985, there were over 100 million people whose average per capita income was less than 200 RMB Yuan, and who lived in 699 counties in the southwest and northwest of China. However, the poor population was reduced to 80 million and the poor counties decreased to 592 in 1992.

Key Measures of the Chinese Government

The Chinese government began to address its problem of poverty from the 1980s. Six hundred and sixty counties were identified as 'poor'. The main methods used were

a. Establishing the Leading Group for Poverty Alleviation under the State Council to coordinate the activities of different aspects of poverty alleviation. At the same time, all ministries, provinces, counties concerned set up their respective agencies for poverty alleviation.

b. Providing 5 billion financial assistance including funds and grants to support the projects to help the poor families to increase their incomes. The provincial government also collected some grants and funds to be used with the same objectives.

c. Mobilization of society. All government agencies, non-government organizations, and enterprises were asked to take part in specific places or plans to assist the needy. All large cities were required to set up partnerships to help the poor areas.

Assessment of Training Needs

We have achieved some success with regard to work on poverty alleviation. However, the effectiveness of the financial assistance is not as good as it should have been. About 50 per cent projects in poor areas failed which was caused by three reasons.

First, the executives in the provincial and county level did not fully understand the policies and approaches of the Central government, and did not realize the developing strategies and plans of economics. Most of them did not even have on-the-site experience and chance to visit the southeast and coastal areas of China.

Second, the project managers of economic development did not know the concepts and skills of project identification, evaluation, implementation and monitoring. They often chose unsuitable projects. The enterprise managers did not know the approaches and technology of business and administration. They often made wrong decisions.

Third, the farmers of needy families did not know that new agricultural skills could improve their living conditions. They put borrowed money in some projects but got nothing out of it.

Our conclusions from the above situations are that the officials needed to get trained on developing economics and the policies of our government. The managers of the project and enterprise needed to be trained in theory, concept, technology and management and administration. The farmers needed to be the trained in agricultural technology and skills.

STRATEGIES OF TRAINING

There were 699 poor counties and 100 million needy people in China in 1980s. According to the training scheme, if three officials per county, two officials each from 25 per cent of the townships and about 50 per cent enterprise managers were trained, the number of the clientele group would amount to almost 10 000 persons. There was not enough capacity to train this big a number in a short time. We made the following strategies to solve this problem.

1. Building the training capacity. We set up the training net in poor areas which included the National Training Centre in Beijing and sub-centres at the provincial and county level.

2. Training the officials at the county level first. They are the leaders of economic development in backward rural areas. We delivered the concepts of developing economics and the policies on poverty alleviation of the Chinese government to them and helped them to make the county's developing plan.

3. Identification of the responsibility between the National Training Centre and the provincial training agencies. The National Training Centre in Beijing is in charge of the training for the officials and managers at the provincial and county levels and the sub-centres are in charge of the training of agricultural technology and skills for farmers.

INSTITUTIONS

The training net in poor areas includes the National Training Centre in Beijing and the training agencies at the provincial and county levels.

1. The National Training Centre was set up in 1990. It is allocated 20 positions and headed by a Director, a Deputy Director and three Division Chiefs, who are in charge of a training unit, a training materials unit and an administrative office respectively.

The National Training Centre takes the responsibility to coordinate and guide the work of provincial training institutions that provide training for officials and managers of enterprises in the poor areas of the county. Ten professional staff members have been trained in the various aspects of managing and supervising the training programmes for the poor areas. The National

Training Centre is also in charge of developing the guidelines and criteria for assessing and responding to training needs and developing training programmes that bring strong influence on development projects.

2. The training agencies at provincial and county levels.

There are two kinds of agencies at the provincial level. The first is the sub-centre of the National Training Centre. The three sub-centres, which belong to their provincial government and accept the guidance and coordination of the National Training Centre in the various training programmes, are in Nanning, Chengdu and Lanzhou. Each sub-centre has ten professional staff members or more.

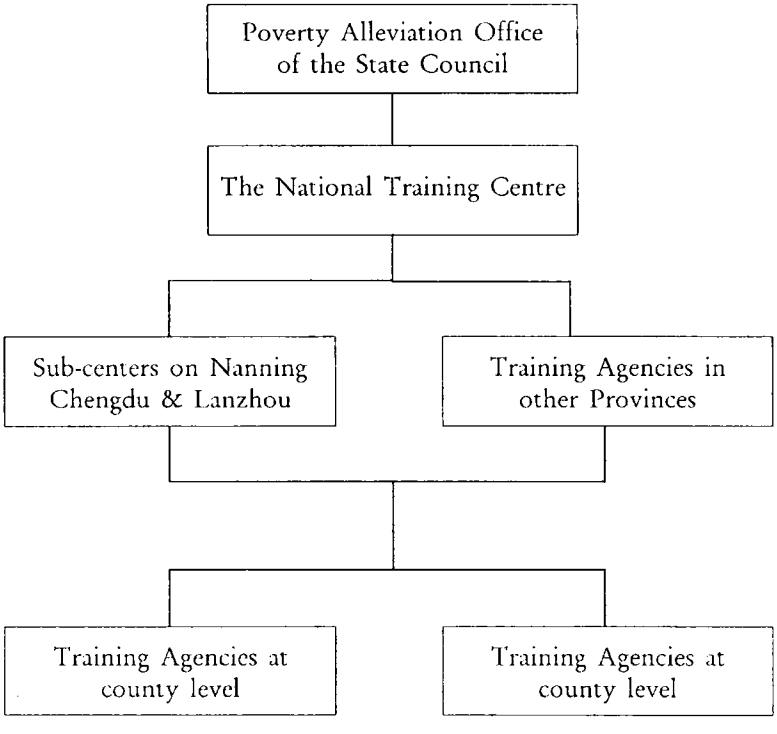
The second kind of agencies belong to the provincial government and arrange training programmes independently, but usually take part in the training courses for trainers and use training plans and materials approved by the National Training Centre.

The training agencies at the provincial level hold training courses for the officials and managers of the projects and enterprises, and also the training courses on agricultural skills for technicians and farmers.

Nearly all the poor counties have a small training centre for delivering practical technology and skills to the farmers.

3. The linkage between the National Training Centre and other training agencies is shown in Figure 1.

Figure 1



ACTIVITIES

From 1991 to 1995, the United Nations Development Programme (UNDP) supported a project to build a certain capacity for training officials and managers in poor areas (the project number is CPR/91/161). UNDP provided USY 243.75 and the Chinese government matched this amount by providing RMB 1 477.3 to this project. It enhanced the activities and results of the training programmes in the poor areas by

1. Reinforcing the institutional function of the National Training Centre and its sub-centres in Nanning, Chengdu and Lanshou. UNDP subsidizes the training equipment, office and training materials, preparation equipment, and vehicles for the four centres. They can prepare training materials by computers and conduct lectures by visual aids such as slides or a projector. In fact, due to the development of the training plan model, the training materials and managing the training courses successfully, the National Training Centre has the capacity to guide and coordinate the training programmes and to help to set up training agencies in other provinces.

2. Training of trainers National Training Centre held some local and international training courses on project management, enterprise management and developing economy for its own trainers and those of the sub-centres (Appendix-I). At the same time, it organized the trainers to take part in the national scale investigation and case study three times. More than forty full-time and part-time trainers joined these activities and became the core faculty of the National Training Centre and its Sub-centres. Eleven of them were promoted recently. Some trainers who are remarkable in handling the English language and operating computers have undertaken the responsibility of foreign affairs and international projects in their offices.

3. Developing training materials. The National Training Centre organized the trainers to produce training materials under the guidance of the national and international consultants. The training materials include twenty two publications on project management, enterprise management and economic development in rural areas. They also collect teaching notes on project management and enterprise management to share with the trainers (Appendix-II).

   The materials absorb the new concepts and skill of other countries as well as the concern about the main problems of the Chinese poor areas. The participants at the county level have given the materials a good evaluation after each training course.

4. Designing two sorts of training plans on project and enterprise management. The model includes training contents, target, plan, criteria curriculum, materials, method and the evaluation form. The teaching notes were edited and entitled Teachers Handbook on Project Management, and the Teachers Handbook on Enterprise Management, to share among all trainers. Two handbooks consist of the basic contents of the training plan model.

5. Holding training courses for 3 000 officials, 1 200 project managers, and 700 enterprise managers at the county level. We carried out and traced the investigation of the

participants in early 1996. Over 90 per cent participants still work in the position related to the training contents. Most of them enhance their skill and capacity through training. For example, the National Training Centre held training courses on project management for Guangxi, Ningxia and Shanxi before they prepared the Chinese Poverty Alleviation Project funded by the World Bank. The participants became the core staff of the project office and took up an important mission. The feasibility study in three provinces was improved and they got more money than other provinces.

EVALUATION

Evaluation is made according to the three principles of relevance, effectiveness and sustainability.

Relevance

Training activities is related to the task of poverty alleviation of the Chinese government. Training agencies are a part of the poverty alleviation office in Beijing as well as the provinces. The training contents, plan, materials and methods must meet the needs of the participants who work in the poverty alleviation offices at the county level.

Effectiveness

The training capacity of the National Training Centre and its sub-centres, the training plan model, and materials, especially the training courses, was demonstrated by the trainers. The participants have said that they have found the training courses to be of great help

Sustainability

The Chinese government drew up the National 87 Poverty Reduction Plan, which claims to solve the subsistence problems of 80 million needy people in the rural areas throughout the country within seven years, starting from 1994. The Central government provides RMB 50 million Yuan for training each year. The Director of Poverty Alleviation Office of the State Council has announced that this kind of training activities will be supported continuously.

There are still 591 poor counties and 80 million needy people in the rural areas. On the basis of three officials of each county and two officials of each township, the number needed to train is 17 618. It does not consider the personnel change of the officials. Many provinces invited the National Training Centre to hold training courses in their provinces.

The training capacity of the National Training Centre and its sub-centres is sustainable. The training plan models, including the training contents, target, plan, criteria curriculum, materials, method and evaluation forms could be applied to all the poor areas of the country.

APPENDIX-I: TRAINING COURSES FOR TRAINERS

Content	Site	Duration	Faculty	Participants
Rapid Rural Appraise	Chengdu	September 1991	London University Wye College	Staff of Four Centres
Integration of Economics & Management	Shenzhen	April-July 1992	EDI of WB	Staff of Four Centres
Circuit on Case Study	Nanning Chengdu Lanzhou	December 1992	EDI	Staff of Four Centres
Circuit on Training Method	Nanning Chengdu Lanzhou	July-August 1993	UNDP/DTCP	Staff of Four Centres
English	Beijing	Febuary-July 1993	Beijing Foreign Language College	Staff of Four Centres
Project Management	Beijing	October-November 1993	China People's University	Staff of Four Centres
Agricultural Economics	USA	October-December 1993	OSU	Staff of Four Centres
Enterprise Management	Dalian	June & December 1994	Dalian Science & Technical Col.	Staff of Fuor Centres
Enterprise Management	Hongkong	September-October 1994	Hongkong Chinese University	Staff of Four Centres
Project Management	Manila	January-April 1995	UNDP/DTCP	Staff of Four Centres

APPENDIX-II: LIST OF THE PUBLICATION OF TRAINING MATERIALS

I. Developing Economics

Poverty and Development
The Village Organization of Rural Areas
The Developing Plan of Rural Community
The Management of Small River Basin
The Management of the Cooperation Economics
The Stock Company of Township Enterprises
Building the Rural Energy Resources
The Outline of the Economic Development in Rural Areas
The Land System of Chinese Countryside
The Case Study on Development of Poor Areas (1-3)

II. Project Managerment

The Project Management in Poor Areas
The Project Feasibility Study and Evaluation in Poor Areas
The Handbook of Project Management

III. Enterprise Management

The Outline of the Enterprise Management
The Organization of the Enterprise Management
The Management of Conduction Process
The Management of Finance
Business and Marketing
How to Make Decisions
The Affairs of International Trade

POVERTY ALLEVIATION THROUGH ELECTRONIC INFORMATION TECHNOLOGY

BACKGROUND

Rationale

Information has been regarded as an important resource in modern society. If communicated and utilized efficiently, it will greatly improve social productivity as well as industrial and commercial activities competitively, and contribute to the public welfare in the long run. Currently, all the developed countries in the world are devoted to the building of a national informational infrastructure, which applies electronic means to make good use of the demand and supply of information, so as to propel social and economic development.

The Chinese government has attached great importance to the development of information in the building of its national economy, and began to hold regular 'joint meetings on Information in National Economy and Development'. Lead by Vice Premier, Zhou Jiahua, the overall plans for the information work was formulated with respect to the economic development of the whole country.

The National 87 Plan for Tackling Key Problems in Poverty Alleviation, aims to make 800 million poor people raise their standard of life by the year 2000. To realize this goal, the State is providing powerful support in terms of finance, techniques and technical personnel training , etc. so that the poor regions will be able to enhance the function of self 'blood-creating' in line with the development of the socialist market economy. However, the undeveloped systems of communications and telecommunications and a general lack of communication with the outside world in the poor regions seriously hinders economic reform. As a result, rich natural resources cannot be efficiently utilized, and the economic cooperation and co-development with other developed regions cannot be established since local information is not available to the outside world on time. What is worse, the uninformed situation results in the backwardness of cadres and the masses in these poor regions. The management and business operations keep the state of small-scale peasant economy, far from becoming competitive in line with the booming market economy. The reality urges the poor regions to utilize not only their limited natural resources, but also the unlimited informational resources to alleviate poverty. Naturally, the practical electronic information techniques should be applied to develop and utilize informational resources.

Technical Readiness

As an electronic informational programme, technical readiness means satellite telecommunications by means of a new nformation transmission, the retracting-information transmission. It makes use of the current television information resources by attaching the informational data

to television programmes, forwarded by the satellite, and transmitted and received simultaneously. While receiving the television programmes, the decoder prepared will automatically save the data onto the attached computers so that the users may deal with it themselves. According to the present technology, one set of television programmes transmitted by the satellite may carry 256 electronic mail boxes, which contain plentiful information so that the State need not invest in establishing special information tracks. If combined with the 'Golden Bridge Programme', the city and county branch receiving stations can be established, so that national information network is established, even with the information coverage of the Tibet Autonomous Region and the Xijiang Uyger Autonomous Region.

The Programme Proposed

On 21 November 1994, the Ministry of Electronic Industry and the *Economic Daily* jointly requested to establish the joint meeting on the Information in the National Economy and Development, and proposed that the programme be implemented under the leadership of the members attending the meeting, with the concerted action of the related departments.

The proposal was approved by Vice Premier Zhou Jiahua and State Councilor Chen Junsheng, and it was agreed that the implementation of the programme would be headed by the Office of the Leading Group for Economic Development in the Poor Areas of the State Council, in cooperation with the China Data Broadcasting Centre of the Ministry of Broadcasting, Film and Television, the Ministry of Electronic Industry and the *Economic Daily.*

Objectives

As an importnt measure to implement the 87 Plan, the objective of the programme was set to build the informational bridge between the poor and the outside regions, especially between the developed coastal regions and the poor regions in central and west China. China's present satellite telecommunications technology, network technology and computer technology will provide the rural areas, especially the poor regions, with an information service regarding agricultural production, economy and urban-rural economic dynamics. It will do this by setting up information branch stations in 592 declared poor counties and 2 200 cities and counties.

IMPLEMENTATION

As governmental action, the implementation of the programme is a systematic task including information resources development, compilation, transmition and retransmition, receiving, feedback, and information service at the grass-root level. Therefore, organizational work is very important.

Establishment of Leadership

Headed by the Leading Group for the Economic Development in Poor Areas under the State Council, the 'Leading Group for Poverty Alleviation through Information Technology' was jointly established by the Ministry of Electronic Industry, the Ministry of Broadcasting, Film and Television, and the *Economic Daily,* together with the State Planning Commission, the Ministry of Agriculture and the China Foundation for Poor Regions. The Office under the

leading group was set up. It was chaired by a member from the Leading Group for the Economic Development in Poor Areas under the State Council, with one deputy director respectively from the Ministry of Electronic Industry, the Ministry of Broadcasting, Film and Television, and the *Economic Daily*.

Division of Work and Cooperation among Related Departments

The Leading Group for Poverty Alleviation through Information Technology is responsible for the overall planning and coordination of the programme, solving the key problems arising during implementation, and coordination of the departments concerned.

As a daily business office, that under the leading group is responsible for the implementation of the programme, general coordination work, controlling and earmarking of the State's special funds for the programme and the social and financial support to the programme. It is also responsible for organizing the regular supervision of the implementation of the programme and reporting the problems in the implementation to the leading group.

The Ministry of Electronic Industry is responsible for fully utilizing the Golden Bridge Network and various other networks, quality appraisal and supervision of the needed computers, satellite aerial and other equipment. It has to ensure the installation and full sets of technical support, and technical training of the city or county-level staff. It has to also organize the transmitting and receiving of information in cooperation with the Ministry of Broadcasting, Film and Television, and the *Economic Daily*.

The China Data Broadcasting Centre under the Ministry of Broadcasting, Film and Television is responsible for the preparation of a retracing satellite track and arrangement of the time to transmit information. In addition, this centre with its local branch centres, is responsible for providing the receiving stations at city or county level, with a maintenance service fee. It charges the technical training of the station staffs in cooperation with the Ministry of Electronic Industry and the *Economic Daily*.

The *Economic Daily*, is responsible for the 'Information Compiling and Publicizing Centre' by using its current data bases, information collection and editorial staff, and good ties with the economic sector abroad. It is responsible for the collection of information compilation, publicization and inter-communication work, and the technical training of the station staff in cooperation with the Ministry of Electronic Industry and the Ministry of Broadcasting, Film and Television.

The Ministry of Agriculture, the Ministry of Domestic Trading, the Ministry of Foreign Trading, and other units should help the aforesaid centre to collect related economic information and data.

The Work of the Information Stations at Local Level

During the period of 8:00–17:00 everyday, information is received, then it is printed and distributed. The information regarding demands and supplies is collected and the input put into the network, and feedback sent to the main station.

The Necessary Equipment

This programme requires a main station, and a multitude of sub-stations to be established. The main station is located in the *Economic Daily*. The sub-stations are located with the terminals at the provincial, municipal and county's sites. Every sub-station is equipped with one receiving equipment, including:

One satellite receiving aerial (containing high frequency tops, receiver).

One decoder.

One computer (386) (containing telecommunications software, searching and compiling software and a modem).

This set of equipment also receives the television programmes of the Central Education TV via satellite transferring.

The enterprises under the Ministry of the Electronic Industry has worked out this set of equipment and produced them in great number.

The Budget for this Programme (RBM yuan)

1. The purchase of one set of this equipment costs 20 000. The total investment of the 592 poor counties in purchase of one set of equipment per county reaches 12 million. The other counties can establish the stations with their own collected funds by lease. The principal capital can be paid in five years with the yearly rate of 5 per cent interest. The total investment is 50 million.

2. *The Daily Operation Expenses:* The satellite information fees, and information track materials fees are exempted during the five years of 1996–2000 for 592 poor counties. The other 1 600 counties which out of the category of poor counties are required to pay a total annual rate of 2000, for the full operations of the information network since 1997. Half of this is for service fees and information materials respectively.

A profit of 2.5–3 millions will be attained after deducting one million as expenses incurred by the Information Compiling and Publicizing Centre. Suppose the pace and scale of the programme are not as good as expected, the annual profits in 1997 or 1998 will reach 2 million or so.

The Steps of Implementation

The implementation of this programme are expected to be finalized during the period of 2.5 years from 1996 to 1998. During 1995–6, examples and models of the programme have been set up. From 1996, the programme will be extended to other counties and regions. By 1998, the information network oriented to alleviate poverty and develop rural economy in the whole country will be completed.

At the same time, the related departments and sectors see such related work as the technical personnel training, publicity, equipment tendering and appraisal, and related laws and regulations, etc. as important.

THE IMPLEMENTATION SITUATION

The Experimental Success

In April 1995, the Leading Group for the Economic Development in Poor Areas under the State Council, the Ministry of Electronic Industry, the Ministry of Broadcasting, Film and Television, and the *Economic Daily* jointly worked out 'the Implementation Measures of Poverty Alleviation and Well-being Attainment through the Introduction of Information', which decided to experiment the programme at Zhangjiakou City in north China's Hebei Province. The corresponding organizations helping poverty alleviation, such as the Beijing Municipality, the State Education Commission, China Agriculture Bank, and the city, jointly invested and purchased 14 sets of equipment for 13 counties, of which 10 counties were poor and one in the category of special poverty.

On 27 June 1995, the two-way communication network covering Zhangjiakou City and the 13 counties of the first phase of this programme was opened. The county stations distributed the *Latest News for Bulletins* which is compiled with the latest economic information for governments and enterprises and institutions every day. The feedback of the information regarding business and investment, and demands and supplies is communicated to the Information Compiling and Publicizing Centre and the *Economic Daily*. The *Economic Daily* then publicizes the information together with other newspapers such as the *China Poverty Alleviation Information*, and the *People's Daily*.

The vegetable and fruit farmers were the first people to enjoy the benefits after the operation of the network. Here are three examples. First, in 1995, the autumn vegetable growers in Bashang County successfully transported and sold autumn vegetable to Beijing, Tianjing, Guangdong and other regions in the country by not losing time with respect to the demand information they got to know from the network, in sharp contrast with the past years when they did not know where the demands were and a great quantity of autumn vegetables were destroyed in the cold. Second, the information that over half a million kg of celery in Shangyi County was sent to the Information Compiling and Publicizing Centre, was transmitted to the network within one week and publicized in the *Economic Daily*. As a result a lot of buyers from Beijing, Tianjing, Shanxi and other places came and ordered all the celery. Third, in September 1995, the Zhuolu County sent the information that a great quantity of fruits were in stock and the centre publicized the information in the network and the *Economy Daily*. Very soon, over ten fruit companies in the country contacted the county, and 2.5 million kg of apple, 1.5 million kg of grapes, and half a million pear were sold out by October 1995.

The information through the electronic network also plays an orientation role. Here are three examples. First, the Zhangbei County Sugar Factory, from the county's information station became aware that white sugar was in demand, and it mobilized the farmers to plant beet and expand sugar production. Second, the Shangyi County Glass Plant began receiving big orders and decided to expand production after the information of its great stock of glass silk was on the network. It attracted buyers from east China's Shandong Province, who came to see samples and agreed to order. Third, the Yangyuan County planned to construct a high grade freight highway from this county to north China's Datong City which required 1.7 billion RMB yuan. After the information was publicized, many companies from Beijing, Taiyuan and

other places came to contact the county and expressed the wish to work as agents to seek international investment.

Programme experiments in the Shangjiakou region were warmly received by the government, economic and management sectors, township enterprises and farmers. Enjoying success and benefits from the experiments, people there spoke highly of the programme of poverty alleviation through the introduction of information.

The success of the programme experiments in the Zhangjiakou region also received warm response from the whole country. South China's Hubei Province, Jiangsu Province, and north China's Shanxi Province, Inner Mongolia, Helongjiang Province sent people to this region to investigate the information network and expressed great interest in joining it. All the provinces and cities in China hoped to extend the programme to every corner of the country.

The second phase of programme experiments in 20 poor counties in the provinces of Sichuan, Shaanxi, Jiangxi, Hebei, Anhui and Shanxi were also very successful. On 11 October 1995, representatives from 20 poor counties accepted satellite receiving aerials, receivers, computers and other equipments.

Present at the donation ceremony, Mr Chen Junsheng, the state councilor, the head of the Leading Group for the Economic Development in Poor Regions under the State Council, highly praised the Ministry of Electronic Industry, the Ministry of Broadcasting, Film and Television, and the *Economic Daily* who successfully organized the programme's activities. Meanwhile he expressed thanks to the Great Wall, the Longchao, the Changjiang, the HK Weiyida, and other companies for their donation of the computer and other equipments.

An Example: The Implementation of the Programme in the Regions not in the Category of Poverty

The Xinshan County of Hubei Province is a typical example. Within the short time of only one month in June 1995, the county government successfully established the Xinshan County Economic Information Centre, the first one of its kind in the Hubei Province. The people there began enjoying the benefits after half a year since the network came into operation.

The Economic Information Centre of this county compiled and edited the received information according to the needs of mountainous regions, and published the *Economic Information Weekly*, the first one of its kind among the over hundred network members. It sent the latest information to the whole county and the neighbouring counties. Potential and direct effects resulted from the information. The following are some examples. First, the Nanyang Township sent the information that it hoped to set up a power station jointly. Very soon investors in Central China's Henan Province and south China's Guangxi Region and Australia responded warmly and hoped to negotiate with the township. An engineer from a big enterprise in Wuhan City drove to the county in the hope to supply equipment at a reasonable price. Second, the Sixi Village of Xiakou Township sent the information marketing its great quantity of orange. Within only one month the total of half a million kilogramme of oranges was sold out. In the past, sales of oranges took over three months.

In addition, the county mapped out the Poverty Alleviation and Well-being Attainment Plans through the Introduction of Information in February 1996, aiming to change the ways of thinking of the cadres and the mass, in the Hubei Province both at the county and the township levels.

IV Current Work

By 30 April 1996, 85 counties had set up stations and linked to network, and over 60 counties entered the stage of normal operations. Many other provinces, and counties are actively preparing for joining the network. For instance,

On 10 May, Shaanxi Province decided to experiment with the programme in 103 counties of 10 prefectures.

Sichuan Province is working on the Plans of Poverty Alleviation through the Introduction of Information, and is preparing to practice in over 80 counties of 20 prefectures and cities.

Yichang Perfecture of Hubei Province is preparing to establish stations in Three Gorge Districts and hopes to promote the economic development in those areas.

Xinshan County of Hubei Province has set up the Economic Information Centre and is going to establish a network among all the township enterprises in the county.

Ningcheng City of the Inner Mongolia is to establish a network through the telephone line among the city's enterprises whose computers are available.

The Beijing-based Information Compiling and Publicizing Centre has so far transmitted the latest economic information in 3 000 000 Chinese characters to sub-stations through five channels. The information covers not only poverty alleviation information, but also demand and supply information regarding production materials, agricultural and side-line products, farm products fair, techniques transfer and cooperation and investment etc. The centre also sent information regarding the agricultural knowledge and the state's related laws and regulations.

The information put to the network covers not only that from the *Economic Daily,* but also from the Ministry of Agriculture, the Ministry of Domestic Trading, the State Commission of Science and Technology, Beijing Municipality, Shanghai Municipality and many other sources. The information is to be expanded and enriched.

ANALYSIS

The programme with the application of modern telecommunications technology, is leading the rural areas especially the poor areas to alleviate poverty and become rich in the long run through the introduction of the most applicable techniques and the latest economic information.

The state financial assistance can help to relieve and eliminate poverty. However, this programme provides the people in poor regions with 'blood making' techniques through the introduction of information. Therefore, it works as a basis, on which further economic development of poor regions will be soundly achieved.

The implementation of this programme is not easy. The biggest problem is the lack of funds. Building information network covering 592 poor counties requires a preliminary investment of 12 million of RBM yuan. In many areas, still backward, the leaders are not willing to invest the preliminary installment cost of 20 000 RBM yuan. This seriously hinders and slows down the implementation of the programme.

In conclusion, the implementation of this programme for one year has resulted in social and economic effects. The organizers of the programme are more confident. It is hoped that all social sectors will help the implementation of the programme in terms of funds, equipment, techniques, etc. so as to realize the 87 Plan and alleviate poverty in the long run.

LIAOYUAN PLAN AND ALLEVIATION OF RURAL POVERTY

BRIEF REVIEW OF THE POLICY BACKGROUND

Alleviation and elimination of poverty is a major problem facing developing countries in the world today and is also the consistent principle and basic policy of the Chinese government. In order to promote the prosperity of the people of all nationalities of our country, the Chinese government has been making unremitting efforts for a long period of time. During the long lasting Aid-the-Poor Programme, the Chinese government has fully realized that slow development of education, outdated education concept and relatively low scientific and technological levels of labourers are among the major reasons which caused poverty. Therefore, it is paying attention to educational reform which has been an important substance of the programme, and improving labour quality. As early as in 1984, the Central Committee and the State Council pointed out in the 'Circular on Helping Poor Areas to Change Present Conditions as Soon as Possible', 'that education in poor areas should be paid close attention to and investment in brainpower be increased'. 'The Programme of Action for Education of the Whole People' promulgated by the government in 1993, stressed 'that importance should be attached to helping economically underdeveloped and minority nationality regions, and realize nine-year compulsory education and education for eliminating illiteracy'. In the same year, the Central Committee and the State Council further stressed 'The Programme for Chinese Educational Reform and Development' to actively support poor areas and minority nationality regions to develop education. In addition, 'The National Aid-the-poor and Difficulty Tackling Plan, 87' also requires to speed up scientific and technological progress of poor areas.

PRACTICE OF LIAOYUAN PLAN

In order to promote economic development and social progress in the countryside, especially in the poor rural areas, the State Education Commission organized the implementation of the 'Liaoyuan Plan' with the approval of the Chinese government in 1988.

The overall requirements of the Liaoyuan Plan are: to speed up economic and social development by developing and reforming rural education, improving labourers' scientific, technological and cultural quality and strengthening the capacity for rural areas to absorb and use science and technology.

The main tasks of the Liaoyuan Plan are based on the campaign to eliminate illiteracy and popularize compulsory education, to promote intellectual and technological advantages in rural schools, and actively launch education in practical technology. It was therefore important to train a large number of new rural builders.

By now a total of 8 000 Liaoyuan Plan demonstration towns (accounting for 10 per cent of the total number of towns throughout the country) have been established in over 1 500 counties throughout the country. Generally, train graduates of junior and senior middle schools and even primary schools in practical technology to bring about coordinated development of education and economy.

In order to push forward the development of the Liaoyuan Plan in depth, the State Education Commission again organized the Hundred, Thousand and Ten Thousand Project (hereinafter referred to as Project) in 1995, which aimed to spread out a hundred practical rural technologies in a thousand towns and ten thousand villages. In operation, the Project selects those practical rural technologies recommended by the Ministry of Agriculture which have production benefit and are easy to spread. The use of audio and video tapes and popular science reading materials, as well as rural radio and television schools, rural vocational schools, cultural and technical schools were all important. Through various means of education, farmers were helped to learn and master practical technology, and shake off poverty and build up a fortune. This activity is under rapid development now.

EFFECTS FROM THE IMPLEMENTATION OF THE LIAOYUAN PLAN

In recent years, during the execution of the Liaoyuan Plan, the intellectual advantage of rural education has been made use of to serve rural scientific and technological progress, which has pushed forward the spread of rural culture and science and technology.

Training a large number of primary and middle rank talents in science and technology for rural areas

According to incomplete statistics, from the beginning of 1987 to October of 1993, through a comprehensive reform of rural education and execution of the Liaoyuan Plan, 46 000 various practical technologies were popularized and 335 million person-time junior and senior high school graduates returned to their native towns and villages and young farmers received training. Heilongjiang Province in 1988 and Liaoning and Ganu Provinces in 1991, started to launch the Winter of Liaoyuan campaign with the aim to make use of rural education to train mass farmers and junior and senior high school students in the practical technology of farming. For several years in the slack winter season, there was an upsurge in spreading of practical farming technology. The 231 Project proposed by Ningxia Autonomous Region includes the following: eliminating illiteracy in culture and science; learning general knowledge, science, technology, and management; and bringing up a new generation of farmers. Over the past several years, more than 25 000 literacy classes and over 3 000 sessions of short-term training classes in practical rural technology have been established in the whole region. Over 6 000 000 people of all kinds received training which accounts for 45.6 per cent of the total number of young farmers and farmers in the prime of life. Four State-level and seven provincial-level testing counties in Shanxi Province trained 475 000 persons-time personnel about various practical technologies just in 1993. Since 1986, Nanyang Prefecture of Henan Province has insisted on the development of rural economy on the basis of scientific and technological progress and improvement of labourers' quality with stress on the latter. During the Seventh-Five Year Plan, 2.2 million farmers received training at different levels; during the Eighth-Five Year Plan, it is planned to train 1.7 million person-time. Nanyang Prefecture delivered science and technology know how to innumerable families

through various forms of popular science activities. For instance, it distributed Technical Understanding Card to farmers, edited and released *Science and Technology News*, organized Science and Technology Spreading Wagons, and sent groups of lecturers to the countryside to spread practical technology, and so on.

Popularizing practical scientific knowledge and technology

Since 1988, in order to coordinate with overall rural educational reform and spread of practical scientific knowledge and technology for farming, the State Education Commission has sponsored *China Liaoyuan Information News* (an openly published newspaper) jointly with Tianjin Education Commission, the *Rural Practical Technology* magazine (openly published nationwide and worldwide), jointly with Hebei Education Commission, with about 400 000 volumes per month. The State Education Commission has also sponsored the *Rural Education* magazine with the Association of Rural Education Research and edited over 100 issues of *Liaoyuan Bulletin*. These newspapers and magazines have played a positive role in popularizing rural science and technology and general knowledge and have been warmly welcomed by cadres and masses in the countryside. In addition, the testing counties of provinces, cities and autonomous regions also have their own press spreading science and technology.

Promoting the construction of rural morality and ideology

In the first place, rural basic education experienced a big-step forward. The quality of education improved greatly. Educational policy was carried out in an all-round way. The ideological education of teenagers was enhanced. Students of preliminary schools and junior and senior high schools, in many rural areas, not only reached the unified learning standard for literacy class, but also cultivated good habits of doing physical labour and taking care of themselves. They developed harmoniously in moral education, intellectual education, physical training, aesthetic education and labour.

In the second place, in many rural areas, farmers not only developed an interest in culture and science, but discontinued outdated customs as well. There was a reduction in the instances of gambling, fighting, superstitious activities, disputes between neighbours, and stealing. Such long-standing difficult problems as public order, family planning, relations between cadres and masses have improved remarkably. In some towns and villages where educational reform has taken a positive turn, such phenomena as illiteracy, bearing more children than permitted by law, gambling, stealing, fighting and superstitious activities were on a sharp decline.

The construction of rural grass-roots level organization, family planning, public order, education and economic development were particularly in evidence in the following towns and villages: Bacun Village of Longjiang County of Heilongjiang Province, Wangjiabu and Dongfangshen Village of Haicheng City of Liaoning Province, Zhandao Village of Huolu County and Beiguo Village of Anping County of Hebei Province, Gechazui Village of Fangshan County and Qianyuanzhuang of Liulin County of Shanxi Province, Xiangtan Village of Yulin City of Shaanxi Province Mashan Town of Hengxian County of Guangxi Zhuang Autonomous Region.

Promoting joint construction of urban and rural spiritual civilization

Liaoyuan Plan is a grand social project. For many years, the State Education Commission has been initiating and mobilizing colleges and universities and scientific research units and large and medium-sized enterprises to participate actively in the Plan, and the results have been remarkable. (1) In the course of the reform, from the central to the local authorities, many colleges and universities and scientific research departments sent a large number of teachers, scientific research personnel and students to the front line of rural educational reform to spread science and technology and new information concerning agriculture. They helped to train teachers and rural scientific research personnel, which has resulted in good economic returns and social effect, enhanced the contact between colleges and rural practice and speeded up the turning of scientific and technological achievements into a productive force. For instance, Qinghua University, Northeast Teachers University, Beijing Teachers University, Beijing Chemical College, and Hebei Agricultural University have done a lot of work for the construction of material and cultural well being in poor rural areas. (2) Some large-sized enterprises have set up a joint construction with poor towns and villages where the Liaoyuan Plan is implemented. For instance, Capital Auto Group helped Yangjiatai Town of Shunping County of Hebei Province set up Capital Auto Liaoyuan Primary School, China Mechanical Equipment Import and Export Corporation established Zhongshe Liaoyuan Primary School in Qinglong Man Autonomous County have all benefited from the Liaoyuan Plan.

SCIENCE AND TECHNOLOGY AND THE PACE OF POVERTY RELIEF

Ji'an Prefecture, located in the south-west of Jiangxi has 13 counties (or cities) under its jurisdiction. Its total area is 25 000 square kilometres which supports a population 4.47 million. The former famous Jinggangshan Revolutionary Base is in this prefecture. We implemented several projects, insisting on taking resources as base, market as guide, S&T (Science and Technology) as pillar and develop commodity economy. In 1995, the total agricultural and industrial output value (fixed price of 1990) of the whole prefecture was up by 13.94 billion yuan, yielding a revenue of 673 million yuan, which meant an increase of 5.2 times and 9.1 times compared to those of 1978. Net income per capita was up by 1 134 yuan, 8 times that of 1978. Now, forty-two townships have shaken off poverty and 110 731 poor households have adequate food and clothing.

Jinggang Mountains Area (including Jinggangshan City, Yongxin, Shuichuan and Ningang) in which there are 77 townships and towns, covers 6 566.35 square kilometres and has a population of 1.1 million. It was the target area for implementing the strategy of poverty alleviation through S&T in our prefecture. In 1988, it was listed by the National S&T Committee as a major project. Thus both the Provincial S&T Committee and the National S&T Committee organized groups to stay there for guidance, helping the poor to use S&T from the year 1989. In the following years, we achieved much of the work of developing Jinggang Mountains Area which markedly changed its face. In 1995, the total agricultural and industrial output value and revenue of the whole prefecture increased by 455.8 per cent and 194.7 per cent respectively. The percentage of the poorest population declined from 29.4 per cent to 14.6 per cent. People's consciousness of commodity economy and development by S&T was obviously enhanced. A common mood of self-reliance and an eagerness to use S&T was evident.

During helping the poor by S&T in Jinggang Mountains Area, we worked mainly in the following manner.

COMBING THE WORK OF HELPING THE POOR BY S&T WITH LOCAL KEY INDUSTRIES TO STRENGTHEN ECONOMIC VIGOUR

The development of the key local industries was the focus in our work in the Jinggang Mountains Area. In order to select good key industries scientifically, we organized over 100 experts and technical persons in 1988 to engage in the study of economic and technical development of the area. Silkworm, bamboo, water poultry, fruit and tea were chosen as the key local industries to be developed, which could fully utilize the rich resources and cover most of the area. In the years, according to the plan, we laid the foundation in 1975 raised the level of living in 1985, and guided the people into abundance in 1995, we worked out the development programme and annual plans on the area's key industries, took a series of effective measures to perfect

industrial service system, put emphasis on manpower, intellect and materials found out the weak links of the local key industries and solved a great number of difficult technical problems through study. For example, the achievement of cutting mulberry reduced the expenditure for building mulberry plantation per mu by 150 yuan, and enabled the newly built plantation to yield profits in the same year of putting it into production, which brought the initiative of the silkworm raisers into play. We successfully carried out the projects of transforming low yield kumquat, seed selection, keeping it fresh, transforming silkworm and mulberry techniques for comprehensive prevention and cure of silkworm diseases, transforming low yield bamboo, cultivating bamboo shoots and bamboo dual-purpose forest and comprehensive processing of bamboo shoots, which promoted the healthy development of the key industries. The silkworm and mulberry industry in the area (mainly in Hogxin) developed from three townships, 67 households, 370 mu in 1983 to 62 thousand households, 83 thousand mu. The cocoon yield went up to 54 thousand dan. By transforming a low yield bamboo of 50 thousand mu (mainly in Jinggangshan City), we extended 20 thousand mu of dual-purpose bamboo forest, developed three main classes and over one hundred varieties of bamboo products. The total bamboo-growing area increased from 58 thousand mu to 86 thousand mu. For the water poultry industry (mainly in Shuichuan), the number of goose and duck raised per year was up by 4 million, and pressed salted duck over one million. Demand for the newly developed pressed duck in vacuum package exceeds the supply in the markets. As for the fruit and tea industry characterized by kumquat and 'Furong' plum, the area and yield of kumquat are up by 86 thousand mu and 6 million kgs respectively, which increased product varieties up to 38. The annual yield of the Ningang plum-growing area of over 10 thousand mu, was up by 1.5 million kg has, tea plantation area extended to 34 thousand mu, withan annual yield of over 500 thousand kg, in which the 'Gougunao' tea was in the first place.

COMBINING THE WORK OF HELPING THE POOR THROUGH SCIENCE AND TECHNICAL TRAINING TO STRENGTHEN THE FUNCTION OF 'MAKING BLOOD'

Realizing that the quality of the labourers was very important for pushing S&T and economy of the area forward, we promoted the importance of a technical training as a basic project of helping the poor. According to the principle of 'actual conditions, actual functions and actual effect', we carried out the task of universal education in practical techniques. In the years, such training classes was run over 2 000 times, it trained over 120 thousand persons, and printed technical data of about 150 thousand copies. Through training, most peasants mastered one or two practical techniques. In Shuichuan, each of the trained peasants was given a book of technique for *Kumquat Growing and Management,* a picture book of *Diseases and Pests of Oranges,* a schedule of kumquat growing and management and a pair of scissors for cutting branches. The 'Four A' training has created a remarkable effect and won the provincial second grade praise of training technical persons. The training also renewed the knowledge of technicians and managerial persons. We organized more than 200 leaders and technical cadres to Dabeishan and the developed districts near the sea for study and training, and invited several senior experts from Development Research Centre of the State Council to Jinggang for delivering lectures to the leaders and S&T personnel. We also raised funds from different quarters to practise audio-visual teaching, produced four popular science films on practical techniques for the key industries such as mulberry growing and silkworm raising, which was shown nearly one thousand times.

In Yongxin County, each township was provided with a colour TV set, videocoder, video tapes, and a network for audio-visual teaching set up. Ji'an Prefectural Office of Helping the Poor, joined in the Chinese Japanese Friendly Network of Showing S&T Films, and also introduced and showed a great number of films about new overseas and domestic techniques.

COMBINING THE WORK OF HELPING THE POOR WITH IMPORT AND UNION TO WIDEN THE RANGE OF S&T EXCHANGE

In order to solve the problem of a lack of techniques and information in Jinggang Mountains Area, we established contact with over 20 scientific research units, universities and enterprises in or out of our province, through which we imported techniques, got information, and increased the technical content of industrial development and correct policy decision. We developed more than 20 kinds of products concerning silkworm and mulberry, bamboo veneer board etc. We also introduced several varieties and nearly one hundred items of new techniques. In addition we introduced over 500 S&T persons to carry out different kinds of technical services and solve lots of difficult technical problems. For example, we invited two experts from the National Building Material Institute to spread the patent colcining for adding seed cement kiln to seven cement factories, which would result in reducing energy consumption, raising the cement quality, increasing its yield by 7 per cent–14 per cent, saving coal by 11.2 per cent–20.06 per cent, lowering the intensity of labour, and increasing net profits by 2.05 million yuan per year.

Aided by the National S&T Committee and the Provincial S&T Committee, Ji'an Prefectural Office of Helping the Poor and the S&T Committees of three counties and one city all set up computer terminal stations. These formed the Computer Information System for Helping the Poor by S&T in Jinggang Mountains Area connected with the central network of China National S&T Information Institute, and six data bases of Technological Information Promotion System (TIPS) of the United Nations. Each year, we can import over 3 000 pieces of information on chemical industry, food, building material and comprehension. The area can also issue different kinds of information to domestic data bases and TIPS.

COMBINING THE WORK OF HELPING THE POOR WITH BUILDING S&T SYSTEM TO ENHANCE WORK

In order to ensure the smooth implementation of our development strategy for helping the poor, we enhanced the system of S&T management and insulation, and established leading groups and organizations for helping the poor in our prefecture and counties. Each county, township and some villages and factories have a leader in charge of S&T work. Each county established a leading group for industrial development and expert-consultation. Some counties even set up project bases and organizations for of helping the poor.

The prefecture laid down the 'Standardization Management Means of Helping-the-Poor Projects in Jinggang Mountains Area', and established the system of target management responsibility. Each county (or city) made a series of policies and rules advantageous to the development of S&T, and arouse the enthusiasm of S&T persons. In the subsequent years, we amplified the organizations in villages guiding farmers to combine technical management with technical service, and perfect the numbers of economic entities serving the local key industries. The economic entities such as the small tree farm in Jinggangshan City, silkworm and mulberry

trade industry, agriculture companies, the head company of kumquat development and small-sized orchards in Shuichuan, Yongxin and Ningang are all in the pattern of 'company + farm households, enterprise + farm households and factory + farm households'. This brought about better effect in helping the poor.

As above, the work of helping the poor by S&T in Jinggang Mountains Area markedly promoted the economic development. The achievement is inspiring, but those awaiting help are still many. In 1995, we'll put each work of helping the poor into effect in a down-to-earth manner according to the 'Plan on Tackling Difficult Problems of Helping the Poor' by the State Council, and make the necessary efforts to promote the work in Jinggang Mountains Area on a new scale.

POVERTY ALLEVIATION THROUGH TECHNOLOGY CAPACITY-BUILDING

COUNTRY PAPER, INDIA

INTRODUCTION

India is one of the oldest civilizations in the world, kaleidoscopic in variety and rich in cultural heritage. It has achieved a multi-faceted socio-economic progress in the 49 years past its independence. India became self-sufficient in the year 1985 in agricultural production and is now the tenth most industrialized country in the world.

Nearly three-fourth of India's population, i.e. 74.3 per cent, still lives in villages and therefore, realization of the dream of desired socio-economic development of India depends upon the development of its villages.

Agriculture alone cannot sustain a big economy like India. Industrial development is essential to ensure the supply of goods and services required to improve the quality of life and provide opportunities for employment. However, industrialization requires heavy capital investments. The industrialization of the entire country, i.e. the entire rural India, is still an object difficult to achieve, and therefore, decentralization of the economy is a natural consequence. There is a need for production by the masses, rather than mass production. Such production can only be realized by small-scale and cottage industries in villages.

India is famous for its traditional handicrafts. Muslin, handmade paper, pottery, coir and other fibre, carpet weaving, bamboo and cane work, biogas from animal waste, gold ornaments, leather products etc. are in demand all over the world. The handicraft sector is a major provider of employment in the villages, and agriculture and village industries are the mainstay of the villages of India. From ancient times to the beginning of the British era these two provided the villagers with their staple food and other consumer needs. But these traditional crafts started dying out under foreign rule. At the time of independence, India was totally dependent on the import of manufactured goods. However, after independence industrialization in India progressed from basic consumer goods to space technology. Both agriculture and industry made good progress. However, the rate of increase in employment is very slow in large and medium industries.

Prior to independence, the Indian economy consisted of self-sustaining villages. The village craftsman was one of the important members of the community. The needs of the villages were simple and could be met within itself. The prosperity of village industries depended upon the prosperity of agriculture. The technique of production was simple and labour intensive in character. The village industries in those days employed local skill, local labour and local

resources to meet local demands. However, with the advent of British imperialism, the market was flooded with machine made goods, and with the introduction of large-scale production in the economy, the village industries started declining gradually.

Mahatma Gandhi—the Father of the Nation realized the significance of village industries for the Indian economy and included them in his Constructive Programme. With the attainment of independence in 1947, the country embarked upon a developmental programme by initiating the planning processes. The directive principles of the State policy in the Indian Constitution specifically mentions the promotion of cottage industries in the rural areas. The Government of India, therefore, formulated various organizations at the apex level such as the Khadi and Village Industries Commission, Handicrafts Board, Handloom Board, Coir Board, Small-Scale Development Organization and others for the development of decentralized industries. These organizations were charged with the responsibility of the development of appropriate technology suitable to the sector in addition to the creation of employment and production. In the first Five Year Plan, the development of these industries was treated on a priority basis as conjunct to the development of agriculture. However, in the second Five Year Plan, an independent position was carved out for the development of decentralized industrial sector. Substantial achievements have been made in the decentralized industrial sector in the seven Five Year Plans after independence.

VILLAGE AND SMALL INDUSTRIES IN THE EIGHTH PLAN (1992–7)

Explaining its approach and strategy for the development of village and small industries, the Eighth Plan states:

> One of the areas of priority of the Eighth Plan is generation of adequate employment to achieve near full employment level by the turn of this century. Several activities pertaining to this sector, like processing of agricultural produce in rural areas, sericulture and allied activities, have been identified as critical goals in priority sectors. It is possible to dovetail programmes of khadi, village industries, handloom, sericulture and handicrafts to integrated local area development programmes for selected villages for poverty alleviation through increase in employment. It is also envisaged that entry into the service, which is expected to play a major role in generating employment during the Eighth Plan, and the 'informal' sector will be made free of innumerable rules, regulations and bureaucratic controls. Further, research and innovation in the tools and techniques of traditional occupations, including those of rural artisans, will be encouraged and their extensive adaptation will be induced.

The Eighth Plan has allocated $ 1 810 million, i.e. 1.5 per cent of the total public sector outlay for the development of Village and Small Industries (VSI). Indicative targets of production, employment and exports are given in Table 1. It may be noted that the major contribution in the VSI sector is from the modern small-scale industry which is targeted to achieve 86 per cent of the total production in value terms. Among the traditional industries, handicraft production is targeted for $ 8 462.85 million by 1996–7, i.e. 10 per cent of the total output. Handloom cloth is losing in importance to powerloom cloth. Whereas powerloom cloth is targeted to reach $ 568.71 million by 1996–7, handloom cloth will touch only $ 1 625.71 million. During the Eighth Plan, employment in the VSI is likely to expand from 44.3 million in 1991–3 to 55.3 million in 1996–7, an increase of 11 million. Major contribution to additional employment of the order of 7.6 million is likely to come from three sub-sectors: (a) Handicrafts: 2.94 million

(b) Modern Small Industry: 2.45 million and (c) Powerloom cloth: 2.2 million. Besides, three other sub-sectors, viz village industries handloom cloth, and sericulture (raw silk) will generate employment for 3.2 million persons, each contributing employment for 1.0. to 1.1 millions persons. It may be noted that with the growing importance of the powerloom cloth, khadi (handspun and handwoven) cloth is losing its importance rapidly and the additional employment generated in khadi cloth will be for only 0.19 million persons. On the export front, two major contributors of additional exports are modern small industries ($ 2 154.85 million) and handicraft ($ 5 342.85 million). The Eighth Plan also speaks very candidly about the likely impact of the New Economic Policy (1991) on small scale industries. Main features of the policy are as follows:

Table 1: The General Economic Statistics in India in the Small and Village Industries

Industry	Unit	Production		Employment MN Persons		Export S MNS	
		1991–2	1996–7	1991–2	1996–7	1991–2	1996–7
Modern Small Scale Industry							
SSI	$ mns	45 714	66 696	12.6	15.0	3 617	5 771
Powerloom	mn mts	11 036	15 280	5.3	7.5	—	—
Traditional Industries							
Khadi cloth	mn mts	114	160	1 046	1.65	—	—
	$ mns	93.80	125.70	—	—	—	—
Village Industries	$ mns	61.42	107.42	3.5	4.6	1.15	5.71
Handloom cloth	mn mts	5 000	7 000	10.6	11.7	450	1 000
	$ mns	1 161	1 626	—	—	—	—
Silk raw	tonnes	13 535	21 400	5.46	6.5	6 000	10 000
	$ mns	285	454	—	—	—	—
Handicraft	$ mns	3 788.50	8 463	4.83	7.77	92 150	279 150
Coir Fibre	mn tonnes	0.22	0.2	0.55	0.58	660	1 000
	$ mns	48	60.50	—	—	—	—
Total (VSI)	$ mns	51 058.70	77 422	44.3	55.30	6 251.15	13 752.71

Note: One US Dollar is equal to Rupees 34.50 as on 1st June 1996.

The Small-Scale Industries (SSI) sector has emerged as a dynamic and vibrant sector of the economy during the 1980s. At the end of the Seventh Plan period, it accounted for nearly 35 per cent of the gross value of output in the manufacturing sector and for over 40 per cent of the total export from the country. It also provided employment opportunities to around 12 million people.

The primary objective of the small scale industrial policy during the 90s would be to impart more vitality and growth impetus to the sector to enable it to contribute its might fully to the economy, particularly in terms of the growth of output, employment and exports. It underlines the fact that credit continues to be crucial for the establishment and expansion of small industries. There is no doubt that credit to the SSI sector has increased to $ 4 900.28 million as on 22 March 1991, which is an increase of 153 per cent. This indicates a growth rate of 16.7 per cent per annum. But if adjustment is made for the money inflation then the growth of credit (at 1984–5 prices) works out to be only 8.8 per cent per annum. This is insufficient for a rapidly expanding sector like the small industries.

Handicrafts is a very promising area in small industries. Handicraft items, which blend utility with beauty, cater to the needs of the elite as well as other classes of the population. They are important not only from the point of view of employment but possess a high export potential. The value of output in the handicrafts sub sector increased from $ 1 000 million to $ 2 019.14 million in 1989–90, signifying a real growth rate of 15.1 per cent per annum. From the point of view of generating employment and poverty elevation, the scope of VSI is much greater than that of the organized private sector. It may be noted here that the total employment available in the organized private sector is of the order of 7.5 million persons in all establishments employing 10 or more persons whereas the VSI sector provides additional employment to more than 11 million persons.

To enhance the production of the Village and Small Industries (VSI) sector, it is very necessary to upgrade the technology and quality of goods produced by them, so that they can compete with the organized sector in the large and medium segments. A number of measures have been initiated by the Government of India to make this possibile and will be discussed later in this paper.

At the same time, a number of measures have been taken by the Government of India regarding the improvement of the environment of the SSI sector and the removal of some of the obstacles which hinder its growth. These include ensuring payment to small-scale units and the formulation of a scheme to train unemployed non-technical graduates so as to augment the availability of managers at affordable rates for the SSI sector.

COMPARATIVE STRATEGIC PLANNING IN THE DEVELOPMENT OF INFORMAL AND FORMAL SECTORS

The industrialization of a country of India's size can become complete, only if it penetrates into the remote corners of the country. Large enterprises are mostly concentrated in metropolitan cities. The small towns and the country-side, in order to benefit from modern industrialization, must encourage small enterprises. It is quite possible to select a group of villages and start small enterprises to cater to the needs of the small area from the local centre. To achieve *this cluster approach in the VSI sector, the rural industrial areas in the organized sector have been tried out and this method has met with a limited degree of success.*

Decentralization of industrial enterprises also helps to tap local resources such as raw-materials, idle saving, and talents to improve the standards of living in backward regions. Decentralization also helps to solve the problems of congestion in the few industrial towns by enlarging the area of employment.

The small-scale sector has progressed well, and many of the sophisticated and precision products like electronic control system, micro-waves components, electronic equipment, TV sets etc. are manufactured by this sector. India has been following a policy of reservation of items for exclusive development in the small-scale sector. The capacity utilization in the small sector as a whole was of the order of 53 per cent. However, for any country it would be suicidal to encourage inefficient small enterprise, in the long run.

Inducing industries to move to rural areas, are likely to be advantagous in the following manner.

1. Funds will move to rural area, through industrial service and business concept.
2. Development of rural entrepreneurship will be possible.
3. Better communication and information sharing will become a reality.
4. Development of appropriate technology will take place.
5. Value addition of raw-material will be beneficial.
6. Less pressure on urban areas and facilities will be a positive change.
7. Outward flow of people from urban areas to rural areas will take place.

The problems of rural employment both for the educated and the uneducated can be tackled only by rural industrialization. Traditionally, rural labour was not considered to be fit to be absorbed in industrial works. However, with training opportunities and motivation, good skilled workers can come from the rural areas as well.

The Indian experience has proved that the unorganized sector, i.e. the decentralized sector, is the only logical solution for solving the rural unemployment problems. Though Indian stands along with the frontliners in its technological improvement, our experience shows that we can not look upon the organized manufacturing sector for employment generation on a mass scale. At present about only 10 per cent of our work force is accommodated by the organized industrial sector. This pin-points the importance of the informal sector.

INDIA'S NEW MARKET REFORMS

The market reforms introduced in 1991 consist largely of removing controls on the industrial sector, such as the removal of industrial licensing, decontrol of prices, privatization, deregulation and the lowering of tariff barriers. These reforms by the government have borne fruit, and there has been an increase in the growth rate of production, and of industrial output. While the organized sector has benefited from this, the unorganized sector has suffered due to increased competition from the Multi National Companies (MNCs) and the large industries.

RURAL INDUSTRIALIZATION NEEDS MORE SUPPORT

Unemployment with poverty and its consequences has been India's problem for centuries. Even though the traditional artisans in the country flourished well prior to British entry their skills were lost and they became unemployed the moment English started taking away raw materials and bringing finished goods to India for sale after processing them in England. As a result after independence in 1947, there were millions of unemployed persons in the country. As the population increased the number of unemployed increased too, in the same proportion. In addition, as agricultural operations became more mechanized, a greater number of persons became idle, thereby adding to the number of the unemployed. To add to the problem, the unemployed persons, not knowing what to do, began to shift to cities in search of a livelihood. As a result, cities have grown unhealthy and large slums threaten the lives of its population.

Even though some employment was provided to the city people by the introduction of large-scale industries after independence, the numbers absorbed in the factories were negligible when compared to unemployed persons being turned out every year. Added to this was the cost of having to spend large amounts in the from of social costs to provide civic amenities to the large masses migrating to the cities. Within the resources available the capacity to absorb the ever increasing labour force was limited. It may be interesting to know that our rural labour force in the age group of 15–59 is expected to reach a staggering level of 264.33 million by the end of AD 2000 as can be seen from the following Table 2.

Table 2: Labour Force Projection (millions)

Year	Rural	Urban	Total
1980	186.26	51.42	237.68
1985	206.79	63.02	269.81
1990	228.61	77.47	306.08
2000	264.33	115.52	379.85

Source: Seventh Plan Document Planning, Commission.

As already indicated above much larger numbers of labourers were engaged in agricultural operations than were needed because of large-scale unemployment in the countryside. Unless a supplementary source of income was provided to these masses, this kind of enforced unemployment would remain in the countryside without in any way improving the economic conditions of these people. The rural industries which by and large depend upon locally available resources of raw materials useful for the manufacture of goods of daily needs of the people are mostly concentrated in the rural areas. This would in other words mean solving the problem of unemployment in the rural areas, through a positive choice of the promotion and development of the rural areas by encouraging labour intensive activities.

With the growth of industries not only sales but also most of the consumer goods began being produced in the cities on a large scale, thereby depriving the rural population who were mostly employed in earning their livelihood by participating in the production of these articles. Secondly, the villages where the raw materials are abundantly available are reduced to acting as the suppliers of raw materials which are taken to the cities and processed for sales again in the village. The rural masses who do not have sufficient avenues of employment, apart from some seasonal agricultural work, do not have the means of creating wealth in the villages. Consequently, those who have not been absorbed in the agricultural operations, have to migrate to the cities. Industries in the cities might not be in a position to provide employment to all the migrants from the rural areas. The only solution to this would be providing employment opportunities to the villages in their own villagers. This will have the following advantages.

1. Providing work to the villagers near their homes, will avoid migration to the cities.

2. Since migration of rural population to the cities will be arrested, there will be no slums in the cities and consequently the social costs to be borne by the government will also be reduced accordingly.

3. By establishing cottage and other village industries in the villages the raw material which are locally available will be utilized for producing consumers goods required by the local

people. Also, the local population will be in a position to purchase these as they will have the money because of their participation in the activities.

4. When the cities are overcrowded with a huge population migrating from the villages to the cities, corruption, crime and disease will spread which can be easily avoided if people in the villages can be provided with employment at their own places.

5. The implements used for the village or cottage industries will be simple and they can be easily prepared locally and a lot of investment will not be required for the development of rural industries.

6. The rural people will be self-employed and self-reliant.

ROLE OF TECHNOLOGICAL ADVANCEMENT IN POVERTY ALLEVIATION

Technology plays a very important role in the poverty alleviation programmes. It not only helps in the improvement of production techniques, but results in the reduction of human drudgery as well. However, before its adoption it is necessary to know what type of technology is actually needed. Whether it is for mass production or for the production by the masses. In fact in a country like India, where human power is available in abundance, the need of technology for a decentralized economic order should essentially aim at production by masses and not mass production. A technology so adopted should be more productive than the indigenous one but should be immensely cheaper than the sophisticated high capital intensive technology of modern industry. The importance of science and technology for the decentralized sector and for the production by masses has been emphasized very well in the technology policy statement of January 1983, which reads as

> The application of Science and Technology for the improvement of the standards of living of those engaged in traditional activities will be promoted, particularly household technologies. Technologies relevant to the cottage and small industries sector will be upgraded. In the decentralized sector, labour must be diversified and all steps taken to reduce drudgery. In all sectors the potential impact on employment will be an important criterion in the choice of technology.

Remarkable achievements have been made over the years in India to upgrade the level of technology suitable for the decentralized sector keeping in view the following parameters.

1. Technology should reduce human drudgery.

2. Technology should result in an increase in the earning power of the workers.

3. Technology should promote the production of quality goods in comparison with the products of the other sector.

4. Technology should enable the use of locally available raw materials to avoid migration.

5. Technology should be able to attend to the existing elements of skills and personal interests of artisans, and not make him a slave of the machine, and

6. The ultimate result should be an increase in employment potential either in the primary or auxiliary incidental activity and efficient utilization of locally available raw materials.

In India the following are the leading Research and Development organizations, involved in the specialized field of technology upgradation:

1. Council of Scientific and Industrial Research (CSIR) laboratories.
2. Department of Non-conventional Energy Resources.
3. Indian Institutes of Technology.
4. Rural Engineering College.
5. National Small Industries Corporation.
6. National Institute of Small Industries Extension Training (NISIET).
7. Community Polytechnics.
8. Council for Advancement of People Action and Rural Technology (CAPART).
9. State Councils for Science and Technology.
10. Textile Industries Research Associations.

Apart from the above, a number of voluntary organizations are also engaged in the improvement of a technology suitable for the informal sector. Here it may be mentioned that research is a continuous process. Indigenous efforts may not be sufficient in this regard. An exchange of technology among the developing countries is essential so that they can benefit from the experience of the each other. An exchange of scientists and researchers is also necessary so that they can learn from the experience of their counterparts in other developing countries.

While talking about the generation of new technology, some other factors, viz. extension, training, economic incentives, reliable servicing facilities and technical back-up in the initial period should also be kept in view. The readiness of the artisans to adopt a new technology will depend in the ultimate analysis on their perception of the impact it is likely to have on their life style. In other words, he must perceive that his products will become increasingly saleable. The new technology should be seen to be capable of producing marketable goods. Research must therefore, pay attention not only to the production process but also to the finishing and packaging quality and other marketing aspects of the products.

INDIAN EXPERIENCE

Cobblers, potters, blacksmiths, carpenters, etc. constitute a large proportion of artisans engaged in traditional crafts. Some estimates indicate that average per capita income of 80 per cent of the world population is only 6 per cent and of that of the remaining, is 20 per cent. The above statistics are alarming and economic disparities have caused tremendous stress on environment

and ecology. Every essential item of a life support system, i.e. energy, water, land, and forest is experiencing a lot of pressure due to the above reasons.

In the background of the above, the need for an input of technology upgradation in the trade practised by the traditional craftsman becomes very significant for poverty alleviation and in this regard some model experiences are narrated below under primary and auxiliary rural occupations.

(1) Khadi

Khadi is a textile made out of handspun yarn and is interwoven. For centuries, traditional village craftsmen, have been engaged in it as a part-time occupation. The production of khadi textile is around $ 125.70 million per annum. The traditional appliances used for spinning the yarn have been a single pot *charkha*, where a craftsman spins the yarn. Over a period of time, the spinning instrument has been improvised and a new metal *charkha*, which is hand driven has been developed. It has four spindles in it, enabling a spinner to spin simultaneously by four spindles at a time. The same has now been developed further into eight spindles, as a result of which the productivity and quality of the yarn has improved considerably enabling the craftsman engaged in spinning activities to earn considerably higher wages. Khadi is an eco-friendly and environment friendly textile, since no power or chemical process is involved in it, and is making a tremendous inroad even in the Western countries. Over 1.319 million village craftsmen are engaged in the production of this fabric.

(2) Leather Activity

As against a total estimated 1.5 million traditional leather craftsmen, 0.493 million traditional craftsmen have been exposed to modern tools, and technology. As a sequel to which gainful employment for poverty alleviation has been achieved for 0.493 million people. Inputs in the leather industry have been in the areas of foot-wear, leather, garments and utility items (wallets, belts, fancy items) using modern tools and appliances and accessories. On an average the earning of each cobbler engaged in the trade has increased to about 100 per cent. Few select model projects have been set up at Ambala, Haryana, Kalyani in West Bengal, and Athni in Karnataka. Centralized forward and backward linkages have been provided to the traditional leather craftsmen through an improved quality of raw material, modern tools, market oriented designs and even accessories to be used as an end product. This has resulted in a tremendous success in providing a full time gainful employment to about 0.314 million village craftsmen. Strict quality control, suitable marketing support, has been taken care of by the agencies running the model centre.

(3) Pottery Industry

The traditional potters are perhaps the second largest number of craftsmen in the countryside who shape, mould, and produce various kinds of terracotta, raw clay and white clay pottery items. Shaping the clay to its desired shape and size is an important function the potters undertake for earning their livelihood. Technology upgradation provided in the trade to replace the traditional potter's wheel by a ball-bearing potter's wheel has immensely increased the productivity and quality of products since the uniformity of speed and the inertia built into

the design of the wheel enables the potter to put in less human energy in running his wheel. The traditional potter's wheel, therefore, has been replaced and improved with ball-bearing fitted potter's wheel and has become a boon for traditional craftsmen.

Some items where speed control of the wheel is necessary in shaping the product, the power driven potter's wheel has been introduced in which the mechanism for speed control has been provided. The speed control, therefore has been an important instrument for sophisticated potters engaged in value-added white clay and clay product items. Due to the introduction of upgraded technology and instruments described above gainful employment of 0.513 million village craftsmen has taken place.

(4) Village Oil Industry (Edible Oil)

Artisans engaged in the trade of edible oil are known as Telis. The traditional instrument used by the Telis which is also a caste name, was a mortar (fatcher) driven by bullocks. A counter weight and a beam, was used for crushing oil seeds.

A large number of traditional village craftsmen who are engaged in this trade cater to the needs of edible oil requirements of the village population. The technology improvements in these implements have been gradual; bullock power has been replaced by electric motor resulting in higher productivity and a reduction of labour input. Initially the implement was tried by putting an overhead mechanism, which was further improvised by converting the device to a counter-shafted portable mechanism, making the unit compact and sturdy. Productivity has increased four times as against the traditional *kolhu* which was earlier driven by bullocks. The new improved implement has been able to create gainful employment for 0.088 million village craftsmen.

(5) Processing of Cereals and Pulses

Cereals and pulses are major agriculture products and are consumed by most Indians. Some modern implements and devices, which have been introduced are described below.

(i) *Under Runner Chakki (Wheel)*

Dehusking pulses with modern equipment is a very costly proposition and the village craftsman individually cannot afford to have this kind of machinery and implement. To enable the village craftsmen to have their raw material processed at the village level a under-running *chakki* which is manually operated has been introduced. In this, the upper disc rotates and the bottom disk makes the pulses dehusk with about 80 per cent efficiency and is a common implement for the village craftsmen. Being a low cost appliance, it provides gainful employment at a low cost.

(ii) *Ground-nut decorticator*

Groundnut is one of the major oil seeds from which edible oil is extracted. One of the edible oil reprocessing activity consists of decorticating the groundnuts in a power operated mechanical device. The capacity and cost of the implement is very high. In order to make the village craftsman have an intermediate technology, a hand-operated low-cost groundnut decorticator has been developed and is used in edible oil crushing. Groundnut is also eaten by the people

in its raw form by frying it, cooking it, etc. and hence such a decorticator is a very handy implement for gainful employment.

(iii) *Papad making machine*

Papads are a popular Indian snack, which is a semi-processed mixer of various pulses, spices, etc. rolled out and usually eaten by roasting, or frying. A large number of village craftsmen are engaged in making these *papad* and manually, which is a process where the various mix of pulses are ground, spices are mixed into it and dough is made manually. They are then rolled into a round shape, which are paper thin and are of 5 inches to 6 inches in diameter and are sold in packets of 50 to 100 grams. Since the entire operation is done manually, productivity is low. In order to enhance the productivity of the village craftsmen, a hand-operated *papad*-making machine has been developed and its productivity has increased considerably (at least five times), making the village craftsmen earn a better wage.

(6) Handmade Paper

For centuries, traditional craftsmen known as *kagjis* have been engaged in the manufacture of various types of handmade paper. There are about 0.17 million traditional craftsmen engaged in this trade, located in various parts of the country. After the trade was identified as a 'village industry', the process of manufacturing handmade paper was improved by designing a suitable beater for pulp-making, vats, digesting system, and semi-automatic lifting devices, facilitating the production of handmade paper, like drawing paper, greeting card paper, etc. The basic raw material of production for handmade paper is waste paper, rags and agricultural wastes, etc. The Indian government has been encouraging the use of handmade paper articles in its offices as stationary items like file covers, writing pads, etc.

In order to give a new impetus to the industry and make it economically viable, cylinder mould vat units have been introduced. With the assistance of the UNDP, a project has been started at Sanganer in Rajasthan, where facilities for making a special type of handmade paper for industrial application, stationary items and fancy items have been made. The knowhow and the testing facilities created there are disseminated to handmade paper manufacturing units all over the country.

Traditional craftsmen engaged in handmade paper activities have now got gainful employment. Diversification of the product has also helped the industry to explore foreign markets, where handmade paper is making new inroads as a eco-friendly product. Thus so far 0.016 million village craftsmen have been covered under the industry and plans for a wider coverage of the craftsmen are underway.

The industries indicated above have used some of the upgraded technologies, which has resulted in achieving considerable poverty alleviation of the village craftsmen.

(7) Non Conventional Energy Programme

More that 70 per cent of the Indian population live in villages and Indian economy is largely dependent upon the agricultural sector which not only provides employment to a large number

of people but also food for the teeming population of the country. Fertilizer as well as conventional fuels have always been scarce in the rural sector necessitating a large-scale import of chemical fertilizers and also the devastation of forest wealth for fire wood spelling degradation of ecological and environmental balance. In this respect biogas programme was found to be very useful as it provided fuel for the large household sector and organic fertilizer benefits as well.

The Khadi V. I. Commission (KVIC) is the pioneer organization in biogas programme in India. Realizing the varied benefits of the programme, the KVIC started its implementation in the year 1961–2. A floating metallic drum type biogas plant was adopted. The design had the simplicity of installation, maintenance and also efficiency in its performance to make it a success. Learning from Chinese experience, low cost fixed dome biogas plants have been adopted in the country to spread the benefits of the biogas plant to the economically weaker sections of the society.

It is estimated by the Government of India that even on a conservative basis potentiality of 12 million biogas plants exist in the country. As against this so far only 2.2 million biogas plants have been installed thereby achieving a little over 18 per cent of the potential. So far KVIC has installed over 400 000 biogas plants and is presently the leading agency in the country installing around 40–50 thousand biogas plants per annum.

The plants installed by the KVIC have contributed to

1. Employment — 28 million man days.
2. Production — 1.19 million tonnes of organic manure annully.
3. Savings — 1.22 million tonnes of fire wood annually.

Besides the above direct benefits, the NCE programme has provided indirect benefits like a cleaner environment and the halting of deforestation thereby improving the ecological balance. Rural sanitation has been greatly improved with the linkage of toilets with the biogas plant, which in turn has reduced the drudgery of the womenfolk. As such the biogas plant has been playing a very important role in the rural upliftment in India. KVIC for the first time in India, has decided to extend the status of village industries to NCE programme to make it self-sustainable in course of time.

RECOMMENDATIONS FOR CONSIDERATIONS

1. Close coordination and exchange of technology among the developing countries.
2. Lesser dependence on conventional energy sources and more on utilization of non-conventional energy resource such as bio-gas, solar energy etc.
3. Additional budgetary support for science and technology.
4. Optimum utilization of local raw material, manpower and other infrastructural facilities.

5. Economic incentives, reliable servicing facilities and technical back-up in the initial period.

6. Extra attention not only to the production process but also to the finishing, packaging, quality control and other market promotional support for the products.

7. Diversification of the products, as per the taste and preference of consumers.

8. Exemption from levies, local taxes such as sales tax etc. for village and small industries sector. Purchase and price preference wherever government purchases are involved.

9. Technology developed in the laboratories and universities should be taken to the field by extensive use of extention methods and then commercialized.

POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

OVERVIEW OF THE CURRENT SITUATION IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

Lao People's Democratic Republic is a relatively small country with a land area of 236 800 square kilometers, stretching more than 1 700 kilometers from north to south. It has an eastern border with Vietnam a western one with Thailand, a southern one with the Kingdom of Kampuchea and a northern one with China and Mynmar. Although the country is landlocked and has no direct access to the sea, it has an abundance of rivers including a 1 500 km stretch of the Mekong River.

Lao People's Democratic Republic is now entering into an initial stage of development and is one of the least developed countries. People's livelihood and the national economy are still badly dependent on nature and the exploitation of rich resources for survival in the new market economy.

The government finds it necessary, to discover new options, instead of continuing to exploit the forest and natural resources, as these are detrimental for the environment, and the long term development of the country. Therefore, it is timely and vitally important, to promote science and technology, to improve and upgrade, the existing human resource technical capabilities, in order to build a new infrastructure, for social and economic development.

The total population of Lao People's Democratic Republic was estimated at 4.5 million by the end of 1995, of which 50.6 per cent were female and 49.4 per cent male, with an average density of 19 persons per sq km. However, the population is currently growing at about 2.6 per cent per year, which is high compared to the region.

In general, there are three main groups of inhabitants:

1. Lao Lum or Lowland Lao, who live mostly in cities or flat plains and adjacent lowland areas, comprising about 60 per cent of the total population.

2. Lao Theung or Midland Lao, who live in the highlands, and upstream river lands, comprising about 25 per cent of the population.

3. Lao Sung or Upland Lao, composed mainly of Hmong and Yao hill tribes, living in the mountainous areas, making their living by shifting cultivation. This ethnic group forms about 15 per cent of the total population.

Main Causes of Poverty

The poverty situation in Lao People's Democratic Republic has several dimensions pertaining to location, ethnicity, and the seasons.

Firstly, the degree of integration into the market economy is determined by location. There is a marked difference between the mountainous north and the southern plains where access is easier and infrastructure relatively better.

Secondly, the ethnic minorities or the upland dewellers constitute about 45 per cent of the population and have problems of access to markets, and public services such as health and education.

Thirdly, most of the farmers are compounded by dependence on weather conditions for their livelihoods and food security.

The poor and disadvantaged groups in Lao People's Democratic Republic can be roughly identified as follows:

Rural communities of ethnic minorities especially those living in the mountainous areas.

Disadvantaged rural women.

Those displaced by the New Economic Mechanism (NEM) and without support.

The elderly and the handicapped.

The unemployed and the returned refugees.

The major constraints and problems faced by these poor and disadvantaged groups, includes the following:

1. Lack of education and training in science and technology.
2. Poor access to market and opportunities for modernization.
3. Lack of technical skills, basic management and business skills.
4. Lack of ownership in the agriculture land.
5. Lack of income and credit facilities.

This can be considered as the root cause of the problem and unless this is remedied, the gap between the rich and the poor will widen, and disparities in Laos, will be further deepened.

CURRENT SITUATION OF THE SMIs DEVELOPMENT IN LAO PEOPLE'S DEMOCRATIC REPUBLIC AND THEIR IMPACT ON POVERTY ALLEVIATION

Introduction of science and technology, and the creation of employment opportunities through small-scale industries, is one of the most effective means of combating poverty in Lao People's Democratic Republic, where 85 per cent of the population derive their livelihood from

agriculture. The subsistence economy is small. The production and export base also is thin. Production on a commercial scale for the domestic market and for export is confined to a few products and services.

Two of the major exports of the country is hydro-power and wood products, which are both heavily dependent on natural resources. Recently, garment making has emerged as an important labour intensive and export oriented manufacturing activity with substantial foreign investment.

The survey made in 1992, related to a number of established small-medium and large-scale industries in the various regions, shows geographically concentrated and dispersed industrial activity. (see Table 1)

Table 1: Small-medium and large-scale industry establishment by region, 1992

	Number of establishments			
	Small (< 10 employees)	Medium (10–29 employees)	Large (> 29 employees)	Total
Central Government	15	137	166	318
Vientiane Municipality	5 959	154	131	6 244
Vientiane Province	2 853	26	22	2 901
Subtotal	**8 827**	**317**	**319**	**9 463**
Khammouane	1 141	68	31	1 240
Savannakhet	2 911	110	21	3 042
Saravane	984	7	3	994
Sekong	89	7	2	98
Champassak	3 893	20	27	3 940
Attapen	350	—	—	350
Subtotal	**9 368**	**212**	**84**	**9 664**
Phongsali	385	5	—	390
Luangnamtha	229	4	2	235
Oudomxay	1 034	11	5	1 050
Bokeo	385	9	—	394
Luangprabang	2 190	7	11	2 208
Houaphanh	361	4	2	367
Xayaboury	584	15	10	609
Xiengkhouang	612	14	2	628
Borikhamxay	777	13	9	799
Subtotal	**6 557**	**82**	**41**	**6 680**
Total	**24 752**	**611**	**444**	**25 807**

Source: NSO Establishment Survey, 1992.

Concentrated Large-scale Industrial Activities

These include beer, soft drinks, tobacco and cigarettes, abattoir, sugar, animal feed, detergents leather tanning, shoe manufacture, printing and publishing, medicines, vaccines, ply wood, agricultural tools, metal products (roofing sheets) electric cable, electricity, industrial gases and motorcycle assembly.

Dispersed Medium-and Small-scale Industries Activities

These include rice mills, noodles, bakeries, ice manufacture, bottled drinking water, sauces,

coffee, alcohol, plastic goods, bricks, concrete construction materials, sawmills, parquet flooring, furniture, and handicrafts.

Impact of SMIs on Poverty Alleviation

The main reason for promoting small-scale enterprises in Lao People's Democratic Republic, is to provide the poor people with more opportunities for employment and income.

1. SMIs have a positive impact on the small domestic market, as it substitutes for large imports by large-scale business enterprises which are unrealistic.
2. SMIs provide local products, with appropriate scale and technology, which can be transported easily in the poorly developed internal transport system, in many parts of the country, particularly during the wet season.
3. SMIs provide apportunities for developing linkages between agro-forestry and trade.
4. SMIs are a decentralized establishment. The survey carried out in the Borlikhamxay province in 1990 identified 181 small-scale industrial establishment (see Table 2).

Table 2: Distribution of Enterprises in Bolikhamxay Province, 1990

		District number						
Enterprises	Province wide	1	2	3	4	5	6	Total number
Commerce	3	—	—	—	—	—		3
import-export	8	—	—	—	—	—		8
domestic commerce and retail		108	51	44	45	92	30	370
Restaurant	—	10	2	2	—	—	—	14
Pharmacy	—	50	14	21	17	46	7	155
Total Commerce	**11**	**168**	**67**	**67**	**62**	**138**	**37**	**550**
Rice mills	—	49	17	26	25	5	2	124
Small Sawmills	1	4	1	1	1	—	—	8
Sawmills	4	—	—	—	—	—	—	4
Furniture making	—	2	—	—	—	—	—	2
Alcohol production	—	11	2	1	2	1	1	18
Electricity production	1	—	—	—	—	—	—	1
Salt production	1	—	—	—	—	—	—	1
Vehicle repair	—	10	1	1	—	—	—	12
Noodle production	—	6	1	1	1	1	1	11
Total industry	7	82	22	30	29	7	4	181
Brick making	—	7	—	—	—	—	—	7
Pottery		2	—	—	—	2	—	
Taillors	—	2	—	—	—	—	—	2
Barbers	—	2	—	—	—	—	—	2
Concrete products	—	1	—	—	—	—	—	1
Total artisanal	—	14	—	—	—	—	—	14
Total commerce, **industry and artisanal**	18	264	89	97	91	145	41	745

Source: Ministry of Commerce, Bolikhamxay Province

TECHNOLOGICAL CAPABILITIES AS A MEANS OF PROMOTING COMPETITIVENESS OF SMIs

The major constraints and gaps existing in Lao People's Democratic Republic related to capabilities to promote SMIs:

1. Skilled human resources and financial shortages in the provinces to promote rural credits for farmers and small enterprises.

2. Rural electrification for rural development. Transmission lines from the various dams are being constructed to supply electricity as a part of the Ten Year Plan.

3. An Integrated Rural Development Approach, has been adopted by the government on the highest priority up to year 2000, under which it will receive promotional efforts for credit and other technical support, to be directed towards rural activities, with most positive return from small-scale industries.

4. Technical cooperation and external assistance has been given under the small business development programme supported by UNDP, the German agency for Technical Cooperation (GTZ) and the Asia Foundation. These programmes are addressing policy and institutional work, training requirements, entrepreneurial development and the promotion of cottage and handicraft industries.

NATIONAL POLICIES FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

Broad objectives of government policy for poverty alleviation have been developed and incorporated into the general social and economic development strategy such as:

Shift to market-oriented agriculture and forestry.

Expansion of subsistence agriculture to accommodate diversified commodity production.

Protection of individual farmers' property rights.

Increase in farm productivity with incentives and support services.

Reform taxes to provide production incentives.

Protection of forest and water resources and introduction of modern resource conservation and management techniques.

Rice will remain the dominant crop in the agricultural economy of the country in the foreseeable future. The government intends to remove price controls, and deregulate farm production. A new commercial law will benefit the agricultural sector, and a new property law protecting individual property rights is being planned.

The government plans to gradually turn large-scale irrigation projects over to farmer groups, and to provide management and technical training and support to them to increase operational

efficiency and farm profitability. Priority will be given to medium-and small-scale gravity and pump projects. The projection in the medium term is to privatize existing projects to make it fully operational and efficient, so as to forego public investment in new schemes.

REGIONAL COOPERATION FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

There have been many bilateral and multilateral co-operation in Lao People's Democratic Republic in the past years, particularly in the field of the promotion of science and technology. There was an urgent need to build human resource capabilities, so that the absorbtion capacity in technical and managerial aspects could be strengthened. The following are some of the programmes and projects that are an on-going process in the country

1. Small Enterprise Development Project-Cooperation with GTZ.

2. Agriculture Technological Promotion and Development Project-Cooperation with UNIDO.

3. Service Centre for Promotion of Industry and Handicrafts and many other Lao People's Democratic Republic's textile and handicraft promotion projects.

4. Many other projects related to the promotion of technological capabilities are in the pipe-line with the cooperation with UNDP and other countries.

RECOMMENDATIONS

Given the limited penetration of the New Economic Mechanism into the rural sector, and the fact that labour intensive investments outside the towns and cities, have so far been small and minimal, small and micro-enterprises will most likely be the only sources for off-farm employment in rural areas in the future. Their promotion thus assumes added relevance in countering extensive rural-urban migration. The following are some recommendations for the systematic action and implementation process of poverty alleviation through technological capacity-building.

1. The SMIs should be directed through the small cottage industries with aims to make people better able to earn a living in a sustainable way, helping them to become more self-sufficient, and providing them with jobs during off-farm seasons. Eco-tourism should be developed to further boost the demand for indigenous products of cottage industries.

2. The SMIs programmes should be designed to be sustainable, with long-term development plans, dealing with the conservation and protection of resources.

3. The SMIs programmes need to give more responsibility and resources to local groups and to women, who have responsibility for the promotion of their own sustainable livelihoods.

4. Local people need to have access to raw materials and enough credit to become more productive.

5. Rural people need information, training and network, to link the communities to share their development expertise and models.

6. There is an urgent need for family planning. Women and men need the same right to decide freely and responsibly on the number and spacing of their children.

7. At the macro level—there is need to formulate policies and regulation to create an enabling environment for SMIs development.

8. At the micro-level, support services should be provided through programmes and projects in order to ease the constraints that the SMIs are facing.

9. Establishing an adequate media and information system on SMIs and a National Steering Committee to coordinate the various SMIs development programmes and projects is necessary.

10. Set focal points for SMIs in the provinces to provide information and training and capacity-building in business opportunity identification is important.

11. Providing short training courses based on local skills, self-employment, basic managerial, skills and simple techniques of entrepreneurship development is urgent.

12. Providing credit and saving schemes through financial institutions for the SMIs is important.

13. The SMIs provide numerous employment opportunities at relatively low capital cost and facilitate equitable income distribution. But employment-intensive rural infrastructural development programme, which mobilize the unskilled workforce during the off-season, would be the most effective way of improving the rural infrastructure and living standards.

TECHNOLOGY AND POVERTY ALLEVIATION
AN EVALUATION OF MICRO-ENTERPRISES AND INFORMAL SECTOR IN NEPAL

INTRODUCTION

Nepal's is predominantly an agrarian economy. The population growth far outpaced the economic growth for almost two decades (1960–80). The stagnant growth rate created various social and economic anomalies in the country—dense population, threat to ecology, unemployment, and the rising gap between the rich and the poor. Poverty alleviation has, thus, become a priority since the First Five Year Plan of 1956.

Approximately 8 million Nepalese live in absolute poverty. The poor are overwhelmingly rural subsistence farmers. The agricultural land base is rapidly approaching saturation. Although there is an immense possibility of increasing agricultural productivity through improved irrigation and farming technology, the poor man-land ratio is obstructing viable economic units. Poverty is rooted basically in the insufficiency of resource base *vis-à-vis* excessive population. Its solution lies in productivity growth amalgamated with population control. For this, serious measures should be taken with urgency towards informal sector growth, productivity gains in low-input farming systems and increased labour absorption in off-farm sector.

Nepal's predominantly rural economy sustains a relatively even distribution of income. Nepal has a degree of income concentration somewhat more favourable to the poor than Sri Lanka, somewhat less so than, but comparable with, Sweden, and markedly more egalitarian than the distribution of income in Brazil (Annexure–I). These comparative data suggest that there is not much scope of improving the lot of the poor by a redistribution of income from the top 10 per cent to the bottom 40 per cent poorer people. Transferring 5 per cent of income from the richest 10 per cent to the bottom 40 per cent would increase the average incomes of the later group by less than 8 per cent which would produce no impact on the poverty level.

The sectoral share to GDP has changed for a few years. The share of agriculture in GDP has also declined but this change is accounted for mostly by the growing share of indirect taxation rather than growth in services. Hence, poverty is not a consequence of macroeconomic imbalances. The trade/GDP ratio is not favourable and development financing is mostly through foreign assistance. The modern sector management will take care of the pressing issues of macroeconomic rigidities. The issue of poverty should be viewed from social dynamics and the spatial variations of the country. The alleviation of poverty is therefore possible only if the key issues of poverty—population growth, agricultural output, and the creation of off-farm jobs—are addressed seriously.

This paper attempts to analyse how Nepal has moved forward to generate off-farm rural employment and small, micro and informal business. The effectiveness of technology to achieve these objectives is beyond doubt.

The majority of the poor are rural subsistence farmers. The urban poor are low wage empolyees with a large number of dependents. With these realities in mind, His Majesty's Government (HMG) placed emphasis on infrastructural investments. Recognizing that these would not create growth quickly enough the emphasis shifted (around the Fifth Plan) to raising aggregate income through production incentives and investments. Most recently the government has recognized the importance of social justice and started incorporating 'distribution' in its periodic plans.

The government, while formulating the Eighth Plan, realized the importance of job creation. The Eighth Plan emphasizes the need to generate employment, and the fact that some targeting is necessary, because general programmes tend not to reach the poor. A priority was given to rural industrial development with emphasis upon small, micro and informal sector development.

Industrial Policy, 1992

The government enacted the Industrial Policy, 1992, with two approaches. First, to move towards business-friendly economic environment in order to make a congenial climate for domestic and foreign-direct-investment. Second, to promote with every possible support facilities, the micro-and small-scale industries which would create employment and bring a shift in the economy from an agrarian one to one based on industry. Several new institutions were created to support the programme of micro-and small enterprises. Incentive packages were prepared to relocate industries in less developed areas. The institutions created by Industrial Policy 1992, are as follows:

Technology Transfer Centre (TTC): The TTC was created with the noble objective of counselling and providing technology services to the needy. Recognizing the investment as a factor of credit financing, management and entrepreneurial skill, market and access to technology, the crucial factor of building competitive strength had not been given due attention to in the past. The TTC fulfills its objective by surveying with the potential entrepreneurs the type of investment required. It provides services which match technology to needs to make the end products competitive and environment-friendly.

National Productivity Council (NPC): The NPC starting from its inception in 1994, is working towards the creation of an awareness for the enhancement of productivity. This institution has taken the human-technology hybrid approach as the instrument to build a competitive strength. The NPC has also emphasized training and human resource development.

Industrial Enterprises Development Centre (IEDC): The IEDC fulfills the singular need of a Centre of Excellence. It develops curricula for skill upgradation, entrepreneurship development and management training. It provides services through its trainers to other similar institutions.

Training for Rural Employment (TRE): The TRE aims to create almost five thousand businesses every year by identifying a potential trainee or investor and supporting the individual

with necessary skill development, entrepreneurship and management training. The TRE provides longitudinal one-step services of credit and technology as well.

Promotion of Small and Medium-Scale Enterprises (SMEs): Recognizing the correlation of micro-small and SMEs, and poverty alleviation, the Industrial Policy 1992, has brought a promotional package of SMEs. Some of the features are:

Exemption of scale, excise and income tax for cottage industries. Five years of income tax holiday for small-scale industries.

Two additional years of tax holiday for priority sector.

Additional tax exemptions in geographically classified areas.

Nominal duty on the import of technology.

Further incentives for reinvestment.

Free skill and entrepreneurship training.

Easy access to capital.

Technology counselling—free of charge.

The above mentioned promotional packages for the development of SMEs underlines the importance the government attaches to the task of poverty alleviation. The issue of poverty is directly related to off-farm jobs and off-farm job creation depends upon the creation of small business. Therefore, the nucleus of the solution lies in rural industrial development through SMEs.

SMALL-SCALE INDUSTRIES AND THEIR IMPACT ON POVERTY ALLEVIATION

The difficult topography, small size of the market, shy and small private sector and limited access to capital and management know-how push Nepal to adopt without reservations the policy to promote small-scale industries. Moreover, rampant poverty and massive unemployment can be overcome only with the sincere and concerted effort of industrial development in rural areas. The development of small-scale industries is directly related to poverty alleviation. The development of small-scale industries or the investment on a small scale depends upon a number of factors. In order to make small industries a viable and profitable unit, competitiveness should be prioritized. Therefore, the government should play a key role in providing sound policy support to ensure the safety and profitability of investment.

The following are the factors which determine the dynamics of small-scale industries at the micro and macro-level.

Micro Level

Entrepreneurship

The entrepreneur is a dynamic force for industrial development. He makes the innovation and implements the idea. It is very difficult to say who is an entrepreneur and especially who is

a good one. The percentage of independent entrepreneurs is small in most societies. Entrepreneurship is often considered to be the sixth sense and something that is very difficult to learn. Nevertheless, a few entrepreneurship development programmes do exist and it is certain that entrepreneurship develops best in a conducive environment.

Entrepreneurship also requires flexibility. This can be defined as the ability to shift promptly from one process or product configuration to another and to adjust quantities of output rapidly up or down over the short run.

The challenge for the government is to support entrepreneurship development by creating the right policy environment. Institutions which play an important role are technical schools and vocational training and management centres, financial institutions and technical assistance projects.

In Nepal, Entrepreneurship Development Programme (EDP) has been launched. Given the central role of technology and innovation, technology transfer centre and Industrial Enterprises Development Centre have been established.

Labour Market

A good functioning of the labour market is crucial for the promotion and development of small-scale industries. Education and wage level are two important variables, but the availability of the specialist, the willingness of workers to change jobs and location are also important factors. Given the importance of skills, HMG is providing skill training to almost 20 000 people in different training institutions. Improvement of the functioning of the labour market is also important. The overly politicized trade unions are hindering the productivity in most industries since 1992.

Women's Participation

Small-scale industries usually are labour intensive, widely spread and locally adjusted. Therefore, the employment in these industries is very high. Also there is an immense possibility of employing women.

The average employment of women in SMI is around 13 per cent of the total labour force. However, the number is increasing and there is a growing tendency, in recent years, to employ women.

The Regional Balance

The disparity in economic development between regions, belts and sectors heavily influence the performance of the overall economy. The rural-urban migration, the hill-terai migration and the tendency to cluster around big cities hinder the cluster concept of regional balance. The concept of core and periphery and the hinterland emanates out of disparity. The SMI has bridged the wide gap of such disparities. However, the incentives and promotional packages need to be restructured by incorporating disincentives for locating business in urban centres and incentives for establishing enterprises in geographically under privileged ones.

The Industrial Policy 1992, has addressed this painful issue of regional imbalance. However, the country has to move further to translate this effort to a meaningful process of development.

Macro Level

Policies for Achieving an Optimal System

Industrial production may be organized in alternative technological, institutional and spatial configurations. If an optimal production system were to exist, technological, institutional and spatial alternatives would need to be chosen very carefully. Ultimately, the market will decide, but government policies influence the decision of individual entrepreneurs.

The Industrial Policy 1992, has covered all the gamete of optimal production system. Straight forward outward-looking strategies, have been formulated for the modern sector and import-substitution strategies for small-scale industries, with an emphasis upon flexibility and competitiveness.

New Competition (Flexibility)

The new competition in SMI was organized to pursue continuous improvement in methods, products and processes. Such an enterprise seeks the competitive edge by superior product, design, organizational flexibility and technology.

TECHNOLOGY CAPABILITIES: MEANS OF PROMOTING COMPETITIVENESS

Technology is broadly defined as encompassing everything pertaining to the transformation of inputs into outputs. This definition includes three aspects which are worth describing (a) Technology includes the social organization of production and the labour process. (b) The knowledge embodied in hardware and software. People, institutionalized practices and procedures play a central role in transforming inputs (c) The way in which inputs are transformed into outputs, particularly by enterprises, is intimately influenced by external events, of which competition is the main factor.

Technological capabilities involve the following kinds of activities: (a) the search for available alternative technologies and the selection of the most appropriate one (b) the mastering of technology (c) the adaptation of technology in order to suit specific production conditions (d) further development of the technology as the result of minor innovation (e) the institutionalized search for more important innovations with the development of R&D facilities (f) the conducting of basic research.

The availability of a skilled and qualified labour force is regarded as a vital source for enhancing the technological capability of industries. Technology institutions could perform a crucial role in fostering radical innovation by developing local technology or adapting technology to local conditions. Therefore, technology transfer and support institutions play a key role in diffusing technology.

Most countries have taken to economic liberalism to increase economic efficiency and to maximize economic growth. These countries specialize in those commodities whose costs are comparatively low. The concept of labour has been modified to mean 'human capital' and cost has been redefined as 'opportunity cost'. More specifically, a country will export (import) those commodities which are intensive in the use of its abundant (scare) factor. This concept is more fluid, dynamic and comprehensive, the basis of which is 'competition' (within and outside).

The competitive strength of the developing countries lies in cheap labour and low establishment cost. The tendency of a country like ours is to attract investment in labour intensive industries without giving due consideration to technology. Most of the small-scale industries, therefore, are not efficient. Moreover, these industries are obsolete, environmentally unfriendly and resource inefficient. The successes of small-scale industries lie in continual adjustment to new technology and flexibility in structure for movement towards technology upgradation. A combination of trained labour and efficient technology achieves a dynamic comparative advantage in this area of stiff competition.

It is obvious that only those countries are developing which adopt technological innovations within their leading sectors. The success of the foreign firms lies in three factors. The first is the vertical integration of the various stages of business, primarily to reduce transaction costs. Firms have tried to bring all facets of the productive process, such as the source and transfer prices of raw materials and intermediate products under their control. The second is the production and exploitation of technical knowledge; because of increasing cost, a firm endeavours to appropriate the results of its R&D. The third is the opportunity to expand abroad made possible by improvements in communication and transportation.

Developing countries are caught between two pincers—import of high quality goods and cost ineffective low quality domestic products because of the non-buoyant small enterprises.

The problem of sow technological diffusion in developing countries like Nepal may be overcome by two processes. The first is to bring foreign direct investment (FDI) on a massive scale. The FDI will help to resolve capital, technology and management issue in one shot. The second is to provide policy support and incentives to use modern and clean technology and provide disincentives for using obsolete ones. The latter demands resources from the national exchequer. Therefore, most of the governments tend to follow the former approach, i.e. policy to invite FDI.

Quality and speed are the two basic elements of trade since the early 1990s. The focus of every country, therefore, has to be upon the quickest delivery of quality products at low cost. The growing awareness of environment suggests that the technology should not only be business-friendly but also environment friendly. The government should create institutions to facilitate the process of technological diffusion and provide congenial environment to adopt the new technology. The government also needs to be an 'entrepreneur' to understand and implement the policy needs of the time.

PROMOTION OF TECHNOLOGY

A major obstacle for a country like ours is that we simply cannot afford the R&D cost of technological innovations because of the high cost associated with it. However, a sound transfer policy could be made in order to bring appropriate technology to the country. Nepal has attempted to facilitate, support and promote the policy of technology transfer for a few years. Very recently, some new institutions have been functioning to fulfil the objective of Technology Transfer in the Country (TTC).

The TTC is a recent institution which is working towards creating a data base of matching technology to the areas of our competitive strength. This institution liaises with the Federation of Nepalese Chamber Commerce and Industry (FNCCI) and provides services for the adoption of technology. Institutions like Training for Rural Employment (TRE) and Vocational Training Centres (CTEVT) prepare a fertile ground for an easy transfer of technology by producing trained manpower. Research institutions like the Research Centre for Appropriate Technology (RECAST) and Royal Nepal Academy of Science and Technology (RONAST) emphasize the modification and development of technology. Very recently, the Ministry of Science and Technology (MST) has been established in order to co-ordinate scattered efforts, and enhance the in-house capability for technology transfer.

The Industrial Policy 1992, stresses technology transfer by a number of means: (a) normal duty for the import of new technology (b) free training services for labour (c) access to information developed by TTC. The foreign investment and technology policy has also been brought into account to emphasize the importance of technology transfer. Technology transfer is also viewed as foreign investment and is allowed to develop small-scale industry as well.

REGIONAL CO-OPERATION FOR TECHNOLOGICAL CAPACITY-BUILDING

In a least developed country like ours, only a few institutes dealing with technology exist and those are peripheral. This has limited the activity and also resulted in the development of technologies that are unsuitable or have become outdated by the time they are marketed. In this context, Technical Co-operation among Developing Countries (TCDC) could play a more prominent role, some of the larger countries having developed a whole range of suitable technologies. Multilateral institutions like ESCAP, UNIDO and UNCTAD are already intensively involved in stimulating TCDC, but technology flows are still predominantly North-South. Nepal is a member of South Asian Association for Regional Co-operation (SAARC). This developing countries' club aims to promote South-South co-operation; one of its important functions is to enhance technology flows within the region. Nepal is one of the founding members of the World Association of Small and Medium-scale Enterprises (WASME), the producers' association. This institution also has a component of technology transfer and development.

The most important component of poverty alleviation is, of course, job creation in the off-farm sector. This objective can be achieved only by developing and expanding small-scale industries. The SMEs need to be updated with new technology to maximize gains. Technology innovation and diffusion could be a common agenda of the developing countries. Regional

co-operation to foster this activity is a must, multilateral institutions like ESCAP can play a key role in enhancing such activities.

RECOMMENDATIONS

The subject of technology transfer is receiving fresh attention in developing countries. This is mainly due to the outstanding achievements of the private sector economies in Asia Pacific rim countries wherein technology transfer has generated a variety of new business undertakings. The industrial development policies of many countries tilted in favour of heavy as well as small-scale industries in the late 1980s. The forward and backward linkage effects brought forth the versatility of technology and the new demand for matching it. The developing countries, though late, have realized this fact and have initiated the process of adoption.

Poverty alleviation is the common development agenda. At least for some years (till graduation from the status) to come, developing countries could benefit from each others' experience to overcome the pressing issue of poverty. Some common initiatives are suggested. These are:

Emphasis on a sound policy for technology transfer.

Disincentives for environment unfriendly technologies.

Emphasis upon technical education.

Expansion of vocational training in tradeable trades.

Development of technology transfer centres.

Technology transfer should be viewed as 'equity' for foreign investors.

Emphasis on FDI.

Building inter firm co-operation.

Fostering regional co-operation.

The developing countries cannot perform all the prescribed suggestions by themselves. Therefore, the role of multilateral institution is vital for the success of these programmes.

ANNEXURE—I

Distribution of total household income in Nepal and selected countries

(Percentage of share of income)

Household Group	Nepat	Sri Lanka	Brazil	Sweden
Bottom 40%	18%	16%	07%	21%
Middle 50%	54%	49%	42%	51%
Top 10%	28%	35%	51%	28%

Source: Nepal Restra Bank.

ANNEXURE—II

Percentage of Population below Poverty Line

	Terai			Hills			All Nepal		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Poverty Line	29%	17%	28%	55%	13%	52%	42%	15%	41%

POVERTY ALLEVIATION AND TECHNOLOGICAL CAPACITY-BUILDING IN THE PHILIPPINES

THE ROLE OF A FINANCIAL INSTITUTION

Poverty Situation in the Philippines

Poverty in the Philippines has been largely a rural phenomenon. Data indicate that there are more poor people in the rural areas than in the urban. Only 28.8 per cent of the urban population which constitutes 42 per cent of the total Philippine population belongs to the urban poor sector as compared to 53.7 per cent of the entire rural population which belongs to the rural poor category.

Based on the set threshold income of P 450 000 (US $ 175) per month for a family of an average membership of six persons by the planning body of the country, about 20.3 million people or 3.4 million households are at the bottom of this income level, constituting about 30 per cent of the population. Of this, 2 million families or 63.1 per cent are engaged in crop farming, operating an average land size of 1.1 hectares. Only about 54 per cent of these farm households have full ownership of their farms. On the other hand, 718 000 households are engaged in artisanal fishing. Asset-wise they can fish only on waters not more than 3 kilometers from the shoreline. The primary types of fishing boats used are merely non-motorized bancas complemented mainly by hook and line. For 39 per cent of the fishing families the catch or harvest made is adequate for household consumption only.

More than half of the bottom 30 per cent of the population are likewise engaged in forestry, logging and hunting. For most of these families which constitute 98 per cent, the activity involves firewood gathering only, largely for home consumption (NEDA, 1992).

Aggravating the poverty situation in the rural areas are other factors responsible for the decrease in the available areas for farming such as environmental degradation and population pressure.

Rural poverty actually engenders urban poverty. Over the last twenty years, waves of migration from the rural areas to the urban have been unhampered, brought about by the perceived non-viability of agriculture as well as a mismatch of skill orientation of the potential workforce with the requirements of an agricultural endeavour. The exodus of young people towards the city leaves the farms unattended and agricultural productivity low.

The waves of migration to the urban areas led to valuable areas for agricultural purposes being used for other economic uses, mostly for residential locations. Intensified by the improvement in transport linkages, the influx of people to the cities, is responsible for the runaway growth of the informal sector which is predominantly comprised of low value-adding, marginal, services.

Poverty incidence declined by 4 percentage points from 1985 to 1988, and continued to slide from 1988 to 1994. A marked improvement of 35.7 per cent was realized from 39.9 per cent in 1991. In terms of magnitude, however, despite the lower poverty incidence, there were more poor households in 1994 than there were in 1988 or 1985 (NSO, FIES 1994). This is attributed to the high population growth of 2.4 per cent per annum.

Anti-Poverty Interventions of the Government through Technological Capability-Building

Poverty reduction is one of the major goals of the Medium Term Philippine Development Plan for 1986–92 and 1993–8. These plans recognize the importance of upgrading the quality of its human resources through skills and technological education. This would prepare them to participate in the economic activities beneficial to the country.

The government, as mapped out in the plans, emphasized the pursuit of research and development oriented not only towards increased productivity but towards the reduction of poverty as well. Since a vast majority of the small and resource-poor are farmers and fisherfolk who constitute the base of the agricultural production system, research should be explicitly related to the quantitative importance of a particular technology in an agrarian economy, i.e. the relative importance of a crop or its employment potential. The use of science and technology by the government will be geared towards the development and utilization of technologies that are likely to be adopted in agriculture and industry. These technologies which will be based on market demand for goods and commodities and on the availability of resource materials will enhance the growth of industries and their capacity to absorb manpower resources and thus spur economic activity. Priority will be given to technologies that are adoptable on a small-scale, and are labour-intensive, and at least neutral in their social impact.

The government launched the Science and Technology Agenda for National Development (STAND) in 1993, which spells out the areas which would be the focus of national scientific and technological efforts up to the year 2000. STAND has two major components: the priority list of products and services that would be the recipient of technology assistance, and its science and technology programmes. STAND emphasizes the development and utilization of superior technologies to a level of competitive advantage. Domestic production is expected to be upgraded for greater efficiency and better quality products. STAND is market-oriented and private sector-led.

The following specific strategies are adopted in addressing the scientific and technological requirements of STAND priority products and services:

1. Emphasis is given to the mastery and application of emerging technologies such as micro-electronics, laser, biotechnology, materials science and information technology to maintain creativity and cope with modern market forces.

2. Increased private sector participation in the identification, selection and utilization of technologies to improve productivity.

3. Networking with other government line departments such as the Department of Trade and Industry, Department of Agriculture, Department of Environment and Natural Resources, the academe, non-government organizations (NGOs) and other government and private institutions.

4. Manpower development. Science and technology manpower, the country's store of knowledge and skills necessary to meet present and future need will be increased and upgraded in coordination with the Department of Education, Culture and Sports.

5. Continuing a review of policy-related impediments to science and technology development like incentives and retention schemes for scientists and engineers, intellectual property rights and technology transfer mechanisms, shall be addressed. This will accelerate science and technology development.

6. Monitoring of global developments and technology advances relevant to the Philippines needs to keep abreast with rapid technological changes.

The selection of the products and services to be supported under STAND was based on criteria derived from the ones used by the Department of Agriculture, Department of Trade and Industry and the Department of Science and Technology. The following criteria evolved from consultations with the above mentioned departments and the private sector:

1. Market considerations. This means products and services should have high export performance, high export potential and world market demand, capability to sustain quality and supply, and self-sufficiency in the domestic market.

2. Technology factors. These refer to high value added, availability of and access to superior technology, extensive backward linkages, abundant, cheap raw materials and environmentally sound technologies.

3. Human resources. These mean the presence of highly skilled labour, presence of technical, support personnel, potential for employment generation, and enhancement of manpower skills development.

Thus, the products and services that would be the recipient of STAND's technological assistance are those necessary to sustain a productive population and provide an infrastructure for growth. Being still predominantly an agricultural country, and having a big chunk of its poverty-ridden population in the rural areas engaged in land-based economic activities, STAND's supported products and services are in the following: food products which include rice, corn, rootcrops, vegetables, sugarcane, cattle, swine (pork), poultry and fisheries (small pelagics, tilapia and milkfish); indigenous, cost-efficient housing materials; nutritional products, vaccines, medicinal plants, pharmaceutical chemicals and bio-medical devices; environmental rehabilitation particularly of uplands and agricultural lands, water management, protection, rehabilitation and enhancement of coastal environment, development of pollution monitoring devices, urban and industrial waste management; non-conventional sources of energy such as solar, wind biomass-agrowaste, urban waste and mini/micro-hydro; furniture made from rattan, bamboo, wood and metal; metal fabrication; marble; electronic products, such as semi-conductor, telecommunications, video or sound apparatus, electrical apparatus and appliances; garments and

textile; construction services; professional services; and ornamental horticulture products, such as cutflowers, foliage and other plant parts, live parts and dried ornamentals.

Alongside with this focus on technological upgrading is the promotion of small and medium enterprises (SMEs) which would mostly benefit from the technological thrust of the government. The enactment of the Magna Carta is the government's recognition of their potential for more employment generation and economic growth, and the ability to provide a self-sufficient industrial foundation for the country. An SME is defined as any business activity or enterprise engaged in industry, agribusiness and/or services, whether single proprietorship, cooperative, partnership or corporation whose total assets, inclusive of those arising from loans but exclusive of the land on which the particular business entity's office, plant and equipment are situated, range from a minimum of P 50 000 (US $ 1 925) to a maximum of P 200 million (US $ 770 000). In a generic sense, all enterprises with total assets of P 5 000 000 (US $ 192 000) and below are called small enterprises.

The SMEs comprise the major component of employment in the Philippines. They comprise the largest number of establishments in the manufacturing sector. According to the latest statistics provided by the Department of Trade and Industry, SMEs account for 99 per cent of the total manufacturing sector. Furthermore, each SME generates on an average an employment for 30 individuals.

The Manga Carta declares as a policy of the State to promote, support, strengthen and encourage the growth and development of SMEs in all productive sectors of the economy particularly rural/agri-based enterprises. Through the law, the government assures the establishment of a support structure and the creation and promotion of an environment conducive to the viability of these enterprises. These include the establishment of mechanisms, and the access and transfer of appropriate technology needed by SMEs. The promotion of micro, cottage, SMEs will be the centrepiece for achieving greater employment and industrial dispersal in the countryside. Government support programmes consisted of entrepreneurship development, research and development, financing and marketing and technical assistance including access to technology and market information.

The linkage between SMEs and large enterprises will be strengthened through the establishment of common facilities, service, and the promotion of subcontracting arrangements. Assistance will likewise be extended to ensure the supply of quality raw materials and thereby improve the marketability of SME products.

Infrastructure support that will facilitate the transfer of goods from production to market centres will be upgraded. This will improve market access, enhance interregional trade and expand the domestic market of SMEs.

Aside from the Department of Science and Technology which is the implementing agency of the government for its STAND programme there are other programmes of the government mandated to promote and transfer technologies particularly to assist the rural poor in their small-scale enterprises. These agencies are the Technology Education Skills Development Authority (TESDA) and the Technology Livelihood Resource Centre (TLRC).

Technology dissemination programmes include the publications of books, manuals pamphlets, monographs, agricultural magazines and the like. They also provide technology video tapes. They maintain a technobank library which houses more than 10 000 titles on technologies that can be turned into viable enterprises for practising or would-be entrepreneurs. They conduct their programmes through radios and televisions. They also have their in-house and institutional training programmes in business technology, as well as distance study programmes. To improve the reach of their technology dissemination programmes they promoted the establishment of technology centres in every province and municipality in partnership with the local government unit as well as with the NGOs.

The Department of Trade and Industry, through its Bureau for Small and Medium Enterprises Development, works for the promotion and technological capability-building of the SMEs through its various programmes. Among these are:

1. Training programmes assisted by the Overseas Economic Cooperation Fund (OECF) which are a series of management and entrepreneurial training programmes for SMEs for improving their efficiency/competitiveness and productivity.

2. Countryside Entrepreneurial Development Programme aims to develop entrepreneurs in the Philippine urban and semi-urban areas using an enterprise creation and entrepreneurship development model developed by the GTZ (German Agency for Technical Cooperation).

3. Enterprise Development Programme provides management and technical assistance on general aspects of small business management operations that enhance the management capabilities, business productivity and competitiveness. The programme has four components: entrepreneurial advisory services, in-plant intensive consultancy, backward linkage, big/small business linkages and productivity improvement programme.

4. Tulong sa Tao (Assistance to the People) Sub-Contracting Programme gives financial assistance to sub-contractors who wish to expand their subcontracting activities that will result in employment generation.

5. Japan External Trade Office (JETRO)-ASEAN Programme is a cooperation programme for disseminating appropriate technology for SMEs. Technical survey mission is dispatched to conduct research for the development of appropriate technology. On the basis of the findings of the survey missions, technical experts hold seminars and lecture meetings and provide technical counselling.

6. Entrepreneurship Packages and Information Materials Development refers to the development of information materials aimed at would-be entrepreneurs, enhancing their knowledge and skills in managing and developing an enterprise.

Recognizing the crucial role of women in development, the government enacted a special legislation, Republic Act 7882, which gives financial and technical assistance, to groups of women engaged in business enterprises.

Landbank: A Financial Institution for Rural Industries and Entrepreneurs

Aside from technological capability-building, SMEs are confronted by an equally important need: access to financing. Commercial banks are averse to lend to SMEs due to the risks inherent in their operations, particularly among those engaged in agribusiness. Because access to financing calls for preparedness to undertake market-oriented enterprises, assistance to SMEs, especially those emanating from the bottom poor of the population should come in a package that will address both capability-building and financing. Otherwise, the development loop will not be complete. Capital is a primary requirement to pilot-test the newly accessed technologies or pioneering industries, or proper high-risk groups, such as small farmers and fisherfolk, into economic production units of the country. These are actually the mandates of the Landbank.

Landbank is a government financial institution created on 8 August 1963, with the enactment of Republic Act No. 3844 otherwise known as the Agricultural Land Reform Code. At that time, Landbank was tasked simply with purchasing vast tracts of private lands and distributing them to small farmers. Because this was quite a limited operation and the Bank had to survive on its own, a Presidential Decree issued on 21 July 1973, revitalized Landbank's operations by giving it full banking powers of a universal bank enabling it to engage in commercial banking transactions such as deposit generation, trust operations, loan services, etc. Landbank's resources steadily grew and it is considered to be one of the biggest banks of the Philippines.

The success and growth of the Bank, despite a development mandate of providing financial assistance to the bottom poor, is made possible by its judicious and balanced banking operations. Despite the risks involved, Landbank remains the biggest provider of financial assistance to the countryside borrowers, consisting mainly of SMEs, predominantly involved in agribusiness. It also provides assistance to small groups of urban entrepreneurs. Being an experienced service provider, the Bank is well aware of the interlinkage of the needs of the SMEs. Thus, its financial assistance packages cover components essential to the success of borrowers' businesses, such as organizational and technological capability-building.

Organizational and technological capability-building components of Landbank's assistance package to rural entrepreneurs are non-revenue generating activities, hence, the Bank, which does not enjoy subsidy from the national government, has to involve other partners in these undertakings. The aim of the Bank is to enable small-scale rural and urban entrepreneurs to engage in market-oriented, high value added enterprises and not remain in the marginalized informal service sector. Hence, the Bank's assistance packages are levelled, based on the readiness and preparedness of the client to absorb financial and technological assistance. This is made possible by accessing groups for its credit programmes. Enterprises accessing loans determine the level of assistance SMEs are able to absorb at their present level of development.

Addressing technological capability upgrading of its present and potential borrowers requires huge financial outlay, hence Landbank networks with myriad partners which share similar interest and mandate in the conduct of technical trainings to small entrepreneurs. Generally, these are government departments such as the Department of Science and Technology, through its STAND, the TLRC and the TESDA. Other major programmes being implemented or

worked out by Landbank in cooperation with other institutions, addressing the technological capability upgrading of its borrowers are:

1. Partnership with state colleges and universities specializing in technologies. One of these is the establishment of farm schools in the countryside for the farmers by the Technological University of the Philippines. Another is a link-up with the University of the Philippines' Institute for small scale industries for the training of SMEs accessing loans from the Bank. The University of Asia and Pacific (formerly the Centre for Research and Communications, a private think-tank) is also in collaboration with Landbank, training small agribusiness enterprises, particularly farmers' cooperatives towards product enhancement, packaging, intermediate processing and value adding.

2. Landbank also links-up its SME clients with the Philippine Chamber of Commerce and Industries for technical assistance under a programme being assisted by the United States Agency for International Development (USAID). Known as Regional Enterprises Development (RED) the programme provides the following assistance:

a. Technical and management training to the employees, managers and owners of SMEs in six priority provinces of the programme.

b. Technical assistance to firms, in the form of provision of advice on product designs, procurement of equipment, machinery, export standards, consumer preferences, export services and pricing.

c. Conducting policy studies with the local chamber carrying out policy dialogue with the appropriate government agencies after the completion of each policy study. Specifically, these policies pertain to locally enforced regulations that affect SMEs such as local property taxes and deregulation of port facilities.

d. The installation of a business centre south of the Philippines to provide management and consultancy services. The business centre will serve as a model for the establishment of business centres in other areas.

3. Landbank is currently negotiating a programme with the Asian Development Bank (ADB), to implement a project intended for a region, south of the Philippines, aiming at the increase of agro-industrial output in the area. The immediate objective of the programme is to increase investment, productivity and market competitiveness of the selected SMEs along agro-industrial concern. Technical and management assistance will be provided to eligible enterprises along design and planning (including feasibility studies, market studies, technology identification and social and environmental studies); investment in the promotion and packaging of feasible enterprise proposals will be made available by developing linkages for equity and other financial services.

Landbank has special credit windows for small entrepreneurs, particularly among agricultural cooperatives. These special financing programmes come in a package with technical assistance. Some 8 500 agri-based cooperatives, comprised of more than 800 000 small farmers and fisherfolks, have availed of these assistance packages. Because of the flexibility of its banking

operations the Bank was able to forge several tie-ups from among the small agricultural cooperatives on the one hand, and big agro-industrial firms which are its clients under its commercial banking operations on the other. These tie-ups are formalized under the Bank-initiated Anchor Firm Linkage Programme, where a mutual agreement is arrived at between a group of small agricultural enterprises and an agro-industrial company in terms of technology transfer and the supply of raw materials. This also serves as a venue for harnessing private sector participation in the technological capability upgrading of small rural enterprises.

Other credit windows created to respond to the financial services needs of both the rural and the urban poor concern the Grameen Bank replication through the newly created Peoples' Credit and Finance Corporation (PCFC) where Landbank takes an active role in its implementation. Landbank, through its subsidiary the National Livelihood Support Fund (NLSF), provided the initial capitalization for the PCFC which would be basically responsible for credit assistance to the bottom 30 per cent of the population engaged in small enterprises. Alongside PCFC, a Trust Fund was created which would be capitalized predominantly by the private sector. The earnings of the Trust Fund would be utilized for the institution and capability-building needs of the beneficiaries.

In addition to these, Landbank has tapped the services of the Philippine Statistical Association and a local non-government organization, the Foundation for Resource and Linkage Development, for a computer-based information network of various technologies, markets, and prices for dissemination to its small rural entrepreneur clients. Such a strategy is geared towards making SMEs competitive and information-based. Thus assistance package also includes coaching on simple data interpretations, and market opportunity scanning.

Issues/Concerns and Recommendations

Despite the government and its instrumentalities' and their various efforts in upgrading the technological capability of SMEs, the task, in the case of the Philippines, remains herculean, particularly due to several attendant issues and problems.

First, most SMEs, particularly small rural agricultural cooperatives do not have the means to pay for the cost of technological upgrading, hence they remain dependent on government subsidy and other assistance programmes. Second, such efforts in technological enhancement should be accompanied by facilities for financing, especially in pilot-testing technologies to mainstream these in the market or in promoting pioneering industries. However, most banks are averse to investing in undertakings of this nature. This is understandable due to the fiduciary relationships of banks with their depositors. Hence, sources for venture capital or development (equality) capital are needed.

Second, adequate infrastructure and telecommunications facilities are a necessity for efficient technology promotions especially in an archipelagic country like the Philippines, where natural barriers make it difficult to disseminate information. Infrastructure deficiency is also a deterring factor for the formation of SMEs.

Third, world class technologies, or technologies required for market-oriented enterprises are a monopoly of the industrialized countries, to which most newly industrialized and

non-industrialized countries have little access. Because most of the poor are based in newly industrialized and non-industrialized countries, cooperation among these countries is a must for the poor to access technologies and have them translated within their level of affordability and understanding.

Lastly, alleviating poverty through social preparation and technological capability-building of the marginalized sector or the bottom 30 per cent of the population in order for them to be mainstreamed in the productive sector of the country follows a protracted development path which requires a huge financial outlay from the government. Most of the developing countries are saddled with other development priorities and can barely afford the required funding for this kind of development undertaking.

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POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING

COUNTRY PAPER, PAKISTAN

1. INTRODUCTION

Poverty is basically a reflection of dispossession or deficiency in resources that hampers or prevents the participation of some sections of a society initially in the growth process and consequently in sharing economic gains and thus inhibits them from realizing a reasonable standard of living. This also results in income inequality. Poverty is thus manifested in low income, malnutrition, high incidence of diseases, illiteracy and poor living conditions. Empirical evidence reveals that persistent poverty could become, in the long run, a threat to the social order in addition to being a constant drag on human resources.

Technological capacity-building requires the upgradation of educational standards and skills and expanding, deepening and diversifying of the human resource base. The availability of a skilled and qualified labour force is regarded as a vital source for enhancing the technological capacity of a cluster. In general terms, in many developing countries there appears to be a lack of established, generalized and socially acceptable system of occupational profiles and vocational training.

Another source for endogenous technological capacity-building is face to face relationship between, complementary manufacturers, buyers and users throughout the vertical production, process, and producers, and sellers. Such interaction between various groups can induce strong complementary effects leading towards upgraded technology at various levels of the production process.

Poverty and hunger are critical problems in developing countries. According to the latest estimates, roughly 1/3rd (1 billion people) of the total population of the developing countries live in poverty which is mostly concentrated in the rural areas. The largest victims of poverty are children and women who suffer most in terms of malnutrition, illiteracy, low life expectancy and substandard housing. This paper presents the situation of poverty alleviation through technological capacity-building in Pakistan.

1.1 Country Overview

The Islamic Republic of Pakistan is an independent country. The total land area is 0.8 million sqare km, per capita income is US $ 418 and the growth rate is 6.1 per cent. The total population of the country is 128.01 million. Of this 68 per cent live in rural areas while 32 per cent in urban. Male and female are 51 and 49 per cent of the total population respectively. The population growth rate is about 2.8–3.0 per cent. The literacy situation in Pakistan is far from

satisfactory. The total literacy rate is 37 per cent. Of this 57 per cent is in the urban while 27.5 per cent is in the rural areas. The total male and female education rates respectively are 49 and 23.5 per cent. High level scientific and technological manpower engaged in Research and Development (R&D) is quite low as compared to UNESCO recommended figure (i.e. 10 per cent of the total S&T manpower). The estimated number of scientists and technologists in 1990 was 286 000 while it should have been 345 000, and thus the country was short by 59 000 scientists and technologists. A comparison of the number of scientists in R&D with some other selected countries is given in Table 1.

Table 1: Number of Scientists/Technologists in R&D in Different Selected Countries

S. No.	Country	No. of R&D Statistics	Population (in million)	No. of R&D Scientists per million population
1.	U.S.A.	816 400	242	3 373
2.	Japan	525 874	121	4 346
3.	U.K.	107 500	57	1 886
4.	South Korea	35 664	41	870
5.	India	100 136	781	128
6.	Pakistan	8 428	99	85

It can be seen that the number of scientists in Pakistan involved in R&D activities per million population is less than that in India, one-tenth of South Korea and is less than USA by a ratio of 39.6. The dearth of high-level scientific manpower is mainly due to a meager allocation of only 2.2 per cent of GNP to the education sector. In order to improve the situation the Government of Pakistan has launched a HRD programme under which about 400 scientists and engineers are being sent abroad for higher education leading to M.Sc. and Ph.D.

The total labour force of the country is estimated at 35.7 million. Of this 25.23 million is in the rural areas while 10.45 million is in the urban areas. The overall labour force participation rate is 27.87 per cent with 28.77 per cent for rural areas and 25.83 per cent for urban areas. The participation rate is higher in rural as compared with the urban areas. This is due to the norms of rural life and the nature of agricultural activity in which family members also participate along with hired labour. The participation rate is also lower in the case of female population which is attributable to socio-cultural traditions and also to the non-availability of employment opportunities.

The overall participation rate in Pakistan is relatively low compared to other countries. A comparative position of population and activity rate by sex in selected countries is given in Table 2.

Table 2: Comparative Position of Population and Activities Rate by Sex of Selected Countries

	Year	Population (Million)	Activity Rate in Percentagte of Total	Male	Female
Pakistan	1992-3	120.83	27.87	45.87	8.59
U.K	1990	57.41	50.3	58.4	42.6
Germany	1990	63.06	49.6	60.8	93.2
New Zealand	1991	3.4	47.1	53.9	40.6
Japan	1991	124.0	52.5	63.6	42.2

The large proportion of the employed labour force in the rural areas indicates that non-wage employment consisting mainly of self-employed workers in the agricultural sector and unpaid family helpers dominate the employment scene in Pakistan. There is a considerable movement of people from the rural to the urban areas, increasing the pressure on the already meager social amenities there. This migration is clearly reflected in the declining share of employment in the agricultural sector.

The total labour force is 35.7 million. Out of this 1.69 million is estimated as being unemployed. Generally the open unemployment rate is 4.74 per cent. Recently, there has been a fall in the unemployment rate among the female population mainly due to employment opportunities created in the education and health sectors under the Social Action Programme.

The contribution of S&T to economic growth is widely recognized but in Pakistan its base is weak and there are very few S&T institutions. Those that exist are Pakistan Council for Scientific and Industrial Research (PCSIR), Pakistan Industrial Technical Assistance Centre (PITAC), Metal Industrial Development Research Centre (MIRDC), and National Institute of Electronics (NIE). Since the inception of the council, the PCSIR has developed and released about 300 industries processed on which a few SMIs have been setup which could generate 1000s jobs for professionals, skilled workers/artisans and labour. Most S&T institutions have technical capabilities but lack management skills for the salesmanship of their services in the market.

Pak Swiss Training Centre (PSTC), and Karachi of Pakistan Council of Scientific Industrial Research are active in imparting training to artisans for the development of SMIs. Annually the centre produces about 300 trained workers. On account of their good training, the artisans get employment even before completing their course. Initially there was one PSTC centre which could not cope with the manpower requirement of SMIs for the whole country. As a result, PSTC has now opened three more centres in the provincial capital of the country. National Institute of Electronic has also made some contribution in providing skilled manpower in information technology for SMIs. They conduct short-and long-term training courses relating to the application of computers, electronics etc.

2. SMALL AND MEDIUM INDUSTRIES AND THEIR IMPACT ON POVERTY ALLEVIATION

The SMIs during 1994–5 accounted for 31.26 per cent of value added in manufacturing and 5.79 per cent in GDP. This increase took place mainly in the private sector and employed more than 81 per cent of the industrial labour force. The SMIs were a vital sector of the economy and played an important role in the development process by generating employment opportunities in the country. During the 8th Five Year Plan (1993–8) SMIs are expected to grow by 8.4 per cent per annum. The sector is likely to generate about 300 000 industrial jobs during this period. In Pakistan, SMIs have been formed by provincial governments briefly listed below:

i. *Punjab Small Industries Corporation*

The Punjab Small Industries Corporation launched 'Rural Industrialization Programme and Self Employment Scheme', in order to generate employment opportunities, and provide a sound

industrial base in the rural areas and induct qualified professional, youth, skilled and semi-skilled workers in industry. The rural industrialization programme was designed to contain the rural/urban migration and to create a new class of rural entrepreneurs.

The Punjab Small Industries Corporation has developed small industrial estates at Sialkot, Gujranwala, Lahore, Bahawalpur, Daska, Jhelum, Sahiwal and Sargodha, Chakwal, Mian Channu and Gujjar Khan. Presently, the industrial estates at Khanawal and Taxila are being developed. Work on other proposed industrial estates is in hand and under various stages of implementation.

With a view to improving quality and quantity of the industrial output of small industries, the PSIC has so far established various technology specific service centres in the field of light engineering, leather, ceramics, metal, cutlery and small tools, sports goods, pottery, wood working, blue pottery, bone-china and agricultural machinery. Besides, the Corporation has also established handicraft development centres, crafts development projects, carpet centres, dehi mazdoor centres etc. to ensure adequate supply of skilled manpower as well as the production of handicraft. The PSIC has also established 11 training centres for women. In addition, the Women's Division has sponsored and financed 13 centres for women. The Youth Affairs Division has sponsored and financed seven projects for imparting training to women.

ii. *Sindh Small Industries Corporation*

The Sindh Small Industries Corporation (SSIC) is engaged in promoting and developing cottage and small industries in the province of Sindh. The Corporation established 13 small industries with 1535 developed industrial plots with infrastructural facilities. In addition, the Corporation was running 76 training centres in traditional and non-traditional craft and trades, where training was being imparted in different skills to 2 245 boys and girls. The corporation was also providing facilities for display and sales to the artisans and craftsmen. The ongoing schemes included five projects for Karachi Division, three projects for Hyderabad Division, one project for Mirpurkhas Division and two projects for all over Sindh province.

iii. *Sarhad Small Industries Development Board*

The Sarhad Industries Development Board is promoting and developing small-scale and cottage industries in the province by providing training facilities in modern technology, access to financial assistance, infrastructural facilities, and advisory services and guidance to the aspiring entrepreneurs.

At present, the Board is handling 16 carpet centres, nine textile and handicraft centres, six embroidery and knitting centres, two ready-made garments centres and four art and craft galleries and display centres. The Board is also extending advisory and extension services to the establishment of a number of model projects, such as 8 wood working centres, 1 leather goods service centre, 1 ceramics development centre, 1 electronic development centre and 2 light engineering and metal centres. The Board has established 9 industrial estates covering an area of 338.74 acres with 1 601 fully developed factory plots.

iv. *Directorate of Small Industries, Baluchistan*

The Directorate of Small Industries, Baluchistan is running 70 handicraft and training centres for imparting training and development of traditional crafts and trades. Four zonal offices at Kalat, Sibi, Loralai have also been established to facilitate advisory services to the intending entrepreneurs. The total sanctioned strength of trainees in all these centres was 2 452 against which 1 540 trainees were on the roll.

For promoting computer applications in SMIs, all Provincial Technical Education Boards have introduced a three-year diploma course in all their polytechnic institutes.

For better participation of women, a separate Women's Division and First Women's Bank have been established. A special minimum quota of 5 per cent in the jobs in the public sector was also reserved for women particularly in professions such as nursing, teaching, training etc. Women's Division has established 40 computer training centres at divisional headquarters and in major towns all over Pakistan at a total cost of Rs 19.00 million, to ensure greater facilities to women in computer training with job opportunities. In addition, three women development centres have also been established at Sahiwal, Nawabshah and Mansehra for imparting intensive training for better participation in the economy of the country. In addition, Pakistan has launched the following, specific schemes and programmes for women's employment:

a. Training of 3 300 female health workers and their subsequent employment under SAP in the rural areas.

b. About 30 000 lower grade jobs have been created in the Federal Government. Besides 10 000 educated unemployed persons are being trained for recruitment as teachers.

c. About 31 000 skilled workers are being trained by expanding technical and vocational training facilities.

d. Under National Self-employment Scheme, 21 124 loans amounting to Rs 5 677.25 million have been disbursed. It is estimated to have generated employment opportunities for 139 804 persons.

e. Under Youth Investment Programmes (YIPS) an amount of Rs 995.29 million have been disbursed during the current financial year and employment provided to 14 174 persons.

Benefits of development do not reach all sections of the people equally, particularly the rural masses. One reason for this is a lack of an adequate infrastructure—transport, skilled manpower and marketing—which is why all industrial developments are concentrated around urban areas or near big cities. Since the rural population has no opportunity for employment near their homes they migrate to urban areas in search of employment. They live there in miserable conditions without basic amenities. Such settlements also create a great problem for the supply of basic facilities to the urban population. This rural to urban migration is increasing day by day, hampering a sustained and balanced growth of the economy. In order to redress possible lapses of the general development strategy, Pakistan has launched a number of programmes, namely Social Action Programme, Special Education and Social Welfare Programmes for Women Development and Rural Development.

3. TECHNOLOGICAL CAPABILITIES AS MEANS OF PROMOTING COMPETITIVENESS OF SMIs

Like most developing countries, the development of SMIs in Pakistan has been hampered among other reasons by a lack of technology, skills, funds, access to markets and readily available system of information. In Pakistan, SMIs, particularly surgical and sports goods industries, and fan manufacturing industries are unable to compete at the international level mainly due to a lack of skills, low efficiency, inferior quality of product, high production cost, hazardous operations from safety and environmental points of view.

Lack of financial resources and marketing capability of these SMIs have also restricted their innovative capacity with respect to both new products and production technology. Possible alternative options of solving problem(s) are (i) either through private and public indigenous technology capacity-building and support by setting up technology centres and extensive training services in respective clusters or (ii) through the takeover by a big company. Most such centres are formed at the provincial governmental level, and their overall impact in improving technological capacity of respective clusters to which they are directed has been generally paltry. Part of this failure lies in the lack of technical and organizational linkages between such centres and the cluster. These centres can also greatly assist in the selection of technology, transfer, adaptation, and application of technology.

Under the project, Industrial Technology Development, sponsored by the World Bank under a Japanese grant and executed by the Ministry of Science and Technology, the proposal for the establishment of three local Technology Centres at Sialkot, Gujarat and Multan is under consideration.

In Pakistan, weak technology base and R&D organizations which are act as the source of technology particularly for SMIs continue to exist. R&D set up to some extent is helping out SMIs in developing the required technology, and its selection, adaptation and application. For instance, Pakistan Council of Scientific Industrial Research (PCSIR) has helped out in designing, selecting and adapting the treatment of the effluent of tanneries at Kasur. Two years back all tanneries were discharging their effluent in the open air on the ground surface causing alarming and dangerous degradation of the environment. PCSIR assisted the concerned authorities with designing, and selecting of technology for effluent treatment plant, which was installed with the assistance of the World Bank and The United nations Development Programme (UNDP). Similarly Metal Industries Research Development Centre (MIRDC), established at Sialkot, caters to the export-oriented surgical equipment industry. It provides laboratory testing and technology extension training in the respective clusters.

To promote investment and marketing, Pakistan has taken tax reforms and other different regulatory measures such as planned liberalization, privatization and public enterprise reforms. It has also undertaken capital market development, pollution control, deregulation and labour and management. Pakistan has recently passed the Environment Act and has enforced it with immediate effect in the country. No industrial set up is allowed to function without ensuring its operation to be free of environment pollution. Defaulters are heavily penalized.

4. NATIONAL POLICIES FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

In Pakistan, policies and strategies for poverty alleviation have varied over time. In the early years, some ad-hoc approaches were adopted to provide temporary relief to the poor. In the subsequent period, when systematic planning was started, high growth was chiefly considered to be a panacea for various economic problems including poverty. Towards the end of the 1960s, it was realized that the trickle-down effect of the growth process could not be expected to relieve the burden of poverty. The problem of income disparity especially at the regional level assumed alarming proportions which was also used by some politicians as one of the justifications for the separation of the eastern wing of the country.

4.1 National Technology Policy

Realizing the importance of the role of technology for industrial development leading to economic development of the country, the Cabinet approved National Technology Policy (NTP) and Technology Development Action Plan (TDAP) with an allocation of Rs 2.8 billion during 1993. The Technology Policy has quantified its goal into the following four short term objectives.

i. To bridge the gap between international and local industrial technology policies.

ii To bridge the gap between the best and the below standard local industrial technological practices.

iii To improve and develop technology.

iv To develop technical manpower.

To achieve the objectives of the policy, its strategies include the commercialization of the local R&D system, development of information networks, promotion of SMI, promotion of environmentally sound technologies, and the strengthening of the metrology, standards and testing quality (MSTQ) system. In addition to these, the strategies emphasize the promotion of new and emerging technologies, promotion of direct foreign investment, harmony with other national policies and development plans and the creation of a system in which the government, the industry, and the scientists can cooperate and work as a team.

Instruments of the NTP, include an increased percentage of GNP allocated for science and technology, technical manpower development, establishment of venture capital companies, strengthening of industrial extension infrastructure, contractual research, and the protection of intellectual property rights.

National Technology Policy and strategies are aimed at the promotion of technological upgradation of SMIs and building their capabilities. In this regard, under NTP/TDAP, some major projects are at various stages of implementation as outlined below.

i. *Manpower Training*

In order to upgrade technical training facilities in the country, the Ministry of Science and Technology (MoST) has provided funds to modernize Pak Swiss training centre, Karachi, so that it impart training to technicians on modern designing and production techniques using CAD/CAM and CMC machines. MoST is also assisting Pakistan Computer Bureau to set up regional training centres at Peshawar and Quetta to train scientists in R&D management. MoST has launched another programme under which R&D managers are to receive training in leading R&D institutes of South Korea, Australia and USA. A batch of 20 officers has already attended a training course under the programme in South Korea and MoST is also considering to assist State Engineering Corporation for the establishment of CAD/CAM training centre in HMC Taxila, aimed to establish training facilities on CAD/CAM for 700 technicians and engineers annually.

ii. *Computer Education and Technology*

Realizing the importance of computer technology, and its future implication on the country's technological and hence economic development, MoST and the Ministry of Education have jointly launched a pilot project to introduce computer science as a subject in secondary school, During the first phase of the project, 50 schools have been selected throughout the country, which are being provided with computer hardware and software and teachers from each school are being trained as well.

iii. *Information Technology*

For R&D institutions and universities, MoST has started work on the establishment of Pakistan Education, Research and Development Network (PERDNet) through which R & D organizations, universities etc. will be interlinked and will have access through the internet to databases for the retrieval of the latest information on the subject of their interest.

iv. *Contractual Research Programme*

For the first time in the country, R&D work sponsored by MoST was carried out by the private sector through contractual research project. Shuttleless looms are being developed within the country by using indigenous technology. These locally developed looms are of similar quality to those of the imported ones, and cost a quarter of what the other varieties do. The commercial production of these shuttleless looms by the private sector will give a boost to our declining textile exports due to inferior quality cloth weaved on obsolete shuttle looms. The products made on shuttleless looms will be able to compete in the international market and conform to ISO 9000 standards. The project is a hallmark in encouraging the public-private R&D partnership aimed at the advancement of the country through indigenous technological capacity-building for rapid socio-economic development.

v. *Consultancy Programme*

To assist SMIs in improving their products, services and productivity, and also to create opportunities for local consultants to serve the local industry, MoST has launched Consultancy

Programme for Industrial Technology Development. The project will help the SMIs enterprises to improve quality and quantity of their products with a grant to buy local expertise, particularly with the objective to compete in the international market. Thus the project will support the development of qualified and experienced consultants and the SMIs to improve their management and technical capabilities.

vi. *Indigenous Tea Processing Plant*

In order to develop indigenous capabilities for the processing of locally grown tea, MoST is assisting a processing unit for the establishment of green tea process plant at Shinklari, NWFP.

vii. *Establishment of Technology Development Fund (TDF)*

Technology Development Fund (TDF) Bill is under consideration of the Parliament. The Federal Government will contribute Rs 400 million initially to the fund with an annual increase of 10 per cent. The objective of the fund is to assist industry in financing R&D activities, ensure the improved quality of products and processes, and to promote consultancy and develop resources through technical training.

viii. *Promotion of Venture of Capital Companies (VCC)*

Such companies promote investment in technology oriented business by providing funding on equity and risk sharing basis, and also by working as a partner with the investor and entrepreneur through management support and guidance. The establishment of VCC and the regulation of Technology Venture Capital Fund (TVCF) are under consideration.

ix. *Establishment of CAD/CAM Training Centre at HMC Taxila*

Realizing the importance of computer application and electronics MoST has sponsored this project of the State Engineering Corporation for the establishment of CAD/CAM for the training of manpower, enhancing designing capabilities and other industrial application at a total cost of Rs 91.00 million. The project will be completed within 36 months.

4.2 Technology Training Centre (Techtown)

A techtown has been planned to raise the level of technology in the local industries producing electronic products. Duty free import facilities within the town will be provided. It is estimated that jobs for 1000 persons will be created directly in addition to business and job opportunities for many personnel indirectly.

4.3 Small and Cottage Industries

It is fully realized that small and cottage industries have large employment and income potential. Besides, they also provide a basis for broadening and expanding savings and investment and the dispersal of benefits of growth to less developed regions and poor sections of the society. It is estimated that an investment of Rs 150 thousand in small industries creates one job as against

Rs 3.5 million by large-scale industries. Under industrial policy some specific steps are being taken for the promotion of small-scale industries. They are as follows:

i Wider dispersal of infrastructural facilities, in relation to energy and gas in particular.

ii Promotion of small-scale industrial estates.

iii Strengthening the role of Provincial Small Industries Corporation as a promoter of private enterprise, disseminator of skills, provider of common facilities and facilitator of marketing.

iv Expansion of credit facilities.

v Strengthening the Small Business Finance Corporation and encouraging the private sector to establish Small Industries Banks on the pattern of Development Finance Institutions.

5. REGIONAL COOPERATION FOR PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

Regional Cooperation for the promotion of technological capabilities of SMIs is one of the key instruments. Regional Cooperation is supposed to facilitate the transfer of environmentally sound and poverty target technology (i.e., labour intensive), provision of information, sharing experience, training in addition managerial advice and the provision of testing services, workshop facilities and vocational training programmes etc. Sectoral and business associations can be competent and effective to pursue these activities and tasks mentioned above at all regional level. Except for the Chambers of Commerce and Industry established at the federal and provincial levels, other sectoral bodies, process associations and trader organizations are present in most informal manufacturing clusters in Pakistan.

Therefore there is a strong need for cooperation within the country and among the regional countries in the areas of renewable energy, electronic cottage and its allied industries, informatics, agriculture and industry. The use of locally manufactured goods in the construction industry, training, exchange of information and education, particularly relating to technology development to promote SMIs in the region are urgently needed. Industrialization through the promotion of SMIs is aimed at increasing employment opportunities at the grass root level, ultimately leading towards poverty alleviation in the country.

6. RECOMMENDATIONS

i Technology is a prime mover and responsible for rapid economic development. Technological base in Pakistan is narrow. The number of scientists, engineers, technicians is small. Transfer of technology is sketchy and superficial. The capacity of master technology is rudimentary. The situation needs immediate attention.

ii There is a dire need to establish centres for the absorption of technology, and enhance technological capabilities, to adopt and modify the available technologies.

iii Strong information technology systems are the need of the hour to have accurate data for the planning, and promoting of SMIs.

iv To accelerate the pace of technological development, the allocation of resources for the development of technology, including research and development, will have to be increased on a priority basis. These should then be given to demand oriented technologies, which could boost, the establishment of as many SMIs as possible.

v Private sector should be encouraged to undertake R&D activities.

vi Research and Development institutions should be strengthened and the transfer of technology should be encouraged and promoted.

vii Industrial development technological policy and industrial policy both compliment each other. Therefore these should be in line and consistent with the overall development plan.

viii As already stated there is a strong need for cooperation in the areas of renewable energy, electronic, cottage and its allied industries, informatics, agriculture, the use of locally manufactured goods in the construction industry, exchange of information, training and education relating to technological development within the region.

ix SMIs of low-cost labour intensive nature are the need of the hour for developing countries which could generate employment and enhance the income of the masses which will ultimately alleviate poverty.

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POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPABILITY-BUILDING

COUNTRY PAPER, SRI LANKA

INTRODUCTION

Sri Lanka, has gone through an economic transformation from a state-controlled, to a private sector dominated market economy to sustain itself within the global economic trends. A strong outward export orientation was associated with a new approach. To pursue such a policy, a significant public investment programme was also launched to improve infrastructures such as irrigation, roads and power. It was implicitly assumed that an economic growth, resulting from these structural adjustments would trickle down to benefit the masses, without taking special measures to alleviate poverty. It is said that the momentum generated by the economic reforms were confined to the initial few years of economic liberalization. This momentum did not sustain itself even till the late 1980s and during this period a social and economic crisis of proportions emerged in the country.

A large number of studies carried out on poverty implications of the Structural Adjustment Programmes (SAPs) in Sri Lanka has generally concluded that poverty has manifested itself socially and culturally over a period of time. The study illustrated here, reflects that 36.1 per cent of the population live below the poverty line at National Level, when Food Ratio > 50. The breakdown within the urban, rural and estate sector are 37.9, 36.8 and 19.7 per cent respectively (Table 1). Analysis of the types of households below poverty line, with respect to different socio-economic groups, reveal that agricultural workers, other types of workers in non-agricultural activities (excluding manual labourer), manual workers in non agricultural activities and others—the residual category—are affected most (Table 2).

The Gini coefficient, by sectors, further indicate that the disparity between the rich and the poor in the urban sector has increased considerably, from 0.44 (1980–1) to 0.62 in 1990–1 (Table 3). The growth of GDP of Sri Lanka, between 1970–90, was at an annual rate of 4.1 per cent. Combined with falling population growth rates, this had resulted in a 250 per cent increase in private consumption per capita at constant prices. In the 1980–1 and 1985–6 period, when the GDP growth was 5.2 per cent p.a., it was the higher decile that benefitted, by increasing its real income by 75 per cent and its income share from 28 per cent to 30 per cent, at the expense of other deciles (Table 4). In the 1985–6 and 1990–1 period, when GDP growth had fallen to 3.3 per cent p.a., the highest real income fell by almost a quarter and its income share by 2 per cent. The income of the poorest 20 per cent on the other hand, showed a decline in the first period and some recovery in the second. In 1990–1 the lowest two deciles were still worse off in terms of real income and income share than they were in 1980–1.

Table 1: Alternative Measures of Poverty when Different Criteria are Used to Determine the Poverty Line, Sri Lanka and Sectors (All poverty measures expressed as percentages)

Sector	C%D Type H/H (Persons)	Poverty Line No. 3 (FR > 50) H			Poverty Line No. 4 (FR > 60)		
		H/H (Persons)	PG	P2	H/H (Persons)	PG	P2
Sri Lanka	45.4 (51.6)	36.1 (42.3)	27.9	32.9	33.0 (38.8)	25.7	29.9
Urbans	52.5 (58.8)	37.9 (44.1)	30.2	40.9	32.0 (37.5)	25.5	33.0
Rural	45.5 (51.6)	36.8 (43.2)	31.2	37.7	34.1 (39.5)	29.0	34.7
Easte	25.6 (28.2)	19.7 (22.8)	09.6	07.0	19.3 (22.5)	09.4	06.9

Source: Reference 10

Note: Percentage given within brackets are percentages of persons

H = Head Count Index

PG = Poverty Gap Index

P2 = Foster—Greer—Thorbecke Measure

H/H = Households

FR = Food Ratio

C&D Type Households are those H/Hs which have not achieved the minimum requirement of calorie

The above poverty lines are based on the Regression (Y = a + bx)

'Per capita expenditure on food (v)' vs' actual per capita calorie intake (x)'
Regression (Y = a + bx)

Sector	R	a	b	Per capita Food Expenditure to achieve Minimum requirement of Calories per capita (Sri Lankan Rs Cts)
Sri Lanka	0.69	8.35	0.26	539.27
Urban	0.74	-22.48	0.32	630.96
Rural	0.72	-10.58	0.24	479.50
Estate	0.80	-15.20	0.23	454.46

A special poverty alleviation programme Janasaviya (JTF) was launched in 1989, with the objective of promoting self employment in the rural areas and alleviating poverty through self-reliance. The evaluation of this programme in 1992, revealed that only 1549 employment related projects had been initiated. Of these only 5–10 per cent of the supported business had become self sustaining. This may have been due to the fact that the partner organizations selected quick yielding investments in order to safeguard timely repayment and their revenue. As a consequence the JTF approach had become more a mechanism for income subsidy than a tool for business development.

In terms of poverty alleviation, the programme was successful in the short run, but did not bring substantial numbers of self-employed into the mainstream of economic development. The main issue that could be highlighted here is that this programme gave little or no recognition to S&T, in developing their self-employment programmes.

The government which came into power in 1994, addressed the problem of poverty alleviation through SMI in two ways.

Table 2: Alternative measures of poverty by socio-economic groups (SEG) of the household (H/H) for Sri Lanka and Urban, Rural and Estate sectors based on PL3

Socio-economic group		Sri Lanka				Urban Sector				Rural Sector				Estate Sector			
		%	H	PG	P2	%	H	PG	P2	%	H	PG	P2	%	H	PG	P2
SEGI	Agri. Employer	0.7	16.1	12.7	11.8	0.3	7.9	8.2	9.8	0.9	18.0	13.2	12.5	0.0	—	—	—
SEG2	Agri. own Account workers	21.6	34.7	28.1	32.0	3.3	28.5	22.5	25.8	28.6	33.2	28.5	32.6	1.8	28.7	13.7	8.8
SEG3	Agri. Employee. Prof. Tech. Etc.	0.1	8.2	2.3	0.6	0.0	17.4	5.3	1.6	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
SEG4	Agri. Labourer	12.8	40.5	33.1	40.8	1.4	54.4	43.9	60.1	9.6	51.0	48.1	64.1	76.2	19.3	8.8	5.5
SEG5	Agri. Other	2.1	36.7	30.8	36.0	0.3	59.9	41.7	38.3	2.3	41.3	36.3	44.1	6.1	11.7	6.1	4.1
SEG6	Non Agri. Employer	1.1	14.5	7.3	5.9	2.6	12.6	4.4	2.3	8.0	19.5	11.5	8.4	0.0	—	—	—
SEG7	Non Agri. Own Account worker	12.5	35.7	24.7	26.9	17.4	42.7	32.5	44.3	12.2	34.2	26.0	28.1	1.5	22.4	8.8	5.8
SEG8	Non Agri. Employee. Prof. Tech. etc.	4.3	16.3	7.7	6.2	8.3	12.6	6.6	5.3	3.6	16.1	9.9	8.7	0.5	13.9	5.1	1.9
SEG9	Non Agri. Employee Clerical etc.	8.9	30.5	19.2	21.3	18.0	35.0	26.3	34.6	7.1	28.3	20.4	23.0	2.0	38.2	14.8	9.4
SEG10	Non Agri. others excluding manual workers	13.0	42.7	28.6	28.9	17.4	48.7	37.9	49.5	12.9	40.4	29.8	29.8	1.2	22.7	11.2	7.0
SEG11	Non Agri. manual workers	4.5	53.3	42.1	55.2	6.3	54.5	49.1	65.7	4.3	50.0	44.8	61.3	1.7	29.3	38.5	62.5
SEG12	Un employed	0.7	34.2	21.5	23.3	1.3	29.4	30.7	39.2	0.5	28.0	19.2	22.3	0.2	80.8	67.2	55.8
SEG13	Economically inactive	9.6	32.3	21.3	31.2	15.5	27.0	21.1	30.4	8.6	27.3	24.9	38.6	3.4	32.4	14.4	10.6
SEG14	Other	8.0	53.7	47.2	61.3	7.8	56.3	55.0	83.9	8.4	54.0	51.5	67.8	5.3	11.1	6.9	8.6
		100.0	37.2	27.9	32.9	100.0	37.9	30.2	40.9	100.0	36.8	31.2	37.7	100.0	19.7	9.6	7.0

Source: Reference 10.

H = Head count Index, PG = Poverty Gap Index, P2 = Forest-Greer-Thorback Measure.

Table 3: Gini Coefficients by Sectors

Sector	LFSE 1980–1	LFSE 1985–6	INEX 1990–1
Sri Lanka	0.43	0.46	0.47
Urban	0.44	0.48	0.62
Rural	0.38	0.44	0.42
Estate	0.27	0.31	0.24

Source: Reference 10.

1. Launching an effective safety net and income generating programme to protect the poor, known as Samurdhi Movement (Prosperity Movement). The programme was initiated in June 1995, and covers 1/3 of the population of the entire country, consisting of 1 200 000 families estimated to be at the bottom of the income scale. The ultimate objective of 'Samurdhi' was to promote self-reliance on the basis of saving habits and the development of income generating self-employment. One of the main functions was to improve the entrepreneurial abilities of the poor families.

2. Creating employment through small-and medium-scale industries. The estimated potential employment over the next five years of this sector, is 250 000. Mechanisms to solve problems relating to production technology, product quality, labour training, marketing and finance are to be sorted out with integrated measures. While linkages with the Board of Investment project, trading houses, and large-scale and modern industrial enterprises are encouraged, special lines of credit or windows for SMIs, including micro enterprises, are arranged with the prevailing structure of commercial and development finance institutions. This is essentially with a view to reduce the cost of capital and help SMI with commercial borrowing and equity funds. It is envisaged that the necessary inputs for both programmes above, will be performed with adequate recognition to S&T resources.

The objective of this paper is to identify the needs, opportunities and mechanisms for 'technology capacity-building', within the policies of the government development programmes, is order to effectively upgrade the quality and productivity of small industries contributing to poverty alleviation.

SMALL-AND MEDIUM-SCALE INDUSTRIES AND THEIR IMPACT ON POVERTY ALLEVIATION

The contribution made to poverty alleviation through small-and medium-scale industries have been illustrated in this paper by highlighting some of the related on-going programmes.

Income generating employment programmes

Under the liberalization of economy in the areas of industrial trade policies in 1997, a small-and medium-industry loan scheme was initiated by the IDA and Work Bank. Their overall objective was to strengthen the private sector, by assisting viable existing small-and medium-scale industrial and service firms, and new entrepreneurs to expand production, generate employment opportunities and exports. This was facilitated through the access to institutional sources of financial and technological assistance.

Table 4: Per Capita Income an Income Share by Deciles, 1980–1, 1985–6, 1990–1

Year	Deciles 1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Combined Decil 1–2	1–3	1–4
Income share													
1980–1	3.5	5.3	5.9	6.7	8.0	8.6	9.4	10.9	13.8	27.8	8.8	14.7	2
1985–6	2.4	3.8	4.5	5.3	6.2	6.9	8.3	10.0	13.5	38.8	6.2	10.7	1
1990–1	1.9	3.3	4.3	5.3	6.4	7.5	9.2	10.8	14.8	36.5	5.2	9.5	1
Percentage increase in income at Constant Prices													
1980–1—1985–6	-12.5	-2.8	2.0	3.6	5.0	7.4	11.1	15.8	11.2	75.3	-6.6	-3.0	
1985–6—1990–1	5.8	1.9	3.2	4.3	3.7	2.5	0.0	-3.0	4.3	-23.0	3.1	3.0	
1980–1—1990–1	-7.5	-1.0	5.3	8.0	8.8	10.0	11.1	12.3	16.0	35.0	-3.6	0.0	

Note: Constant value has been calculated at 1980 prices using the Colombo Consumer Price Index.
The 1990–1 household survey excluded the North East Province where about 15 per cent of the population live.

Sources: Department of Census and Statistics, Socio Economic and Labour Force Survey, 1980–1, 1985–6.
Department of Census and Statistics, Income and Expenditure Survey, 1990–1.

The statistics of the National Development Bank of Sri Lanka, the apex institution operating through a number of state commercial banks, have indicated that the scheme has assisted in setting up 15 000 projects. This granted employment to 140 000 persons at a comparatively low capital cost of Rs 220 000 per job created, as given in (Table 5). The data here clearly indicates that SMI is able to create jobs at a substantially lower investment cost per job than medium and or large industry.

Table 5: SMI Credit Scheme-sector-wise Classification as on December, 1955
(expressed in Sri Lankan Rupees in Million)

Sector	SMI I		SMI II		SMI III		SMI IV	
	No	Amt.	No.	Amt.	No.	Amt.	No.	Amt.
Food Processing, Beverages & Tobacco	474	56.6	665	287.2	519	264.9	1530	755.3
Textiles	52	7.7	54	38.7	62	41.5	187	179.5
Garments	89	9.5	137	61.2	236	148.7	367	211.4
Metal Products	215	22.4	211	87.6	227	77.9	582	304.6
Construction materials (Mineral based)	272	42.9	172	69.4	255	88.6	329	127.5
Rubber Products	29	6.8	74	42.7	63	51.8	83	80.3
Wood & Wood products	176	20.4	174	47.9	181	56.2	454	207.4
Leather & allied Products	—	—	28	11.1	34	10.1	118	50.5
Plastic Products	—	—	42	40.9	35	26.0	135	159.4
Printing & Paper Products	—	—	138	74.7	93	56.1	286	248.6
Chemical & Chemical Products	—	—	8	2.3	34	18.7	91	81.0
Agri. Industries	120	10.1	46	13.2	78	23.7	124	59.0
Fisheries	—	—	—	—	2	13.7	549	504.3
Animal husbandry/ Horticulture/Aquarium	—	—	158	53.2	147	41.1	481	189.6
Construction, Contracting	11	5.0	24	19.5	19	10.1	51	49.0
Services	51	4.1	120	29.4	114	46.8	1 016	654.7
Transport/storage & communication	—	—	210	60.4	187	71.7	1499	679.8
Miscellaneous	252	44.0	280	119.2	128	65.4	205	133.2
Total	1 741	229.5	2 491	1 058.6	2 439	1 114.0	8 087	4 675.1

Source: National Development Bank of Sri Lanka (NDB)

Improvements in the level of skill and education

The mismatch between employment opportunities and the expectation bred in the education system, have been discussed in many employment studies. Though adjustments have been effected from time to time, the problem persists.

A significant portion of the manpower in the country remain unutilized, mainly the female, educated population (Table 6). The unemployment rate however, remains relatively high (13.6 per cent in the 1st quarter of 1994, Table 7). Employment opportunities in various sector in industry show a growth of population and labour force in non-agricultural occupations. For example, this is reflected in the manufacturing sector and the service sector (Table 8). The loss of professionally qualified personnel through brain drain and the migration of skilled personnel causes an imbalance in the supply and demand in labour. It has further reduced the number

of the educated and qualified personnel in the country. Manpower training systems have not adequately met the needs of private sector entrepreneurial needs. In this context, the need to restructure all vocational and training systems have been discussed (Table 9). The major constraints have been due to the lack of qualified staff and physical facilities for training centres. Designing the curricular to meet the entrepreneurial requirements and changes in the teaching techniques also needs attention.

Table 6: Faculty-wise Distribution of University Students

Faculties	1985–6			1991–2		
	Total	Female	%Female	Total	Female	%Female
Medicine	2 345	1 009	43.02	3 869	1 662	4.9
Dentistry	289	161	57.7	407	212	52.1
Veterinary Science	170	73	42.9	261	115	44.1
Agriculture	775	279	36.0	1 517	676	44.6
Engineering	1 762	264	14.9	3 082	377	12.2
Architecture	108	49	45.4	211	100	47.4
Science	3 125	1 306	41.8	5 604	2 330	41.6
Management Studies	3 367	1 426	42.3	5 555	2 450	44.1
Law	461	219	47.5	924	526	56.9
Social Science/Humanities	6 511	3 377	51.9	9 207	5 144	55.9
Total	18 913	8 160	43.1	30 637	13 592	44.4
Total Prof. Science based Courses	5 449	1 835	33.7	9 347	3 142	33.6
Total Science Courses	3 125	1 306	41.8	5 604	2 330	41.6
Total Arts based courses	10 339	5 019	48.5	15 686	8 120	51.8

Source: Statistical Handbook 1985, 1990, University Grant Commission Planning Division.

Table 7: Unemployment Rates in Sri Lanka

Year	Total	Male	Female
1963[1]	7.3	8.9	7.6
1971[1]	18.7	14.3	31.1
1980/81[2]	15.8	12.4	23.0
1985/1986[2]	14.1	10.8	20.8
1990 1st Quarter[2]	14.0	9.1	23.4
1990 Qrs 2-4[2]	—	11.8	23.4
1994 1st Quarter[2]	13.6	9.6	21.1

Source: 1. Census of Ceylon, 1963 & 1971.

2. Labour Force and Socio-economic Survey 1980–1, 1985–6, 1990/1st Quarter (all island) 1990/2–4th Quarter and 1994/1st Quarter (excluding North and Eastern province)

Women's Participation in SMI

The participation of women in industry has shown a substantial increase with the expansion of export-oriented industries in 1984, in response to the SAPs. However, their participation in the industrial sector is primarly related to fields such as (a) food, beverages and tobacco (b) textile, garments and leather products (c) chemicals, petroleum, rubber and plastic industries, as shown in (Table 10). With the exception of chemicals and petroleum over 80 per cent of women are in the manufacturing labour force. They are essentially concentrated in these industries, at the lowest levels in the employment hierarchy in the export processing zones. Their employment

in these industries such as garment, has little added value and are overshadowing the need to stimulate local rural industries and employment.

Table 8: Incremental Changes of Employment by Industry 1998—1990-1

Industrial Category	Change in Employment	Change in Employment	Change as % of total 1985	Change as % of total 1990-1
Agriculture etc.	364 840	313 493	0.834	0.400
Minning & Quarrying	137	97 533	0.000	0.124
Manufacturing	63 735	233 888	0.146	0.298
Electricity, Gas, water	7 605	-12 236	0.017	-0.016
Construction	-15 688	-30 374	-0.036	-0.039
Trade & Wholesale etc.	57 671	-38 869	0.132	-0.050
Transport, Storage Communication	20 825	28 590	0.048	0.036
Insurance at real Estate	13 389	-16 791	0.031	-0.021
Personnel Services	5 612	325 747	0.013	0.416
Not defined	-80 546	-117 133	-0.184	-0.149
Total	437 580	783 848	1 000	1 000

Source: Labour Force Survey 1981, 1985 and Quarterly Report 1990-1.

Table 9: Vocational Training Course by Occupational Group (1989)

	Occupational Category	No
1.	Professional, Technical & Related	335
2.	Clerical & Related	321
3.	Sales Work	15
4.	Service Work	211
5.	Agriculture, Animal husbandry, Forestry, Fisheries	81
6.	Production	2 419
7.	Other	51
	Total	3 433

Source: Reference 13.

Women's participation in small industrial sector, on the other hand has faced major casualties, resulting from this social adjustment programme. For example, the 'feminized' handloom industry of the 1960 and 1970 and other traditional and import substitution industries of the 1970s, collapsed in the face of competition from cheaper imports. This was due to the withdrawal of subsidies and protection and around 40 000 women lost their livelihood.

The export promotion villages (EPVs) set up in early 1980, linked the villager producers with exporters. Most women were engaged in cultivation, agro-based industries or in the manufacturing or assembling products. Although they had an access to markets their incomes did not improve significantly even in the most successful areas of profit earnings, e.g. green chillies. However, in some of the EPVs women had a high visibility as producers and decision makers in the Board of Investment, e.g. cashew processing.

The realities of the participation of women in the agricultural sector has been highlighted in a study conducted on the largest irrigation based Mahaweli development programme. It was obvious that women in poverty are at a disadvantage by gender and economic circumstances

Table 10: Employed Population by Industries

Industries	1985–6 Total	% total distribution	% male distribution	% female distribution	% female of total	1994 Total	% total distribution	% male distribution	% female distribution	% female of total
Agriculture, Hunting, Forestry	2 530 967	49.3	47.2	54.2	33.2	2 191 587	42.6	40.7	46.4	34.1
Fisheries, Mining, Quarrying	66 726	1.3	1.6	0.6	12.9	30 746	0.6	0.9	0.02	1.5
Manufacturing	648 469	12.6	10.04	18.6	44.5	782 179	15.2	10.5	25.6	52.6
Electricity, Gas & Water	21 484	0.4	0.6	0.04	3.1	19 675	0.4	0.6	—	—
Construction	226 913	4.4	6.04	0.6	4.6	171 554	3.3	4.8	—	—
Wholesale & Retail, Trades, Restaurants, Hotels	513 872	10.01	11.5	6.6	20.0	666 275	12.9	15.8	6.6	15.9
Transport, Storage & Communication	220 025	4.3	5.9	0.5	3.2	205 424	4.0	5.6	0.5	3.9
Finance, Insurance business	65 094	1.3	1.4	0.9	23.2	97 652	1.9	1.7	2.4	39.5
Community services, Personnel services	631 048	12.3	10.6	16.3	40.1	825 391	16.0	15.4	17.4	33.8
Activities not classified	206 791	4.02	5.1	1.5	11.2	157 966	3.1	3.9	1.04	10.0
Total	5 131 749	100.00	100.0	100.0	30.2	5 148 356	100.0	100.0	100.0	31.2

Excluding Nothern and Eastern Provinces.
Source: Labour for Survery, 1985–6, 1994 (1st Quarter).

coupled with little access to skills and technology, assets, and resources. Nevertheless the economic role of women's participation was undervalued or taken for granted. In many instances women were not even counted in the official status in the agricultural development programmes. They had no access to alternative opportunities for economic development and alternative modes for production to maximize participation. They lacked equal access to agricultural information, training, technology, credit input, and marketing facilities. The need to create non-firm employment, training in skills of agro-based and modern technologies were identified as requirements in order to draw women to self-employment or enable to them to get remunerable employment in the financial sector.

Women's participation in income generating activities has been very low, mainly with reference to technology-related activities. It has been said that 59.69 per cent did not engage in any income generating activity, among the five communities shown below (Table 11). Improved technologies had not reached the majority of the low-socio economic groups, and the following were identified as constraints in development. (a) Limited availability of appropriate technology to meet women's specific needs and capabilities (b) Lack of financial resources and capital.

Table 11: Technologies used in Income Generating Activities by Women

Activity	Type of Technology (Method)	Communities (% Users)				
		Fishing (Low Income)	Urban tural	Estate	Rural	Agricul
Coir-yarn industry	Wooden log and club	86.6				
	Spring wheel	76.6				
	Cleaning Machine	20.0	—	—	—	—
Weaving rush and reed mats	Knife	3.3	—	—	—	13.3
Breaking stones	Hammess	3.3	—	—	—	—
Fishing	Boats, Nets, Hooks	3.3	—	—	—	—
Bourtique Keeper	—	3.3				3.3
Sewing Garments	Sewing Machine	—	13.3	—	—	—
Candle Making	—	—	3.3	—	—	—
Poultry keeping	—	—	—	3.3	10.0	6.6
Dairy Farming	—	—	—	10.0	3.3	—
Rearing Goats	—	—	—	6.6	—	—
Vegetable cultivation	—	—	—	—	3.3	—
Paddy cultivation						23.3
Winnowing	Winnowing pan					
Harvesting	Sickle					
Parboiling	—					
Rice Milling	Electrically operated mill	—	—	—	—	3.3
Cleaning ekels	Knife	—	—	—	—	10.0
Cleaning coconut plants	Mammoty	—	—	—	—	3.3
Weaving palm leaves	—	—	—	—	—	3.3
Copra making	Improvised dryer made of sticks	—	—	—	—	10.0
Carpentary	Saw	—	—	—	—	6.6
House construction (plastering)		—	—	—	—	3.3
Brick making	—	—	—	—	—	3.3
No Income generating activities	—	3.3	86.6	80.0	83.0	46.6

Source: Reference 1.

However, it is appropriate to discuss a very enterprising rural bank, the Janashakthi Bank Sangam in the Hambantota district, set up for the poor rural women with a view to alleviate poverty in their families. The bank which is a savings and credit scheme, has granted 44 350 small loans (an average size of Rs 2 300) to poor women for either cultivation or self-employment activities over the last four years. It reports a repayment record ranging from 98–100 per cent. The resources mobilized through savings, shares and deposits of various forms now amount to Rs 25 million, on an average of Rs 1 000 per member.

More Balanced Economic and Industrial Growth and Reduction of Rural-urban Migration

The economy of Sri Lanka is challenged by both a low-level of industrial development and a high incidence of poverty. Contributing factors are: (a) the persistence of backward regions mainly in the rural areas (b) high rates of unemployment and under employment (c) under utilization of raw material resources and lack of appropriate technology (d) dearth of professionally qualified and skilled human resources.

No adequate data is available to discuss the performance of the SMI industries. However, the rural and small-scale industries are placed in a highly vulnerable situation as their operation is characterized by skewed distribution of incomes and a rising income concentration ratio.

The small industries have a great potential for the geographical dispersion of industry, which in turn controls the rural-urban migration. A study on the spatial distribution of industrial activity according to size, scale, modern, or traditional, formal, poor, informal, rural, or urban, and according to industrial division of group, brings out some salient features of the geographical dispersal of small industrial activity. For example it shows that certain regions can be identified and nurtured according to the level of industrial developments there, e.g. dispersal of the south-western small industrial region for handloom, weaving, coir and coir-based products, rubber processing etc. while the Kandyan handicrafts and small industries region for an industrial base for Kandyan arts and craft, wood products, handlooms and fabricated material.

The urgent need therefore to formulate a rural development programme to uplift poverty through SMI and 'technology capacity building' cannot be over emphasized.

TECHNOLOGICAL CAPABILITIES AS A MEANS OF PROMOTING COMPETITIVENESS OF SMIs

The Technology Capacity Building (TCB) mechanisms should be dynamic enough to penetrate into the system to transform small-and medium-scale industries, to become productive and sustainable in order to promote economic growth.

To build up such a system within the country, a basic infrastructure, is necessary. These are:

(a) Creation of a 'scientific' cultural (milieu) throughout the country, reaching the rural areas.

(b) Understanding the spatial distribution of the small-and medium-industrial activity within the country. For example, enterprises should be located according to the availability of raw material and labour.

(c) Training entrepreneurs to cultivate an entrepreneurial attitude to exploit opportunities, organize, implement and manage business and also understand the value of product quality, development and technology in industry.

(d) Outsmarting policies related to importation of consumer goods that can be produced in the country to improve the domestic market and develop marketing strategies to focus on locally manufactured products.

(e) Strengthening links between the financing institutions, R&D institutions and SMI. For e.g., consult R&D institutes when writing feasibility reports for industries and recommend consultancy services.

(f) Creation of social mobilization strategy for the methodology of participatory development (a process of self-reliance).

Priories for TCB, include: (1) Appropriate trained manpower with responsibility and accountability to the nation (2) Appropriateness of technology to meet the requirements of SMI and (3) Adequate flow of information within the country to meet the needs of industry. Sri Lanka, today, possesses a major advantage for TCB (within the national policy) because the activities geared to TCB are within the purview of one Ministry, namely, Ministry of Science, Technology and Human Resource Development.

TCB should be directed to (1) Building a pool of scientists and engineers to cater to SMIs within the country (2) Developing and upgrading human resources available within institutions dealing with SMI activities. For e.g. training programmes geared to the development of skills in technology transfer, introduction to technologies within the region, and the methods of management of R&D institutions (3) Promoting R&D for SMI, e.g. upgrading technologies, innovation of new technologies, selection of appropriate technologies, alternative raw materials etc. (4) Development of vocational training programmes, e.g. entrepreneurship skills, through the Human Resource Development Council, (5) Promotion of technological import and adaptation and assimilation (6) Access to low-cost technology with productivity (7) Build-up of pilot plant facilities for the demonstration of technologies (8) Locating available technologies within the country for the dissemination of information to SMI (9) initiating computerized data banks and access to international technologies.

NATIONAL POLICIES AND STRATEGIES FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

The task of technological capability-building under the purview of the Ministry of S&T and HRD, has identified two major constraints, at the national level, in implementing such a programme. These are (a) the severe dearth of research scientists, engineers and technicians in the country and (b) the extremely low inputs of funds, as low as 0.18 per cent of GNP (Table 12), for R&D at the national level. S&T needs to be strongly supported with state investment to that SMI becomes productive and competitive.

Table 12: Expenditure of Science and Technology expressed as a % of GNP

Country	% from Government Funding	% from Private Sector (industry)	Total funds available for R&D
Australia	0.86	0.69	1.55
Germany	0.79	1.79	2.58
Australia India	0.61	0.18	0.79
Indonesia	0.31	#	#
Japan	0.61	2.06	2.67
New Zealand	0.60	0.28	0.88
Singapore	0.41	0.49	0.90
South Korea	0.21	1.38	1.59
Taiwan	0.51	0.89	1.40
Thailand	0.19	#	#
United Kingdom	0.70	1.33	2.03
United States	0.68	2.04	2.72
Sri Lanka	0.18	0.00	0.18

not estimated

The Ministry of Science and Technology and Human Resource Development in support of development programmes of the government supporting SMI for poverty alleviation has adopted the following strategies for technology capability-building.

(a) Initiating strategies through the Human Resources Development Council to rectify the shortcomings of the lack of scientists, engineers and technicians. The industrial needs of the skilled workers need to be looked into and the use of the existing scientific personnel and resources should be optimized.

(b) Strengthening the existing scientific institutions to cater to industry, e.g. CISIR and NERD by R&D programmes of national interest with special reference to agro-based industries, and technology transfer programmes.

(c) Forming Inter-Ministerial Committees with the Ministry of Industrial Development, the Ministry of Agriculture Lands and Forestry and the Ministry of Livestock Development and Rural industries in order to identify and undertake R&D progammes of mutual interest.

(d) Transferring technology from developed countries as well as developing countries like India, China and South Korea. These technologies should be promoted to enhance local technological needs.

(e) Encouraging interaction between various research institutions through NARESA. This will permit a multi-disciplinary and inter-ministerial approach to the development of industries making optimal use of our resources.

The public sector-private sector interactions are well demonstrated by two government institutions, namely CISIR and NERD which play a major role to promote industrial growth.

The CISIR is the only national multi-disciplinary, industrial, R&D institution, which has been mandated by the Ministry of Science, Technology and Human Resource Development to (a) Conduct scientific and technological research, build-up a base of scientific knowledge and technological capability with a thrust in areas that will directly assist the SMI (b) Initiate new research projects and continue such projects that are deemed to have long-term prospects in the nations industrial development (c) Continue the policy of demand drive R&D and maintain it at a sustainable level without jeopardizing the need to maintain its level of scientific expertise and (d) Initiate and conduct R&D in special areas identified through inter-ministerial consultations, (Intermin Programme), recently initiated in relation to the work of all ministries.

As such the CISIR caters to industry in terms of carrying out routine testing services, contract research projects, technology transfer, training of personnel for industry as given in Table-13. The information services of CISIR are made available to all scientific and industrial communities.

Table 13: CISIR Statistics on Number of Scientific and Technical Services

No. Scientific and Technical Services	1991	1992	1993	1994	1995
Standard Services	2 256	2 897	2 981	2 718	3 213
Customized Services	149	74	—	552	507
Contract Projects	35	48	42	12	25
Consultancy	60	95	65	83	77
Technology transfer	05	10	08	05	09
Training	40	35	18	32	48
Total	2 545	3 159	3 114	3 402	3 779

More than 90 per cent of services undertaken have been for SMI industries.

High priority R&D projects undertaken by CISIR:

(a) Agro-food processing and post-harvest management

(b) Waste minimization and management in industry

(c) Investigations into upgrading the materials based industry

Other areas os services to industry:

Quality analysis and testing of Adhesives, Air & waste water, Metal and minerals, Building and materials, Herbal and cosmetics and Medicinal preparations, Rubber and Plastic related products, Paints, Engineering appliances, Fertilizers, Soil and pestisides, textiles, Paper produce etc.

- calibration, Design and fabrication
- Repair/Maintainace and Testing
- Information Services

For example, CISIR has undertaken to provide S&T inputs to the Southern Province Development Programme (Ruhuna) of the country. The main contribution will be in the export agriculture sector in which (a) value added products would be formulated from abundantly grown traditional crops, such as cinnamon, citronella, lemon grass, 'vetvar' etc. and (b) the extraction of essential oils, isolates, specialized phytochemicals and oleoresins of well known spices such as pepper, cloves, nutmeg, ginger, cardamom, will be used as intermediate food industry. The main contribution of this programme will be to impart skills and knowledge to the rural sector which will participate in the cultivation, and supply of raw materials and produce high-value and low-volume products.

The contributions of the National Engineering research and Development centre (NERD) to small-and medium-scale industry is directed towards (a) Industrial low-cost housing and construction techniques. For e.g. training programmes have been conducted for small-scale entrepreneurs on these techniques (b) Alternative fuels systems, e.g. rice husk/saw dust fuelled bakery ovens, dry batch bio-gas and organic fertilizer products and systems, digester for market garbage etc. (c) Construction of electronics appliances, e.g. energy saving fluorescent lamps, manufacturing of modern teaching aids using electrical and electronic circuits to be used in schools etc.

REGIONAL CO-OPERATION FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

Regional co-operation are saught in the areas of:

(a) Sharing of knowledge, and training on agro-based processing to be introduced at rural levels. Co-operation should be extended to the sharing of experiences and training and the selection of poverty targeted technology. For example, utilization of locally grown legumes have declined due to lack of processing technology limiting the protein-rich food availability in the country.

(b) To build up a regional data bank on appropriate technology process, inclusive processes, inclusive of pilot plant designs, to be transferred to SMI

RECOMMENDATIONS

The following recommendations could be made at the National Level.

(a) To build up the ability of local planners, scientists and development officers to recognize local needs, potentials and resources, indigenous technologies and the role of S&T in SMI development.

(b) To build up a critical mass of S&T personnel. Develop a policy framework for manpower planning, training and education to meet skill requirements identified by SMI industry, inclusive of providing conditions to attract and retain high calibre S&T manpower.

(c) Upgrade and strengthen existing R&D institutions both, in manpower (technical and management skills) and in physical requirements (pilot plant facilities), to carry out research on a long-term basis for SMI industry, funded by the government. Special emphasis should be placed on the training of manpower on the identification of technology, technology development and transfer of technology. The institutes should build capabilities to lead and direct the development of potential SMI activity in the country.

(d) To give adequate recognition to the spatial distribution of SMI industries with the objective of developing rural communities.

The following recommendations could be made at sub-regional and regional levels:

(a) Setting up specialized training centres and facilities of common concern, e.g. a training on methods of technology transfer processes, selection of appropriate technology for industry, and the management of R&D institutions etc.

(b) Development of technical support systems for SMI, e.g. standardization, quality control etc.

(c) To share resources in the establishment of technology data banks, technology forecasting and assessment.

(d) To increase capabilities of countries for technology gain by promoting joint adaptive research and by pooling the strengths of different R&D institutions in the region and exchange of experts among the developing countries.

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POVERTY ALLEVIATION THROUGH PEOPLE-BASED TELECOMMUNICATION

GRAMEEN TELECOM, A NEW TECHNOLOGY FOR THE POOR

INTRODUCTION

Almost 68 000 villages in Bangladesh, the home of 80 per cent of the country's 120 million people, are without telephones. As a result, a huge segment of the population incurs considerable expense (both in terms of money and time) just to send a message to suppliers, a buyer, or to a loved one. The villager's need to communicate has been traditionally neglected, though it is at least as serious as that of the city dwellers. Indeed villagers pay more for communication, as transportation to which one resorts to when one cannot call, is relatively worse, less easily available and more time consuming in villages than in cities.

This lack of communication facilities in the rural areas and the declining costs of building a network have led Grameen Bank to take an initiative to introduce cellular telephones in Bangladesh. Grameen's main activity is to provide small loans to the rural poor for income generating activities. Grameen is confident that it could also extend its lending programme to individuals who would purchase hand sets with this borrowed money and enter into the business of relating telephone services in their villages. The experience of Grameen Bank has shown that providing telecommunication services in the rural areas can open up tremendous possibilities of socio-economic growth minimizing the gap between rural and urban disparities. The main objective of the Grameen Bank is poverty alleviation through the introduction of improved technology for the generation of self-employment and building up of a nation-wide people-based telecommunication infrastructure.

Grameen Telecom a non-profit enterprise is one of the most recent initiatives of the Grameen Bank, which has been set up as a limited company under the Joint Stock Companies Registration Act of 1994, with the following objectives:

1. To promote and develop telecommunication and ancillary service in the rural areas for reducing poverty.

2. To undertake special credit, savings and investment programmes pertaining to the creation of telecommunication services, including cellular telephone and data network in Bangladesh for the benefit of the poor.

3. To promote and undertake programmes which will extend wireless and cellular telephone services to the poor at lower prices so as to enable them to resell telephone services to other customers on a commercial basis.

4. To devise a management technique which will enable the poor to have access to an effective telecommunication network nationally and internationally, and obtain information on product services, market prices. This will reduce the roles of middlemen who take advantage of the poor who do not have access to such information.

Why Grameen is Interested in People-based Communication?

The usefulness of a cost effective communication system goes to the heart of the original concept of Grameen. Grameen Bank divided a credit system asserting the true worth of labour, and reducing the role of middlemen, who were privileged in forms of credit and capital. Through this project, Grameen wished to take this concept further by enabling the poor to obtain information on products, services, markets, supplies, opportunities, and prices, reducing the role of the middlemen who are privileged in terms of information. However, Grameen Bank's interest in the project goes beyond this.

1. Grameen is fundamentally committed to the development of the rural areas of Bangladesh. The rural poor represent more than 50 per cent of the country's population and their economic progress is critical to the overall development of the country. Since an effective communication system can accelerate economic growth, Grameen feels that through this project, it could provide useful and necessary services to the country.

2. There is a huge unmet demand for telephones in Bangladesh. The waiting list of people wanting phones is larger than the number of phones in the country. There are only 251 000 telephone sets for a population of 120 million. Neighbouring India, with similar or slightly better economic conditions, has four and half times as many phones per 100 people. Furthermore, India, Pakistan and Sri Lanka are currently working on increasing their number of phones drammatically in their respective countries. The rural areas of Bangladesh, where Grameen is particularly focused, have almost no phones. There is no reason why the rural population should be denied access to modern telecommunication services.

3. Grameen Bank has devised a unique communal arrangement through which the rural poor can use cellular phones even though most villagers cannot individually afford one. Typically, a Grameen borrower will purchase a telephone handset, subscribe to rural telecom services offered by the organization and enter into the business of providing telephone services for the community.

4. Grameen is a grass-root organization possessing an adequate knowledge of the rural areas. It has the know-how for managing an organization that reaches out to distant villages. It has a philosophy of operation that appeals to its workers and the areas where it works. It has the proper vision for a true development in the rural areas. Grameen borrowers are disciplined entrepreneurs and constitute the most effective marketing force in providing phone services throughout the country. Grameen's vast network is a network of successful entrepreneurs who have adopted new ideas and succeeded. This impressive network consists of more than 1 057 branches, more than 10 000 workers and 2 million borrowers. The entrepreneurial nature of Grameen members qualify them to introduce a new technology to rural Bangladesh. This marketing force thus reduces the risk of the

enterprise, making it possible to attract foreign investors to the low-income market of rural Bangladesh.

5. Grameen borrowers themselves have created a good market for telephones. Many of these borrowers have progressed through increasing levels of sophistication in their business operations and would have significant use of telephones themselves.

6. Bangladesh has made a considerable economic progress in recent years. It is currently experiencing 5 per cent GNP growth rate with almost zero inflation. With additional economic growth, its 120 million people provide a good potential market for telephones even with very low penetration. Even if we assume a realistic telephone penetration rate of 1 set per 100 people (i.e. similar to other LDCs), Bangladesh has a potential market of 1.2 million telephone sets. As a result, it has become possible to attract quality companies to Bangladesh.

7. Advancement of telecommunications technology make it feasible for the rural poor in Bangladesh to have an access to cellular telephones. Grameen believes that digital technologies which are increasingly becoming cheaper are within the reach of the poor population. Grameen sees wireless telephones only as an instance of digital technology opening new vistas in a cost effective manner. Telephone customers no longer need to wait for each individual telephone set to be connected through cables, that need costly investments. Consequently, Grameen wishes to be involved in digital technology and cellular systems in general to develop internal know-how for future applications in related areas.

Beneficial Effects of the Project

Grameen Bank has decided to enter into the information and telecommunication businesses for two sets of reasons: First, the rural poor could derive several important benefits from a good communication infrastructure. The benefits are explained below. Second, through its initial research, Grameen has concluded that the telecommunication infrastructure it has envisioned is quite feasible. The ingredients that make Grameen's plan realistic are favourable technological trends, its organizational capacity, willingness of reputed telecommunication companies to develop services in partnership with Grameen, and the possibility of leasing a fibre-optic network from Bangladesh Railway.

Benefit 1: Income Opportunities

Grameen Bank feels that entrepreneurs in the rural areas can provide various services to the public by owning and operating one or more information and telecommunication devices. One simple example would be a Grameen borrower subscribing to a telephone and providing services to his/her neighbours. Other possibilities include purchasing a computer and entering into data entry services. In either case, Grameen Bank would consider providing loans, as it traditionally does, to purchase a telephone or a computer. Telecom would create an environment so that such businesses are economically viable for Grameen borrowers.

Benefit 2: More Social and Economic Equality

Grameen also believes that information and communication technologies will contribute to its primary social objective of eradicating poverty, uplifting the poor and reducing economic disparities. Grameen agrees with Sam Pitroda, when he wrote about his experience of introducing telephones in the remote villages of India, that, 'as a great social leveler, information technology ranks second only to death. It can raze cultural barriers, overwhelm economic inequalities, even compensate for intellectual disparities. In short, high technology can put unequal human beings on equal footing, and that makes the most potent democratization tool ever devised'.[1] In the same article, Pitroda wrote, '...information technology played an indispensable role in promoting openness, accessibility, accountability, connectivity, democracy, decentralization—all the 'soft' qualities so essential to effective social, economic, and political development.'

Benefit 3: Improved Infrastructure

Through its extensive work in rural Bangladesh, Grameen Bank is convinced that communication is vitally important for economic development since economic activities invariably involve communication. Even if a product needs only one person to produce, that one-person producer needs to communicate with suppliers and customers. Lack of communication facilities in rural Bangladesh has severely limited the scope of economic activities there. Grameen believes that a significant improvement in the telecommunication infrastructure in the villages will accelerate economic growth and, in turn, employ more people.

Benefit 4: Preparation for Information Age

Bangladesh has an enormous reservoir of unutilized human capital. This human capital could generate significant export earnings if employed in data entry, software development and other businesses related to information technology service. Many countries including countries with low per capita income such as India and VietNam are advancing rapidly in the use of information technology. Grameen believes that the poorest segment of our society could utilize these technologies for generating income and in the process, help the nation as a whole to compete with other nations in this age of information.

Concluding Remarks

The Grameen approach for poverty alleviation emphasize the creation of sound environment where every human being may have the right and opportunity to carve out a dignified way of living for herself/himself. Grameen views its loans as means to gain command over resources. With its effective use a poor person converts her/his latent skills in generating an income and creates self-employment without having to be constrained by the limitations of wage employment. Besides, self-chosen economic activities increase a sense of participation and strengthens the base of self-help. Professor Muhammad Yunus, founder Managing Director of Grameen Bank has said that 'creating favourable conditions for making a living through self-employment is a

[1] Sam Pitroda, 1993. Development, democracy, and village telephone, *Harvard Business Review*, November–December.

much more dignified way of solving unemployment than initiating a system of doles and welfare payments'.

In its effort to effectively alleviate poverty, Grameen Bank has ramified in different directions since its establishment as a separate Bank. In 1984, it introduced the housing loan programme for its poor borrowers for whom it was one of the very basic requirements for increasing productivity while struggling to break poverty shackles. To the poor people housing is not only a place to rest and recreate only, but a place of their work and the base from where they can plan for their future and gain confidence while combating the socio-economic odds around them.

Considering the important role of modern technology in increasing efficiency and creating more job opportunities, Grameen, in addition to Grameen Telecom, has created nine more associate organizations such as Grameen Agriculture, Grameen Health, Grameen Fisheries, Grameen Udyog, Grameen Energy, Grameen Communications, Grameen Shamogri, Grameen Trust, Grameen Fund to address the development issues from different sectors so that poverty is reduced faster and more effectively.

Grameen feels that the eradication of poverty through nastitutional efforts would be neither possible nor beneficial to anybody. Inter-exchange of ideas and information, transfer of new but adoptive technology, sharing of knowledge within the nations are vital elements to resolve our global problem of poverty.

Figure 1

BENEFITS

- Income Opportunities
- More Social & Economic Equality
- Improved Infrastructure
- Preparation for Information Age

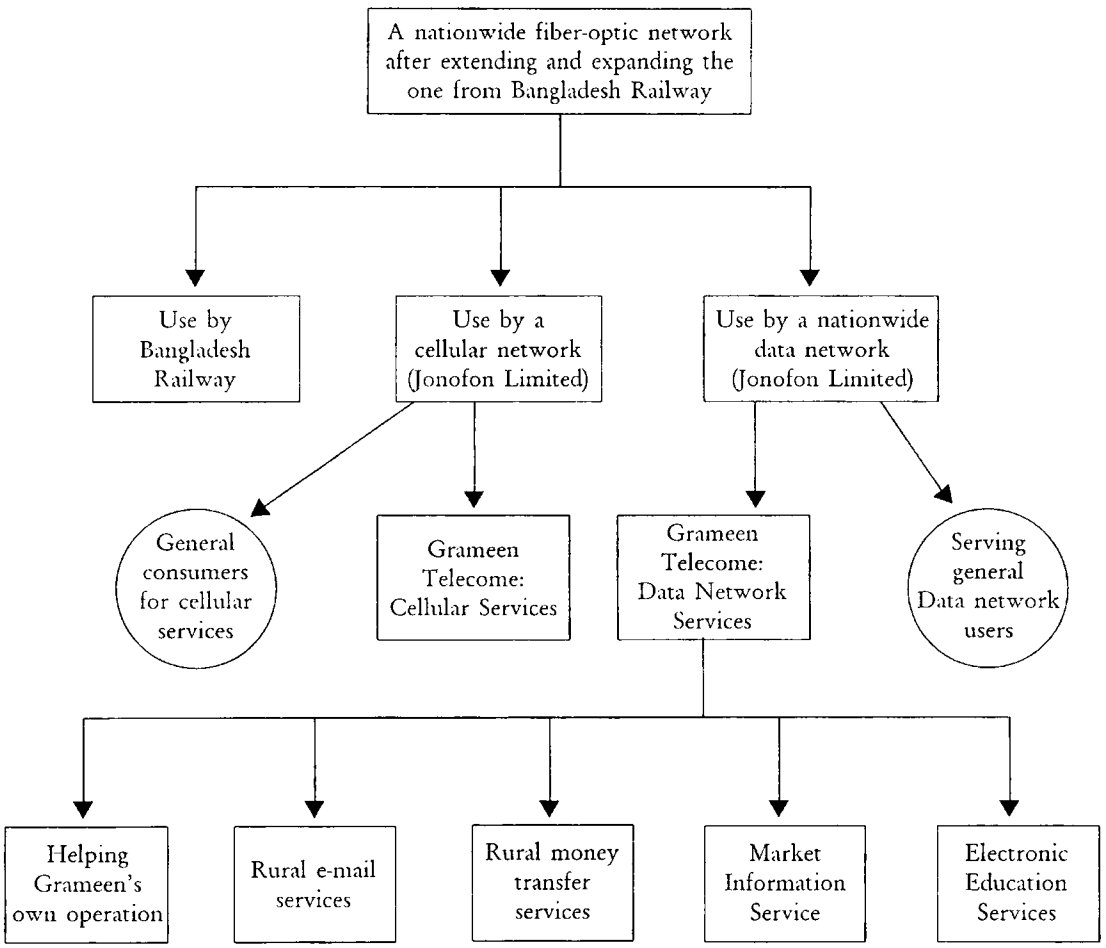
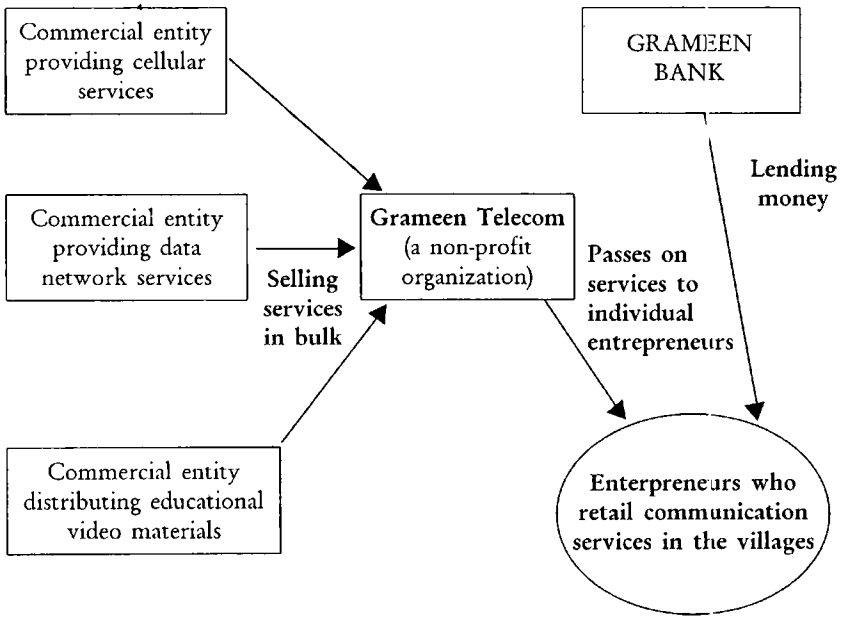


Figure 2

GRAMEEN TELECOM

- Communication Technology as a Means of Income Generating Tool
- Need for establishment of Grammen Telecom



POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING

COUNTRY PAPER, THAILAND

INTRODUCTION

It is recognized that 'poverty is a complex multidimensional problem with origins in both national and international domains'. It is caused by various factors and the significance of specific factors may vary among different countries. However, the most common factors are the burden of a huge nonproductive population (i.e. people, those who are ill and handicapped, children, old), and nonfertile natural resources. But these factors can be reduced effectively by building and using technologies for human and natural resources development.

If the poor of a country were left in isolation without productive and fulfilling employment, they would continue to go hungry, having limited income, resources, education, health care and nutrition. And then they would suffer, and cause other members of the society to suffer as well. Poverty creates many problems such as family breakdowns, drug abuse, crimes, etc. Poverty alleviation is therefore very important for economic and social development, and can be achieved by a sustainable development that yields economic growth together with social growth. A basic component for sustainable development is the technological capability of a country. Thailand, a developing country is now stepping in to be a Newly Industrialized Country (NIC) of the world, by solving her problem of poverty.

POVERTY ALLEVIATION PROCEDURES IN THAILAND

Conceptually, in Thailand, the procedures to alleviate poverty are being followed by setting up various programmes for national policy and plans to provide aids or assistance to the poor which can be divided in two kinds of aids for poverty alleviation.

Direct Aids to the Poor

These are to provide the poor with items of basic necessity. These basic needs include food, clothes, primary health care, housing, safe drinking water, basic education, nutrition programmes, basic security and well-being, debt relief, basic machinery and fertilizer for farming etc. The direct aids should be provided free of charge from the government and/or other non-government organizations including private donors.

Preventive Aids to the Poor

These are the aids provided indirectly to the poor but which prevent the number of the poor to increase and arrest the process of sliding back to poverty after getting direct aids. The

preventive aids include the development of transport, energy, and construction. It also includes micro or small dealers, small-scale manufacturing enterprises, the promotion of basic economies including all public utilities and infrastructure, and also the promotion of political stability including human rights development. The export of labour intensive goods would be very helpful in increasing employment and generating income. It would assist in reducing poverty, as such goods could be encouraged by an increasing market access as well as an enabling environment for small and medium scale enterprises. Development of technology as well as appropriate technology and the transferring of technologies to small enterprises are important and pivotal.

DIRECTION OF THAI POLICY SETTING SUBJECTED TO POVERTY ALLEVIATION

The present Thai government policy and plans concerning poverty alleviation in Thailand are generally subjected to the following trend of thought and direction, as well as the United Nation's guide lines. They are:

1. To place the people at the centre of a development programme and direct the county economics to meet human needs more effectively.

2. To promote the equitable distribution of income and provide greater access to resources through equity and equality of opportunity for all.

3. To improve the possibility of children and older persons to achieve a better life.

4. To recognize that the new information technologies and new approaches to the use of technologies by people living in poverty can fulfill their social and cultural aspirations, as equal partners. This will enable them to exercise their fundamental rights.

5. To ensure that people living in poverty have access to productive resources. These include credit, land, education, training, technology and information. It also includes access to public services, and participation in decision-making enabling them to benefit from an expanding employment and economic opportunities.

6. To develop policies to expand work opportunities and productivity in both rural and urban sectors by achieving economic growth, investing in human resources development, promoting technologies that generate productive employment, and encouraging self-employment, entrepreneurship, and small-and medium-sized enterprises.

7. To develop policies to ensure that workers and employers have the education, information and training needed to adapt to changing economic conditions, technologies and labour markets.

8. To facilitate the flow of international finance, technology and human skill towards the country for industrial investment for the creation of more job for the people.

9. To facilitate the flow of international finance, technology and human skill to the least developing countries in order to assist those countries to alleviate poverty.

THAI NATIONAL PLANS FOR POVERTY ALLEVIATION

The alleviation of poverty as a problem was first faced in Thailand during the various programmes of her Fifth National Economic and Social Development Plan (1982–6): 5th NESDP. Most programmes were directed to her rural areas, and targeted areas where most of the poor lived. In this connection the north, north-east, and southern regions received attention. The main objective was to improve people's capability to help themselves. Major development programmes were aimed at job creation, village activities, basic services, and the promotion of low-cost production. The targets were reached by means of appropriate technology and adapted technological input. In the 6th NESDP (1987–91), the aim of the development programme was to narrow the gap between the urban and rural growth with the consequent narrowing of income disparities between the rich and the poor. At present, in the last year of the 7th NESDP (1992–6), there are several programmes of development in progress for the abolition of poverty in the country. In this 7th NESDP, emphasis has been placed on industrial decentralization to generate employment and income for the rural poor. The coming 8th NESDP (1997–2002) will emphasize the human resource development, and environmental protection for sustainable economic development, and better life-style of the people.

THAILAND'S EXPERIENCE

There are many activities and projects for poverty alleviation in Thailand run by both the government and the non-government organizations (NGO). However, as far as the government is concerned, its general policy and plans are as follows:

1. Revitalization of the national economic activities, including those of dual economic sectors to deal with poverty alleviation. In practice, the 8th NESDP is being developed by prioritizing the human resource development, so as to provide better standard of living for all Thai rather than increasing the average economic growth at a high rate.

2. In 1997, the first year of the 8th NESDP, the government will allocate its budget about 129 134 Mil. Baht (Mil US $ 5071) for human resource development or 13.2 per cent of the total annual budget of 979 000 Mil. Baht (Mil. US $ 38 392), and also allocate 15.6 per cent of the total budget for subregional and provincial development. At the same time the allocation for urban Bangkok is only 2.8 per cent of the total budget.

3. Decentralization of industries is necessary to improve income and generate infrastructural distribution. It is recorded that in 1994, the registration of a total of 103 545 factories in Thailand were in the Bangkok area which was about 22 per cent, while 78 per cent were located in the regional area. Compared with the distribution of the year 1990, 52 per cent of the total factories were located in the Bangkok area.

4. In developing technology in the rural areas as a tool to generate the capability of the rural people in producing goods as well as improve their skill, the Ministry of Industry is running many specific projects, such as:

i Establishing handicraft centres in different subregional areas, and at the same time, launching a project to support the rural small and medium industries (SMIs). This is

expected to cost about 230 Mil. Baht, and also 20 Mil. Baht is needed for cottage industries.

ii Setting up regional industrial promotion centres handling various technical training and seminars yearly. The Ministry allocates 40 Mil. Baht for the Fund of Promoting Industrial Career for the rural people. Besides this, annual training programmes are set up for the farmers who want to learn the know-how of industrial production and handicraft. The 1997 budget for these programmes will be increased by 4 per cent that is about 57 Mil. Baht.

iii Assisting the existing small and medium factories in provincial areas throughout the country to improve their technology and management. The Ministry is running the Operating Fund for Small and Medium Industries of 150 Mil. Baht to improve their enterprises.

iv It has been decided to establish an institute for advanced manufacturing technology with a budget of 752 Mil. Baht for construction. Experts, instructors, machineries and equipments will come from the Government of Germany. It is expected that after the completion of the institute by the year 2003, about 440 persons will be trained every year.

5. The Thai government encourages the development of public and private enterprises, which transfer and adopt technologies for improving work environment, enhancing occupational safety and eliminating health risks. At present, the Ministry of Industry (MoI) has set up a technical committee on industrial environmental standards. At the same time, the MoI as also set up the Thai Standards series 9 000 which compare with the quality which go along with the ISO series 9 000. It is expected that about 35 factories will be certified by the 9 000 series Thai Standard per year, and some of the Thai National Standards of ISO series 14 000 will be ready to implement and be certified to Thai enterprises by 1997.

6. The Thai Government has put forward different programmes for increasing and upgrading skilled labour by allocating two important funds. First, the Labour Development Fund with the amount of 200 Mil. Bahts, and second, the Labour Assistance Fund of 100 Mil. Baht every year.

7. Thai Government assigned the Ministry of Science, Technology and Environment to set the National Technological Manpower Development Plan to increase and improve national science and technology personnel. At present, there are around 34 projects for training which will be conducted by the year 2009 with a total government budget of 1 167 Mil. Baht, and other donations of 426 Mil. Baht. The training projects consist of 14 projects for the training of education, seven projects for the training for jobs for 51 805 persons and the training for 1 529 researchers of 13 projects.

8. For the direct science and technological planning, management and development, the government allocates 14 176 Mil. Baht for the year 1997, which is an increase of 31.7 per cent from 1996.

9. The Ministry of Agriculture and Cooperatives, in increasing the access of small farmers to extension services and appropriate technology, will allocate about 5 000 Mil. Baht in the budget of 1997, to promote education, R&D on farming systems and small holder cultivation and animal husbandry techniques stressed in the resource-poor regions.

PROBLEMS AND RECOMMENDATIONS

Since the poor still exist, therefore poverty alleviation is the most important task facing the Thai government and the NGOs and also the private sectors. The following industrial problems need to be solved.

1. Development of a subcontracting network among the Major/Basic Industries (BI) and SMI to enlarge the domestic market size.

2. Improvement of quality and delivery for subcontractors in view of international competitiveness. In this case a public institution for servicing inspection to the SMI may be established.

3. Improvement of SMI production technology in order to reduce the number of rejected products. In this case, an appropriate programme may be set up for upgrading SMI from low to medium and high levels of technology.

4. To understand the need for better planning and policy-making of small, medium and large groups of industry.

POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING

COUNTRY PAPER, VIET NAM

INTRODUCTION

Viet Nam is in South East Asia with a total area of 331.688 square km and a population of 70 million. It is divided into 53 provinces, large cities and a special zone, all belonging to the Central Government.

From the geoeconomic point of view, Viet Nam has evidently 3 regions: North, Central and South.

North Viet Nam consists of provinces occupying the mountainous areas and the Red River Delta. Central Viet Nam, unlike other regions, has big potentials in forestry and fisheries including aquaculture. Agriculture in South Viet Nam enjoys favourable conditions. The Mekong Delta and a tropical climate make it the largest rice-producing region of the country. In comparison with other regions, South Viet Nam is somewhat more industrialized.

Viet Nam is undertaking far-reaching reforms in its economic management by shifting from a centrally planned economy to a market-oriented one with the State playing the important role of macro regulation. This process is bringing about a wide range of favourable opportunities but, at the same time, a lot of new challenges.

The market economy has led to economic growth. However it has also created a polarization of income in the society. A section of the population has become enriched while others have fallen into poverty.

Viet Nam is still a poor country. According to the UNDP report of 1994, Viet Nam's GDP per capita ranked 150th among 173 countries. Surveys carried out in the 53 provinces and major cities of the country showed that in general 20 per cent of its households were poor, with a calorie intake of less than 2 150 per day per person.

A number of observers have commented on the rising incidence of poverty, particularly in the rural areas, and warned against the danger of moving too far and too quickly in the direction of a free market. According to one estimate, rural unemployment is 5 million and urban unemployment 3.5 million (some 20 per cent of the labour force). At the Party's Fourth Plenum in January, 1993, the Secretary-General reported that the incidence of disease and illiteracy was rising. Rising prices and frozen salaries for teachers and health workers are threatening services.

As early as September 1945, when the Democratic Republic of Viet Nam was founded, President Ho Chi Minh described hunger and poverty as one of the enemies of the nation which must be 'destroyed'. Eradicating hunger and poverty will be one of the priorities of the government in the next five years under a national action plan.

Under the plan, the government will focus on efforts to help an estimated 600 000 families to come out of chronic hunger over the next three years, while reducing the number of poor families from the current level of 16 per cent to only 10 per cent of the population by the year 2000.

To achieve its goals, the government set out six measures designed to help reduce poverty and hunger, including the introduction of science and technology.

Indeed, poverty alleviaton cannot be achieved in the absence of sustained economic growth. Technology as the transformer, acts in two ways in contributing to economic growth. Firstly, technology can promote economic growth by expanding the utilization of resources which have practical application. Secondly, technology can increase material output through a more efficient and productive utilization of the same amount of resources.

The small-and medium-scale industries (SMIs) play a catalytic role in the equitable distribution of national income as well as in balanced regional development, because:

SMIs are the most labour-intensive, using the most labour for each unit of capital and promoting productive employment.

SMIs are most appropriate for developing countries, which have abundant labour but scarce capital, ensuring thus the most productive use of resources.

SMIs thus should be in a position to provide meaningful employment to the population.

The objectives of the government in this regard are:

To create an awareness of the role of SMIs in poverty alleviation.

To underline the importance of technological capacity-building for SMIs and the introduction and use of information technology.

This paper attempts to highlight certain aspects of SMIs which should be kept in mind.

Most SMIs are weak. They lack technology, skills, funds, information.

The country does not have a specific strategy or policy for the development of SMIs.

This paper comprises the five following parts:

1. SMIs and their impact on poverty alleviation.
2. Technological capabilities as a means of promoting the competitiveness of SMIs.
3. National policies for the promotion of technological capabilities of SMIs.

4. Regional cooperation for the promotion of technological capabilities of SMIs.

5. Recommendations.

1. SMIs AND THEIR IMPACT ON POVERTY ALLEVIATION

SMIs in Viet Nam are found in the public, collective and private sectors. They are basically of two kinds: the first are legally registered, including state enterprises, limited liability companies, joint-stock companies and private companies; the second includes organizations which come under various sub-laws.

Most of the SMIs are found operating in light industries, food processing, trading and services where the capital requirement is small and cycle short. The SMIs are also located mainly in urban areas like Hanoi and HCK City with a very small number in the rural areas.

In 1986, after the Sixth National Congress of the Communist Party of Viet Nam, the policy of development of a multi-sector economy, came into existence. Thanks to this policy, private sector could operate and develop. Until 1993, the whole country boasted of 4 212 private businesses. The break down is given below.

1 796 in industry

389 in construction

27 in agriculture

1 804 in material supply and trade

If compared with state-owned enterprises, private business are much smaller in size, fewer in terms of invested funds and disadvantageous in location. But they have an advantage in business management: the process of decision-making is simpler and faster.

For millions of people, employment is mainly a means of providing income and sustenance and its lack often results in poverty and hunger. There is thus a close association between poverty and employment. Solving unemployment is a major challenge facing Viet Nam, which has now about 7.5 million people who are either jobless or under-employed. The government has set a target of 1.3 million new jobs this year, and hopes to create 6.5 million new jobs by the year 2000.

During the first four years the fund contributed substantially to the development of handicrafts facilities and farming. An additional 52 000 works were attracted to livestock breeding and commercial tree planting, 13 600 to afforestation, almost 14 000 to fishery, and 26 400 to handicrafts and small industry facilities. These methods are seen as being responsible for shifting the rural labour structure toward improved economic efficiency.

The Hanoi Department of Labour, War Invalids and Social Affairs aims to create an extra 48 000 jobs for the capital city's workforce over the next five years, but it will still fall short of what will be needed.

An estimated 425 600 jobs will be needed in Hanoi by the year 2000. Nearly half of that number just over 200 000, are expected to be for people migrating into Hanoi from adjoining areas and provinces seeking work in the big city.

There are an estimated 85 000 people, mostly labourers, currently unemployed in Hanoi.

To help overcome its growing unemployment problem, Hanoi has received an annual loan of VND 45 billion (US $ 45 000) from the National Unemployment Fund. Much of that will be used for expanding support to SMIs.

Viet Nam is an agricultural country with 80 per cent of its population living in the rural areas. Developing agricultural economy is an important prerequisite for the strategy of economic development.

Rural industrialization and modernization involves more than simply bringing industry to rural areas. There are processes of transition of the rural economic structure reducing the production of agriculture in the economy, and increasing the proportion of services, handicraft, industry and tourism.

From now to the year 2000, the agricultural sector has many tasks. Agricultural production will make up 50 per cent of the rural economy, industrial production 25 per cent, and services 25 per cent. The economic programme will need to generate employment for 8 million people, doubling the income of farmers as compared with 1993.

By the year 2000, Viet Nam will annually produce 30–32 million tons of starch food, 1.8–2 million tons of live pork and cattle, 0.8–1 million tons of sugar, 220 000–240 000 tons of coffee beans, 70 000 tons of tea, 180 000–200 000 tons of rubber, 700 000 tons of aquatic products.

2. TECHNOLOGICAL CAPABILITIES AS A MEANS OF PROMOTING COMPETITIVENESS OF SMIs

Except for some limited liability companies and share-holder companies, most of the SMIs in Viet Nam use outdated equipment, some of which are more than 20 years old. Another characteristic of the SMIs in Viet Nam is that they employ predominantly unskilled labour, due mainly to an absence of people with managerial skills or adequate knowledge of the market economy.

Technological development can be defined as the acquisition and deepening of technological capabilities. Such capabilities can be grouped under three broad headings: investment, production and linkages. Of these, attention conventionally focuses on production-related capabilities, but the other two are also of importance to productive efficiency. Investment capabilities are skills needed to set up a new facility or expand an existing one. These cover a wide range, from feasibility studies, process design and purchase to project implementation and the commissioning of plants. Each of these skills is complex, and special training, experience and sometimes formal research and development (R&D), takes time, to develop. The possession of investment capabilities can offer significant benefits. Even a modicum of technology selection, negotiation, design and implementation skills can enable an enterprise to specify better the kind of technology

and its elements it should buy. It can lower the cost of technology package. It can lower the capital cost of projects, not just because local engineering skills are usually cheaper, but also because project execution is quicker. Local investment capabilities can enable better adaptation of process designs, greater use of local equipment and greater diffusion of technology within the country. More significantly, local participation in project engineering can give deeper understanding of the technology being implemented, allowing greater efficiency in its subsequent operation and improvement.

Production capabilities range from basic skills like quality control, layout, maintenance, inventory control and implementation of designs to equipment 'stretching', improvement and innovation. Some capabilities may be developed with a minimal base of formal skills. Others may require fairly high levels of schooling or training, considerable search for information within the firm (by experimentation) or outside (from journal, competitors, suppliers, buyers, research institute or academia). Institutional effort, and coordination and further investment in equipment, consultants or the purchase of technology are often extremely important.

Linkage capabilities are the specific skills needed to interact with its external environment. In technological terms, these skills involve the ability to locate efficient suppliers and strike up the coordination and information-exchange linkages. Modern management techniques call for high levels of linkage capabilities.

Among the effective means of upgrading SMIs for their effective contribution to poverty alleviation is the introduction of information technology, which is playing an increasingly important role in the organization, management and operations of a firm. Information technology applications pervade all aspects of business operations including the purchasing of parts, materials and components. Product design, production, maintenance, quality control, marketing, administration etc. are also dependent on information. The successful introduction and use of information technology is the gateway to upgrade management and facilitate increased productivity, profits and quality. In order to compete in the international market, all industries have to adopt information technology.

3. NATIONAL POLICIES FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

State policies have affected the development of SMIs in the country. While a legal framework for their functioning is more or less in place, more needs to be done to help this form of business to develop.

One area that needs attention is the access of SMIs to credit and investment. Despite the abolition of the differentiation in interest rates on loans, SMIs find it difficult to avail of credit facilities. The lack of mortgageable assets and complicated procedures are the main drawbacks. This forces the enterprises to turn to unofficial lines of credit at very high interest rates, hiding the smooth conduct of business.

Land has emerged as another major problem for the SMIs. Soaring prices means that they cannot buy or even hire land at reasonable rates, reducing the firms's cost efficiency.

Although it is not difficult to work out a tax policy for SMIs, it is necessary to clearly define the kinds of taxes to be levied and to eliminate existing vagueness and negative aspects in the taxation system.

The transfer of technology and training are the two vital factors which have undermined the development of SMIs and need to be addressed by the government soon.

Viet Nam's labour and social welfare policies have also not been able to provide the much needed equality among the various kinds of businesses. SMIs, especially those in the private sector, have no capacity to provide their employees with insurance and other social benefits. Therefore, people feel insecure about working for such firms.

Viet Nam does not have a specific strategy and policy for the development of SMIs. The most obvious evidence is the lack of a clear concept and definition of 'small and medium enterprises' in the country. Most policies regarding the promotion of these enterprises come under a broader spectrum, similar to the ones used in the promotion of non-state enterprises and domestic investment.

Therefore, it is difficult to evaluate the policy affecting the SMIs in Viet Nam. However there are concrete policies implemented by provincial or branch level authorities. For instance, the State Bank of Viet Nam has its own credit programme for the SMIs; Ha Bac province has a credit insurance centre for SMIs; and the Central Institute of Economic Management Studies is implementing the national project VIE 86/045 for the training of SMIs. At the central level, there are three centres for SMIs.

In order to promote the development of SMIs in Vietnam, it is essential that the policy environment be improved and appropriate legal support be created along with a clear definition of their constitution.

As remarked earlier, more avenues for credit need to be opened for SMIs to enable them to renew their technology and enhance their competitiveness in the domestic and international markets.

Personnel training, both in management and skills, is very important. There should be long-term comprehensive training programmes which could incorporate international assistance. Entrepreneurs should be sent on study tours abroad to gain from the experiences of their foreign colleagues, especially in management.

5. REGIONAL COOPERATION FOR THE PROMOTION OF TECHNOLOGICAL CAPABILITIES OF SMIs

National effort in assisting SMIs should be complemented through regional cooperation in the transfer of environmentally sound and poverty alleviation target technology, the provision of information, sharing experiences, training, etc.

An area where cooperation could be most effective is information transfer, which is as essential today as it was in the past. The need for regional cooperation in the field of information is justified by the fact that

Self-sufficiency in scientific and technological information cannot be achieved in a country.

The development of modern information technology requires common rules and standards. This is a highly complex issue.

The increase of the volume of information has to be processed and combined with the increasing costs of manpower.

The scope of regional cooperation in the information field covers a range of issues such as the cooperation of commercial information systems, and informal international cooperation. Cooperation of commercial information based on the latest information technology, becomes very dynamic. It consists essentially of on-line access to databases. In addition to the formal frameworks for international cooperation, another important mode of communication is informal international cooperation. It has been developed chiefly among scientists, but is also observed among engineers and technicians. Informal technical visits, exhibitions, and direct contacts constitute a very valuable source of information and inspiration, highly required and appreciated by the users. In most cases these contacts are placed higher in the hierarchy of users' needs than other sources of information.

The rapid development of the knowledge-based industry, where information, combined with new technology, such as electronics, computers and telecommunications constitute an essential component, create new requirements, and expand the information market substantially.

The databases will be quite exclusively built on market-based requirements and therefore will be more user-oriented and easy to use and understand. The information services will simplify entry into their systems in order to appeal to a broad business and consumer market.

The present development of the new potentialities for electronic networking and exchange of various combinations, such as alpha-numeric, pictorial, graphic, single or multimedia information resources via internet, requires an appropriate framework for cooperation.

6. RECOMMENDATIONS

Calling upon the larger companies to catalyse the technological building in SMIs.

Building up local expertise in the identification of technology and its promotion, assessment of technology and project preparation/implementation.

Request the government to

Offer incentives to encourage SMIs to build up technological capabilities e.g. 'soft' loans, technical advice etc.

Formulate a policy and strategy for technological capability-building of SMIs. Consider the introduction and use of information technology for their upgrading, management and facilitating productivity, profits and quality.

Simplify the existing complicated procedures for project preparation and fund disbursement appropriate for SMIs.

Offer incentives to youth to work in rural areas. Every year the state has to spend large amounts of money on professional training and education for people, but many after graduating are not able to find a job while the state does not have a policy for them to go to the countryside to work. Farmers find it difficult to pay for their children to study in big cities. Yet when they do, most of the rural children do not return home to work.

The rural industry needs strategic steps for development. The fundamental tasks are providing and assisting agricultural development, and changing the nature of the two major resources of labour and land.

Domestic investment law policy needs to be implemented. This will encourage the economic sectors in rural areas to develop, which in turn will develop the productive forces.

Request the implementing agencies to

Simplify existing complicated forms and produces for project preparation and expedite fund disbursement process;

Provide support to build local capacity by training local consultant/entrepreneur through 'training of trainers' workshops;

Disseminate the information on technology and a package on the criteria, and format for project preparation for SMIs.

Disseminate success stories and technology and policy related case-studies in the SMIs sector for wide dissemination.

REPORT OF THE SEMINAR ON POVERTY ALLEVIATION THROUGH TECHNOLOGICAL CAPACITY-BUILDING

(Beijing, 17–21 June 1996)

ORGANIZATION OF THE SEMINAR

1. The Seminar on Poverty Alleviation through Technological Capacity Building was held at Beijing from 16 to 21 June 1996. It was jointly organized by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and the State Science and Technology Commission of China (SSTC) with the support of the Office of Poverty Alleviation though Science and Technology (OPAST).

2. The overall objective of the seminar was to facilitate cooperation among the countries in Asia and the Pacific with a view to promoting poverty alleviation through technological capacity-building, particularly of SMIs and enhancing partnership in technology transfer.

3. The seminar was attended by participants and experts from 10 countries, namely Bangladesh, China, India, Lao People's Democratic Republic, Nepal, the Philippines, Pakistan, Sri Lanka, Thailand and Viet Nam.

4. The Seminar was opened by Mr Han Deqian, Vice President (SSTC). In his inaugural address, he welcomed all the participants from the region and the representatives from various organizations in China. He expressed confidence that by seeking meaningful exchanges and effective actions in helping the poor through science and technology, the seminar would enhance technology transfer and cooperation among the countries in the region in the field of poverty alleviation through technological capacity-building and that would contribute to the success of the world's anti-poverty campaign.

5. He pointed out that great achievements have been made since governmental programmes on poverty alleviation through technological capacity-building started in China in 1986. This approach had proved to be one of the most effective ways of poverty alleviation and rural development. He stressed that the period from now to the end of the century was most critical for the eradication of absolute poverty in the country. China planned to carry out more extensive technological exchanges and cooperative activities with all countries in the region, international organizations and people's groups.

6. In his message delivered by the Director, the ESCAP Industry and Technology Division, the Executive Secretary of ESCAP expressed his appreciation for the generous financial support provided by the government of China and to all the officials of the State Science and Technology Commission of China, whose wholehearted cooperation had been highly instrumental in organizing the seminar.

7. He pointed out that while the causes and correlates of poverty were numerous and many of them were interrelated, the introduction of science and technology for the purpose of employment creation and income generation of the low-income population was an essential element of a holistic approach to poverty alleviation. This was particularly true for the rural areas where the basic needs of the people who live in those areas need to be addressed.

8. He also pointed out that along with the cases of successful experiences of the use of science and technology for poverty alleviation, there were examples of less successful applications which illustrated the complexity of the process and the consequences of a lack of experience. The current process of industrial restructuring and levels of technological development even in the most advanced developing countries in the region had often resulted in spacially uneven economic growth and widened the disparity in income distribution at the national level despite the impressive overall economic success achieved in the past decades. This condition illustrated the negative impact of shortcomings in human resources and infrastructural development, the shortage of financial resources, and inadequate participation and coordination of activities of the private and public sectors, nongovernmental organizations, communities and regional and international organizations. Therefore, he stressed that although there was no unique formula that would be sought since every country and situation had its own specific requirements and socio-economic, cultural and political circumstances, the successful application of science and technology and technological capacity-building for poverty alleviation required a comprehensive package of policy measures ranging from improving education and financial incentives to the provision of extension services and the setting up of a technical service centre. The participation of all stakeholders, including the private and public sectors, NGOs, local authorities and the general public in its process was vital for technology development, transfer, adaptation, adoption and dissemination. The Executive Secretary expressed his strong belief that the participants would bring together their collective wisdom to suggest measures aimed at poverty alleviation through more equitable industrial and technological development activities attuned to the need of all groups of population and contribute valuable insights into cooperative endeavours in the region which would complement national efforts in poverty alleviation.

9. The seminar consisted of six sessions. The sessions were respectively chaired by Mr Xie Shaoming, Consultant of SSTC; Mr J. F. Elliott, Dirctor, ESCAP; Mr Chamroom Malaigrong, Director, Policy Planning Division, Office of Industrial Economics, Ministry of Industry, Thailand; Mr Bimal P. Koirala, Joint Secretary, Ministry of Industry, Nepal; Mr Ma Yanmin, Deputy Director of office of Poverty Alleviation with S & T, China; and Mr G. M. Fedorov, Economic Affairs Officer, ESCAP. A study tour was also organized to an apple orchard and a tool factory in the countryside near Beijing.

SUMMARY OF CONSIDERATION OF ISSUES

10. The seminar observed from the experiences of the participating countries that the introduction of science and technology activities and programmes for technological capacity-building could play an important role in poverty alleviation contributing to income and employment creation of the poor segments of the population. It would also contribute to the better utilization of resources and improved living standards. There were many successful experiences in the introduction of science and technology and technological capacity-building for the development of agriculture, forestry, service sector and SMEs, particularly those in rural

areas which led to poverty alleviation in the participating countries. The seminar also noted that new technology, such as information technology and biotechnology were used increasingly for poverty alleviation some in participating countries.

11. The seminar realized that technological capacity-building is only one, although a very important element of a wider holistic approach to poverty alleviation which required a comprehensive package of policy and other relevant support measures ranging from improving the infrastructure (including education, transport, communications, financial incentives), to the provision of extension services, and incentives and awards for scientific and technological efforts etc.

12. The seminar was of the view that small industries were most closely linked to poverty alleviation since they had proved to provide meaningful livelihood and employment for the poor both in rural and urban areas. With the introduction of an open and deregulated economic environment many of them had become vulnerable to competition with more modern, local and foreign firms. Because of the low productivity and quality of production, as well as access to information , such industries could be confronted with limited marketing opportunities, producing mainly for the poorer segments of the local population. It was generally agreed that small enterprises were more successful in industrial production and marketing when they had access to various technology support services. These are, disseminating technological information, research and development, education and training, quality control, marketing support and providing credit and finance for technology introduction and technological capacity-building.

13. There was a general consensus that small industry whose objectives were aimed at poverty alleviation didn't actually present a significant threat to the environment provided that there were appropriate national laws and regulations for environmental protection and a reliable system for their enforcement. Some countries provided incentives for small industries in order to encourage them to use environmentally friendly technology.

14. The seminar observed that the national institutions which were particularly successful in poverty alleviation had a vast network involving scientific and technological organizations, the private sector, NGOs, local organizations, training units, technology extension units, etc. Such a network appeared to be very effective in assisting small industries in technology selection and introduction, obtaining credits and financial services, production and marketing. However, while supportive networks had been set up, many participating countries did not have sufficient financial and technical assistance. There was also a lack of coordination among local and central authorities, financial institutions, different ministries, the private sector and the NGOs which may have slowed the development of small industries and their technological capacity-building.

15. The seminar felt that the choice of technology for the introduction of poverty alleviation should take into account the local natural, human and financial resources endowments, market, environment protection, cultural features, etc. There were successful cases of the development and introduction of such technologies in the participating countries. The participation of the scientific community in this process was especially instrumental. In some countries, measures such as incentives and awards had been adopted to encourage scientists to participate in the process of the selection, development, introduction and use of technologies. However, some

countries lacked capacities, experiences and resources for proper selection of technologies. Furthermore, there was a wide-spread lack of coordination of the activities of different institutions in this regard.

16. The seminar noted that poverty was heavily concentrated in the rural areas. Therefore, the governments in the participating countries had formulated and implemented various policies, measures and programmes to achieve more spatially balanced industrial growth at the national level. Although their policies and programmes were useful for promoting more economic development, the results were not always satisfactory because of the lack of financial resources, infrastructure, education, training, communication, water and energy supply in the rural areas. It appeared that the involvement of all stakeholders, local and scientific communities and NGOs was vital for the successful implementation of programmes and policies. There were some cases of dispersion of industry from urban to rural areas. The subcontracting between small industries in rural areas and big industries resulted in the transfer of technology and building technological capacities in rural areas. They were stimulated by a combination of governmental incentives, cheap labour in rural areas and the setting up of special economic zones with developed infrastructure.

17. The seminar discussed different educational and training programmes in the participating countries aimed at developing skills and entrepreneurship capacities of the poor particularly women entrepreneurs and workers. It noted that although significant results were achieved in many cases the lack of skills, technological and entrepreneurial culture were serious obstacles for the introduction of science and technology for poverty alleviation. Women, particularly, had little access to education, training and technology resulting in little access to employment opportunities. In many countries, NGO, and the private sector contribute substantially to education and training of the poor.

RECOMMENDATIONS AT THE NATIONAL LEVEL

18. The seminar emphasized that governmental programmes to promote technological capacities for poverty alleviation required a high commitment and precise targeting of the groups to be assisted. Such programmes needed to be developed and implemented through coordination among the various concerned regions of the country, departments and agencies, in close interaction and cooperation with technology developers, disseminating agencies and extension services, the private sector and the local and scientific communities. National policy-makers should make an effort to study the experiences of other countries, and design appropriate programmes suitable for their respective local contexts.

19. The seminar was of the view that the creation of a national policy framework and technology culture conducive to scientific and technological development especially for the introduction of science and technology for poverty alleviation should receive a high priority. This could include the provision of sufficient budgetary and human resources for setting up of scientific and technological networks and programmes for poverty alleviation. Specific measures would be required to develop and strengthen the rural infrastructure and financial and institutional support frameworks for starting small-scale industries or making the existing small industries more competitive.

20. The seminar stressed that the building up of technological capacities for poverty alleviation similarly required special measures for education and training. It was necessary to upgrade the technical skills of girls and women to enhance their entry into technologically more advanced activities.

21. The seminar stressed the vital importance of the establishment or strengthening of the national networks of supportive institutions in order to assist small-scale industries and agricultural activities in obtaining the required finance and technology, human resources development, production and marketing. The participation of all stakeholders, including the governmental organizations, NGOs, the private sector, local and scientific communities was necessary for the successful functioning of such a network.

22. The seminar felt that the involvement of commercial and development banks for the financing of small-scale activities was highly desirable and could be promoted through the establishment of a wide network of branches in the rural areas. This would be particularly useful for the poor and potential entrepreneurs. The availability of extension services of public research and development institutions, NGOs and private organization were important. Facilities for consultancy services for standardization, quality control and engineering were required for technological upgradation of small industries.

23. The seminar stressed that the access to information had become an important factor in poverty alleviation programmes. Efforts should be made to introduce information technology, especially in the rural areas for improved communication.

24. The seminar felt that the selection of technology for poverty alleviation programmes should take into account a wide range of local factors and market situations. The participation of the scientific community in this process could be essential and should be encouraged by different incentives and rewards.

25. The seminar pointed out that technological capacity-building for poverty alleviation was only one part of an integrated approach to poverty alleviation. The introduction of science and technology into such programmes should take place simultaneously with the development of physical and social infrastructure, including transport, communication, energy water supply, education and health systems. Special efforts should be made to ensure that in the interest of sustainable development economic development should not result in environmental degradation.

Regional Cooperation

26. Although the main responsibilities for poverty alleviation rests with the countries themselves, their efforts in this regard could be complemented and facilitated through regional cooperation. Therefore, the seminar recommended the following modalities for regional cooperation:

> Exchange of information, experience, technology and expertise concerning technological capacity-building in rural agricultural and industrial sectors should be promoted on a priority basis. The exchange may be through conferences, seminars, workshops, study tours, industrial and technical exhibitions and fairs, information technology channels, technological demonstrations, the circulation of published material etc. Focal points may be designated in each country to undertake the above activities.

Jointly sponsored regional programmes for technological know-how and training for the poor. Formal technological schools, full-time training and on-the-job training, as well as training of technological and managerial personnel responsible for the development and introduction of technology for poverty alleviation were seen as being important. Vocational education is essential to those who cannot enter junior middle school and college to learn one skill or another. Television and correspondence school programmes are also of vital importance for technological training.

Programmes for enterprise-to-enterprise or academic-to-enterprise partnership for the provision of technological assistance were necessary. Such partnerships could accelerate technology transfer and rapid technology innovation and progress. They could also provide practical academic technological results to the enterprises. Such cooperation may be multisectoral, inter-regional and intra-regional.

Investment-related transfer of technology activities were important. The government, private sector, donor agency, academic and R&D (Research and Development) institutions which have technology and capital advantages together with labour and land resource advantages should jointly design and implement programmes to develop the capabilities of the disadvantaged groups.

Area-specific studies and technological consultations were required. Area-specific studies could give specific diagnoses and treatment prescriptions for the observed technical problems. Technological consultation in this context may be the most effective way of transmitting knowledge.

27. The implementation of programmes for poverty alleviation through technological capacity-building demands concerted and united national and international action and additional resource inputs were important. Therefore, international organizations, particularly UNIDO, ESCAP, UNDP, FAO, UNFPA, UNICEF, UNESCO and ILO etc. and financial institutions such as ADB, World Bank etc., are requested to participate in and provide funds for the implementation of the following activities:

Pilot projects were designed and implemented in some selected areas to facilitate the building of partnership between the local government, NGOs and community-based organizations for technological innovation and application.

A number of technical training centres may be jointly set up, or existing ones upgraded, at the national or local level with ESCAP assistance to provide special programmes and training to promote technological capability-building for poverty alleviation.

Regional or subregional 'poverty alleviation through technological capacity-building' forums may be proposed to meet biennially to formulate and review the progress of the implementation of an action plan. The venues may be decided upon in consultation with member governments. Participation will be open to various governmental and non-governmental organizations and institutions.

Periodicals, newsletters and publications on the subject of poverty alleviation through technological capacity-building may be prepared by the Secretariat of ESCAP and other organizations and circulated among the member countries to promote the exchange of information, experience and technology on poverty alleviation issues.

Rural technology development and extension centres or rural technology parks may be set up at different levels. The centres or parks would be regarded as the growth points of technologies. These will become special zones with strong scientific and technological development ability and demonstration functions.

Build up a technical cooperation trust fund and technical development fund to support the introduction of technology. A bonus fund to award the scientific and technical personnel who directly engage in the poverty alleviation work in poor areas for a long time may also be established. The Government and other donors may be invited to contribute to the fund. A feasibility study should be undertaken within the auspices of ESCAP secretariat to determine the possibility of setting up the fund.

Technical capacity-building for disadvantaged groups (for example, disabled persons etc. and women) should be given special attention. Programmes have to be designed among and between countries to meet their special needs so as to enhance their technical levels and self-help ability.

Technical assistance in cooperation with the Technical Consultancy Development Programme for Asia and the Pacific (TCDPAP) to be provided to the national government to establish consultancy service for SMEs in technology acquisition and application.

28. In addition, relevant regional and international institutions could be involved in assisting regional countries in poverty alleviation through technological capacity-building. In particular, the Asian and Pacific Centre for Transfer of Technology (APCTT) and the Regional Network for Agricultural Machinery (RNAM) could undertake the following activities:

A sample survey on technologies available for use by SMEs for various industrial, agro-industrial and service sectors may be conducted in a number of countries in the ESCAP region. Based on the results of the survey, an action plan may be prepared to provide advisory services in this area.

Technology exhibitions, fairs and demonstrations may be held annually in different countries to promote technology transfer and cooperation between and among the various countries in the ESCAP region.

29. Similarly, relevant regional and international institutions such as the Regional Coordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT) should also design and implement programmes of poverty alleviation through technological capacity-building in its areas of expertise to assist various countries in the ESCAP region.

30. Environment and sustainable development issues should feature significantly in regional programmes designed and implemented for poverty alleviation through technological capability -building. Regional cooperation in the transfer of environmentally sound technologies for poverty alleviation played a significant role in this context.

ADOPTION OF THE REPORT

31. The participants considered and adopted the report of the Seminar on 20 June 1996.

ANNEXURE-I: LIST OF PARTICIPANTS/COUNTRY REPRESENTATIVES

Bangladesh

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Grameen Bank
Dhaka

China

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Mr Shi Jicheng
Former Minister Counselor and
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Mt Kieu Nhu
Technology Transfer Expert
National Center for Scientific and Technological
Information and Documentation (NACESTID)
Hanoi

ESCAP Scretariat

Mr J. F. Elliott
Director,
Industry and Technology Division

Mr G. M. Fedorov
Economic Affair Officer

ANNEXURE-II: SCHEDULE

Monday, 17 June

8.30–09.30	Registration of participants
9.30–17.35	Finalization of the country reports

Tuesday, 18 June

Session I—Chairperson: Mr Xie Shaoming, Consultant of SSTC

09.10–09.25	Inaugural address by Mr Han Dequian, Vice President of SSTC
09.25–09.50	Message from Mr Adrianus Mooy, Executive Secretary, ESCAP
09.50–10.10	Coffee break
10.10–10.50	Main Report on Poverty Alleviation through Technological Capacity Building by Mr Ma Yanmin, Deputy Director, Office of Poverty Alleviation with S&T, SSTC
10.50–11.35	Poverty Alleviation through People-based Telecommunication by Mr Ashraful H. Chowdhury, Project Manager, Grameer Telecom, Grameen Bank, Bangladesh
12.00–14.00	Lunch

Session II—Chairperson: Dr J. F. Elliott, Director, Industry and Technology Division, ESCAP

14.00–15.00	Turning Forestry by Scientific Input into a Pillar Industry in Poverty Alleviation of Mountainous Regions by Professor Hong Jusheng, Vice President, Chinese Academy of Forestry
15.00–16.00	India Country Report by Mr R. K. Bhargava, Chief Executive Officer, Khadi and Village Industries Commission, Ministry of Industry, Government of India
16.00–16.15	Coffee break
16.15–16.50	Experience of Anhui Province in Poverty Alleviation by Mr Wang Jing, Division Chief, SSTC, Anhui Branch
16.50–17.35	Lao PDR's Country Report by Mr Somboon Khantivong, Head of Human Resources Development and Population Division, Department of Planning, Lao PDR

Wednesday, 19 June

Section III—Chairperson: Mr Chamroon Malaigrong, Director, Policy Planning Division, Office of Industrial Economics, Ministry of Industry, Thailand

08.30–09.15	The Effectiveness of Technology Towards Poverty Alleviation: An evaluation of Policy Gaps for the Promotion of Micro-enterprises and Informal Sector in Nepal by Mr Bimal P. Koirala, Joint, Secretary, Ministry of Industry, Nepal
09.15–10.00	The Philippines Government's Efforts in Poverty Alleviation through Technological Capacity Building: the Role of a Financial Institution by Mr Harold J. Documos, Vice President, Farmers Livelihood Assistance Group, Land Bank of the Philippines
10.00–10.15	Coffee Break

10.15–10.50	Programme of Poverty Alleviation with Science and Technology by Mr Cao Wendao, Division Chief, Office of Poverty Alleviation with S&T, SSTC
10.50–11.35	Pakistan Country Report by Mr Muhammad Yousuf, Deputy Technical Adviser, Ministry of Science and Technology, Pakistan
12.00–14.00	Lunch

Section IV—Chairperson: Mr Bimal P. Koirala, Joint Secretary, Ministry of Industry, Nepal

14.00–14.35	Poverty Alleviation through Electronic Information Technology by Mr Shu Yai, Senior Correspondent, Economic Daily, Director of China Economic Information Managing
14.35–15.15	Sri Lanka Country Report by Dr M. J. Goonaratne, Senior Research Officer, Ceylon Institute of Scientific and Industrial Research, Sri Lanka
15.15–15.50	Poverty Alleviation through Personnel Training by Ms Sun Guoxia, Division Chief, Division of Training, the National Training Center for Poor Areas, China
15.50–16.05	Coffee break
16.05–16.50	Thailand Country Report by Mr Chamroon Malaigrong, Director, Policy Planning Division; Officer of Industrial Economics, Ministry of Industry, Thailand
16.50–17.35	Introducing Technology, Developing Intelligence and Expanding Pillar Properties to Accelerate Poverty Alleviation and Achieving Wealth by Mr Liang Changjian, Research Scientist, Agriculture Department of Henan Province, China

Thursday, 20 June

Session V—Chairperson: Mr Ma Yanmin, Deputy Director, Office of Poverty Alleviation with S&T, SSTC

08.30–09.15	Viet Nam Country Report by Mr Kieu Gia Nhu, Technology Transfer Expert, National Center for Scientific and Technological Information and Documentation, Viet Nam
09.15–09.55	Technology, Sustainable Development and Poverty Alleviation-A Case Study of Aiding the Poor with Science and Technology in Luotian county, Hubei Province, Dabie Mountains, by Mr Tian Zhikang, Engineer, Hubei Provincial Science and Technology Commission, China
09.55–10.10	Coffee break
10.10–10.45	Development of Science and Technology for Relief from Poverty by Mr Li Houxi, Shaanxi Provincial Science and Technology Commission, SSTC
10.45–11.20	Depending on S&T Advance, Quickening Poverty Relief Pace by Mr Zeng Daping, Jiangxi Prefectural Office for Helping the Poor by S&T, Jain Prefecture, Jianxi Province, China
12.00–14.00	Lunch

Session VI—Chairperson: Dr G. M. Fedorov. Economic Affairs Officer, ESCAP

14.00–17.00	Discussions of Follow-up Actions and Future Cooperation, Adoption of the Report
17.00–17.30	Closing Ceremony

	Closing Address by Dr J. F. Elliott, Director, Industry and Technology Division, ESCAP
	Closing Address by Mr Xie Shaming, Consultant, SSTC
Friday, 21 June	Field visits to apple orchard and tool factory
Saturday, 22 June	Departure of participants